Sustainable MED Cities

Integrated tools and methodologies for sustainable Mediterranean cities

D5.2.2Testing phase

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Name of Author (S)	Organisation
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V02	31/01/2024	Project partner internal review	Partners
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Executive Summary

As part of the Sustainable Med Cities project, each municipality partner in the project chooses a pilot urban area with a public building or buildings (residences, schools, offices, etc.) to test the results developed in WP 3 and WP4 in the goal of defining a concept and a strategic plan to optimize the sustainability of buildings and neighborhoods.

Introduction

Purpose of the document

The objective of this report is to describe the test phases carried out by the partner municipalities on a district or a building using an evaluation system SCTool MED, SNTool MED and SBTool which are developed in WP3 and WP4 and which make it possible to measure the sustainability of Mediterranean cities.

The SCTool MED, SNTool MED and SBTool, developed as part of the international Green Building Challenge research process launched in 1998, will be contextualized and adapted to contexts reflecting the local priorities and particularities of the pilot cities and to any Mediterranean city.

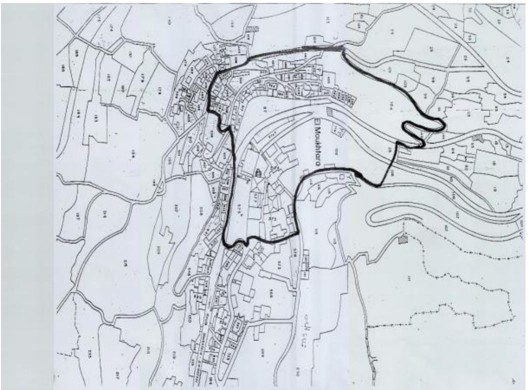
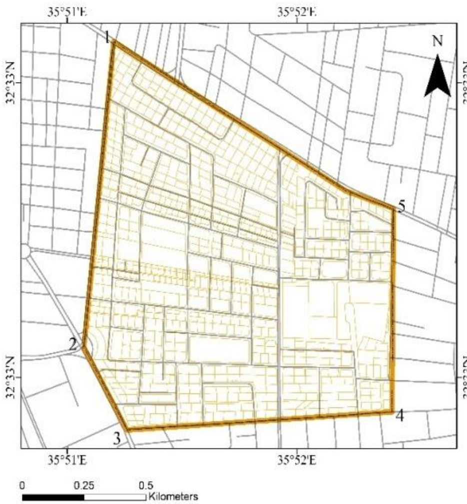
The method is based on the concept of “think globally, act locally”, acting as a common “language” for assessing the sustainability of the built environment.

The use of the tools makes it possible to evaluate, compare and aggregate the results of locally deployed sustainability measures and, at the same time, evaluate progress towards global sustainability goals, avoiding uncertainty and confusion generated by the use of different evaluation tools.

1. Initiation

1.1 : Description of the Urban Area in the three pilot cities

General information			
Name of the urban area	***Moukhtara Central District***	***Al-Nozha***	***SAHLOUL 3***
City	***Moukhtara***	***Irbid, Jordan***	***SOUSSE***
Description of the urban area	*Moukhtara is one of the most important historical villages and still it preserves its traditional buildings. Moukhtara is an authentic village rich in its nature, forests and rivers.It depends on agriculture and tourism as the main economical activities. It is a mountainous area nearly 850m above sea level and located 52 km from Beirut the capital. It has been nominated one of the fifteen" Les Plus Beaux Villages d LIban".*	*Located in the northern region of Jordan lies a city known for its flat terrain and remarkable archaeological sites. This city boasts one of the largest archaeological hills in the area, attracting history enthusiasts from all over. Moreover, it holds the distinction of having the highest population density in the entire country, making it a bustling hub of activity. As the second-largest city in Jordan, it is widely recognized as a prominent center of education, housing a total of seven universities.* *Strategically positioned, this city serves as a vital link between Jordan, Syria, Lebanon, and Palestine. Its geographical significance contributes to its status as a pivotal location for regional connectivity. Administratively, the city is divided into nine sub-governorates, with Irbid Qasabah being one of them. The latter, in turn, is*	*This is a residential area. The area of the district is 60.91 Ha. It contains 1715 housingunits. It isinhabited by 5809 inhabitants. The number of inhabitantsin 2014 was 4619 inhabitants. The number of householdsrecordedin 2014 is 1,396. The urbandevelopment index is 731% between 1998 and 2020. It iscrossed by 14.3 km of roads. Around 8 out of 10 authorized constructions are of the individual type, and 1/10 concerns a rehabilitation or redevelopmentproject. Collective type projects are very few in number, but significant in size.*

		further divided into 25 districts, each with its unique characteristics and attractions.	
Plan of the urban area with the physical boundaries			
Pictures			

History of the settlement	*Moukhtara is an old village that was firstly named and built up in the late 16 century on the remains of the roman ruins, Moukhtara means "The Chosen" and it named so because it was chosen by the Joumblat's Prince (Joumblat family is a prestigious family that is considered to be the family which firstly constructed the village mainly the Moukhtara Palace which is now a touristic site). Also, it contains many water mills and bridges dating back to the 16 Byzantine century with stone houses and old churches.It is characterized by a myriad of small streets, charming staircases, and gardens separated by old houses.*	*The city initially existed as a small town, covering an area of less than 300 m². However, its fortunes began to change gradually with the establishment of Trans-Jordan in 1921. Subsequently, the city experienced substantial population growth due to the influx of refugees and immigrants driven by the volatile political situations prevailing in neighboring countries. The city's population expansion was primarily fueled by successive waves of refugees, starting with Palestinian refugees in 1948 and 1967, seeking asylum and stability. The first Gulf War in 1991 led to a significant migration of over 350,000 individuals to Jordan. In addition, Lebanese refugees sought shelter in the city in 1992, and during the second Gulf War, around 450,000 Iraqi refugees also sought refuge within its borders. The cumulative effect of these migrations, combined with the natural growth of the resident population, exerted considerable pressure on the city's development. Consequently, the city faced significant challenges related to its expansion. Issues such as housing scarcity, strained public services, inadequate infrastructure, and the increased demand for essential resources emerged as major concerns. Addressing these challenges became imperative to ensure sustainable development and the well-being of both the city and its inhabitants.*	*The neighborhoodis a subdivision of the Tunisian land and housingagency (AFH). The first building permitsweregranted at the beginning of 2000.*
Rationale behind the selection of the urban area	*Moukhtara is considered to be the central village of the federation of Higher Shouf municipalities and it has many services and infrastructure that serves the nearby areas, also it is a lively area being near to many important and touristic*	*-It is considered as a part of the latest expansion of Irbid. -It holds various utilities such as schools, public services, single and multiple housing units.*	*This is a typicalneighborhoodsubdivided by the public service AFH (Land and Housing Agency). AFH owns the largestundeveloped land. The experienceacquiredthrough the study of this district can beconsidered as a demonstrationprojectwhichwillallow the*

	sites.		*public developer to betteraddresssustainability aspects in future projects. The neighborhoodalsoincludesquite diverse urban components. (individual, collective housing, administrations, green spaces, etc.) and finally the availability of data.*
Description of the adjacent areas	*Adjacent areas are mostly small residential villages rich in vegetation and agricultural activities.*	*Urbanized area*	*The neighborhoodissurrounded by otherneighborhoods (Sahloul 1, Sahloul 2, Sahloul 4) all belonging to the samedeveloper and which have the samecharacteristics.*
Built environment			
Surface area	*0.076km²*	*0.96 km²*	*60.91 Hectares soit 0.6 (km²)*
Building density	*40000m²*	*9.28 m³/m²*	*6.2(m³/m²)*
Total land area occupied by buildings, streets, parking and parkland in the local area	*(0.05km²)*	*0.84 km²*	*41.98 Ha soit 0.42(km²)*
Total land surface area used for residential purposes	*(0.02km²)*	*0.57 km²*	*0.17 (km²)*
Aggregate gross area of housing units	*(1050m²)*	*572973.1 m²*	*0.34 (m²)*
Total number of residential buildings	*28*	*Currently, we are in the process of counting the buildings within the study area boundaries. To accomplish this, we will employ the field survey technique since the data obtained from the DOS covers a broader area that extends*	*2500*

		beyond the boundaries of our study area. It is essential to exclude the buildings located outside of the study area in order to obtain accurate results.	
Percentage of residential buildings constructed before 1975	*(95%)*	*Due to the lack of archival data in the GAM and other public records, the information pertaining to this matter is missing and cannot be clarified. Specifically, there are no records available regarding the buildings in the area prior to 1975. Consequently, it is not feasible to calculate the percentage of residential buildings constructed before that year. Even if we were able to obtain a satellite photo of the area from that time, determining the precise percentage of buildings based on their usage would still be impossible. The satellite photo can only provide us with information about the number of buildings and their boundaries at that time, but it does not allow us to ascertain the exact purpose of each building back then.*	*0 (%)*
Aggregate gross area of office buildings	*(100m²)*	*0 m²*	*10000(m²)*
Total number of office buildings	*3 office buildings*	*0*	*40 (number)*
Percentage of office buildings constructed before 1975	*(0%)- The office buildings are all constructed after 1975.*	*Due to the lack of archival data in the GAM and other public records, the information pertaining to this matter is missing and cannot be clarified. Specifically, there are no records available*	*0 (%)*

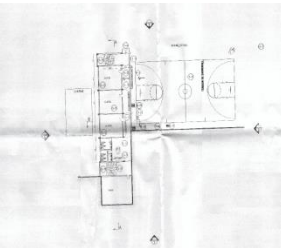
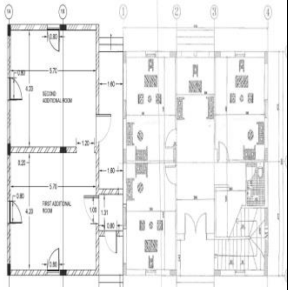
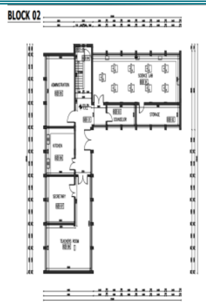
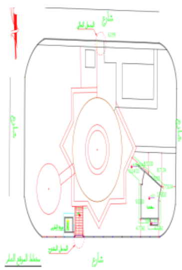
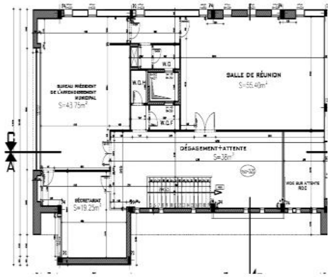
		regarding the buildings in the area prior to 1975. Consequently, it is not feasible to calculate the percentage of office buildings constructed before that year. Even if we were able to obtain a satellite photo of the area from that time, determining the precise percentage of buildings based on their usage would still be impossible. The satellite photo can only provide us with information about the number of buildings and their boundaries at that time, but it does not allow us to ascertain the exact purpose of each building back then.	
Aggregate gross area of retail commercial buildings	*(75m²)*	*57767.04m²*	*68000(m²)*
Total number of retail commercial buildings	*(2 commercial buildings)*	*Currently, we are in the process of counting the buildings within the study area boundaries. To accomplish this, we will employ the field survey technique since the data obtained from the DOS covers a broader area that extends beyond the boundaries of our study area. It is essential to exclude the buildings located outside of the study area in order to obtain accurate results.*	*55*
Percentage of retail commercia buildings constructed before 1975	*(100%)*	*Due to the lack of archival data in the GAM and other public records, the information pertaining to this matter is missing and cannot be clarified. Specifically, there are no records available regarding the buildings in the area prior to*	*100(%)*

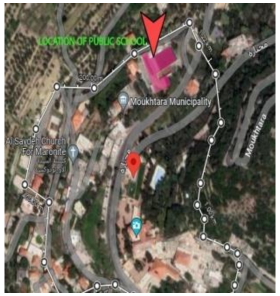
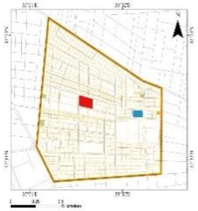
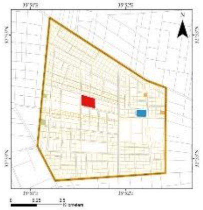
		1975. Consequently, it is not feasible to calculate the percentage of commercial buildings constructed before that year. Even if we were able to obtain a satellite photo of the area from that time, determining the precise percentage of buildings based on their usage would still be impossible. The satellite photo can only provide us with information about the number of buildings and their boundaries at that time, but it does not allow us to ascertain the exact purpose of each building back then.	
Aggregate gross area of public buildings	*(350m²)*	*67323.41 m²*	*700 (m²)*
Total number of public buildings	*(9public buildings)- 2 churches – mosque- Moukhtara Palace- school-municipality- PTT- police station- Restaurant)*	*Currently, we are in the process of counting the buildings within the study area boundaries. To accomplish this, we will employ the field survey technique since the data obtained from the DOS covers a broader area that extends beyond the boundaries of our study area. It is essential to exclude the buildings located outside of the study area in order to obtain accurate results.*	*2 (number)*
Percentage of public buildings constructed before 1975	*(75%)*	*Due to the lack of archival data in the GAM and other public records, the information pertaining to this matter is missing and cannot be clarified. Specifically, there are no records available regarding the buildings in the area prior to*	*0 (%)*

		1975. Consequently, it is not feasible to calculate the percentage of public buildings constructed before that year. Even if we were able to obtain a satellite photo of the area from that time, determining the precise percentage of buildings based on their usage would still be impossible. The satellite photo can only provide us with information about the number of buildings and their boundaries at that time, but it does not allow us to ascertain the exact purpose of each building back then.	
Total number of other buildings	2	*0*	*(number)*
Property ownership	*Private-Public*	*Mix public and private*	*Municipality of Sousse*
Population			
Residential population in the area	*150*	*Determining the precise population of the study area poses a challenge due to its location within the boundaries of two neighbourhoods in Al Nozha area: Al-Hikmah NH and Al-Worood. The total residential population of both neighbourhoods combined amounts to 36,644 individuals.*	*5809*
Population density	*200/km²*	*N.A because it is rely on the Residential population in the area*	*9500 Ha/km² (inhabitants/km²)*
Typical daytime population working in the area	*100*	*N.A*	*1000*

Socio-economic aspects			
Social and economic context	*Moukhtara is a rural area with an integrated social context constructed by family units that are very interactive with the stakeholders in the area. People in the area depend on agriculture and tourism as the main economic activities.*	*Local and immigrant population with moderate to low income.*	*Neighborhoodinhabited by the middle class whoseincomeis 2000 to 3000 DT per household*
Infrastructures			
Energy supply infrastructure	*Through electrical generator and governmental electricity*	*Electric lines*	*STEG Network TunisianElectricity and GAS Company) medium voltage and low voltage 220V.*
Water supply infrastructure	*Available Through Municipality*	*Water pipe network*	*Drinking water supply network delivered by SONEDE (National Water Exploitation and Distribution Company)*
Other significant infrastructures	*Waste water network and treatment plant)*	*Non*	*Wastewater drainage network.* *GSM network* *Telecommunications network* *Natural gas distribution network* *Green spaces*

1.2 :Description of the building(s) in the three pilot cities

General information on the selected building							
	Moukhtara Municipality		Irbid Municipality				Sousse Municipality
Name of the building	*Moukhtara Public school*	*Moukhtara Municipality*	*ABU BAKR AL-SEDEEQ BASIC SCHOOL FOR BOYS*	*Irbid Chamber of Commerce*	*Irbid Electricity Company*	*Prince Rashid Park*	*Sahloul district*
Pictures of the building							
Plan of a typical floor							

Location of the building in the urban area							 *(Draw)*
Address	*Moukhtara Main Road*	*Moukhtara Main Road*	*Jordan - Irbid - Ratib Al-Batayneh Street - in front of Al-Manaseer Gas Station*	*Ratib Batayna street, Irbid*	*Jordan - Irbid - Ratib Al-Batayneh Street.*	*Al-Madina Al-Munawwarah Street, front of Irbid Court of First Instance, Irbid*	*Boulevard Yasser Arafat Sahloul 3*
Actual building use	*Public school- education*	*Municipality- Public services*					*Sahloul District Building*
History of the building	*The building was firstly constructed in the 60s, for the children in the nearby villages, it is a mixed school that played a major role in*	*The building was firstly constructed in 1999, and it is now the official seat of the federation of municipalities of the Higher Shouf and the*	*Inaugurated in the year 1999, primary school for boys boasts the distinction of being the most*	*A recently built building (1998)with a large glass double volume atrium. The other*	*The Head quarter building of Irbid Electricity Company . Irbid Governorate*	*Prince Rashid Park is a public park in Muhammad Najib Nsayr Street, Irbid.*	*(Enter text)*

	compensating the educational needs of the higher Shouf region.	municipality of Moukhtara.	extensive government school at the local level. As part of its accommodating approach, the school functions on a two-shift model, catering to a significant number of students while offering them a comfortable educational environment. This model comprises a morning period intended primarily for Jordanian students and an evening period earmarked for Syrian students	facades are built of local limestone Glass windows is semi-transparent. Irbid Chamber of Commerce In the early 1950s, traders in Irbid were conscious of their requirement for an organization to look after their concerns and function towards their welfare. Thus, several merchants approached the Ministry of Industry and Trade to seek approval for creating a chamber of commerce in Irbid. Irbid Chamber of Commerce moved to this building in 1998	Electricity Company, a Public Shareholding Company Limited	The park boasts an array of facilities that cater to different interests and ages. It features a meticulously crafted pathway for walking and running enthusiasts, a library, and numerous child-friendly games that guarantee an enjoyable experience for youngsters. The park's remarkable cleanliness, bright lighting, and vast green spaces set it apart as an ideal location for relaxation and recreation.. Prince Rashid Park opens every day from 8 am to 10 pm	

Level of degradation of the building	*Low level of degradation: The school was renovated in 2018, and it underwent a wide repair in walls, exterior finishes, doors, aluminium windows and paintings.*	*Low level of degradation: slightly damaged walls- medium damage in interiors such as doors and furniture.*	*Average*	*Average*	*The building is recently built with high standards , limestone facades with large glass east façade*	*under research*	*New building*
Owner	*Government-Ministry of Education*	*Government*	*The Ministry of Education*	*Irbid Chamber of Commerce*	*Abdul Salam Mustafa Al-Qasim Sawalha Agent: Abdul Hafeez Sawalha*	*Jordan government*	*Municipality of Sousse*
Year of construction	*1960*	*1999*	*1999*	*1998*	*2011*	*1997*	*2022*
Building method	*The school is an old construction entity, it is a concrete slab-column construction with concrete blocks and mainly exterior glass skin.*	*The municipality building is a hybrid construction entity (old design- new construction), it is a stone construction (Iwan Building) with concrete columns-stone cladding, it is a Lebanese traditional building with a brick roof, recently 2 rooms where added that are of concrete blocks with concrete columns.*	*Concrete structure*	*Concrete structure*	*Concrete structure*	*Concrete structure*	*Reinforcedconcrete structure, exteriorwalls made of double hollow brick partitions. The slabs are 16+5 slabs. The interiorpartitioningis made of plastered bricks. The joineryis made of single-glazedaluminum.*
Number of levels above earth	*4*	*3*	*4*	*4*	*6*	*1*	*1*

Number of levels underground	*0*	*0*	*0*	*1*	*1*	*0*	*0*
Heating system	*Central Heat Pumps*	*Central Heat Pumps*	*4 AC*	*Inverter AC*	*Central heating*	*N/A*	*Natural gas central heating*
Cooling system	*NA*	*Central Air Conditioner*	*Fans + natural cooling, 4 AC*	*Fans + natural cooling + Inverter AC units + Free air diffuser*	*Central air-conditioning*	*Fans*	*Split system air conditioners*
DHW system	*Electrical Boiler System*	*Electrical Boiler System*	*NA*	*Electrical boilers + Instant electric heating water faucet and shower*	*under research*	*N/A*	*(Enter text)*
Ventilation system	*Natural ventilation (Windows)*	*Natural ventilation(windows)*	*Natural ventilation*	*Natural ventilation*	*Windows and suction system with air conditioners*	*Natural ventilation*	*Natural*
Lighting system	*Electrical Generator – Governmental electricity.*	*Electrical Generator – Governmental electricity.*	*Fluorescent + Glob lighting fixture + Compact Fluorescent lighting fixture + Spot down light + Hooligan + LED*	*LED+* Fluorescent tube+ Halogen lamp	*LED*	*under research*	*LED lamps*
Average U value	*Total: 2.15 W/m2K(Exterior Walls concrete +glass)*	*Total: 1.44 W/m2K(Exterior stone Walls) +2.99W/m2K (Brick roof)*	*0.57 W/m²K for walls*	*0.57 W/m² K for walls*	*0.57 W/m² K for walls*	*0.57 W/m² K for walls*	*1.1081*
Number of occupants	*550(students and staff)*	*15*	*Double shift school, total students= 1920 Total employees = 90*	*1000 visitors + 60 Workers*	*200 visitors - non-staff Employees :350*	*under research*	*20*
Hours of occupation per year	*1350 hrs per year*	*1872 hrs per year*	*1280*	*2016*	*2016*	*5110*	*3000*

1.3: Climatic profile in the three pilot cities

	Sousse		Irbid		Moukhtara	
Parameter	**Value**	**Unit of measure**	**Value**	**Unit of measure**	**Value**	**Unit of measure**
Annual Mean Temperature	20.15	°C	18.3	°C	20	°C
Winter Mean Temperature	13.1	°C	16	°C	14	°C
Summer Mean Temperature	26.8	°C	28	°C	25	°C
Number of days with the daily maximum temperature > 90° percentile					30	
HSI (Heat Stress Index)		-	14.93 WBGT 18.00 UTCI		67F/20°C	-
Mean speed of wind	4.45	m/s	2.8	m/s	2	m/s
Annual mean amount of rainfall	330	mm	Under research	mm	60.6	mm
Number of intense rain events in a year (10 mm / 20 minutes)			Under research		5.63/DAY	

Number of consecutive days without rainfall in a year	25		191.625 (6.3 months)	Days	90-120	
Annual Maximum level of rainfall in one hour		mm	Under research	mm		mm
Heating season Design Temperature	12.7	°C	20-22°C	°C	30	°C
Summer season Design Temperature	28.6	°C	24-28°C	°C	16	°C
Average relative humidity during warm season	70	%	54%	%	65	%
Average relative humidity during cool season	65	%	65%	%	50	%
Average difference, max-min. diurnal temps in warm season, °C	32-28	°C	11°C	°C	Max. 35°C Min. 24°C Diff. 11°C	°C
Solar irradiance on horizontal surface	1650	kWh/m²per year	5.8 Km/m² per year	Km/m²/Year	4.86 Km/m² per year	Km/m²/Year

1.4: SMC teams in each pilot city

Moukhtara - Lebanon

Team Lead – Consultant

Name	Surname	Work Field	Expertise
Christina	Abi Haidar	Attorney at Law	Legal Expert in the field of oil, gas and renewable energy, drafted the Distributed Renewable Energy Law in Lebanon (DRE). Governance and policy expert

Coordinator – Municipality member

Name	Surname	Work Field	Expertise
Evelyn	Kanso	Architecture	Sustainable studies. Urban studies Façade. Sustainable solutions.

Members – Municipality members

Name	Surname	Work Field	Expertise
Bassam	Ghazal	Electrical Engineer	All sorts of electric power installation.
Rawad	Kanso	Energy engineer	Optimization of energy usage and alternative energy.
Zaher	Ghosseini	Civil Engineer	Structure designer.
Wajdi	Selman	Construction Management	Secure quality assurance during construction phases.

Mirna	Audi	Administrative Officer	Data collection focal point for the urban area and municipality building
Ahmad	Salloum	Mathematics Professor and ex-Mayor of Baadarane	Data collection focal point for the school building

Quality Management – Data Analyst – Consultant

Name	Surname	Work Field	Expertise
Gilnar	El Ters	Mechanical Engineer	Water, Energy and Environmental specialist, quality management and data analyst, monitoring, and evaluation expert.

N°	Work field	Definition of the profession
1	Architecture	Architects investigate, design and oversee the implementation of buildings taking into account functional, architectural, aesthetic, structural, technical, regulatory, cost and contextual requirements with due regard to public health and safety. Specialization is possible on topics like construction safety, thermal performance, acoustics, quality of air, daylighting.
2	Mechanical engineering (water and wastewater)	Designer of systems for HVAC, water andwastewater, considering the limitations imposed by practicality, regulation, safety, and cost.
3	Civil engineering	Designer of materials and structures, considering the limitations imposed by practicality, regulation, safety, and cost. Specialization is possible on topics like construction safety, thermal performance, acoustics, building physics.
4	Electrical engineering	Designer of power, lighting, data and or communication installations, considering the limitations imposed by practicality, regulation, safety, and cost. Designer of building automation systems, system engineer / system integrator, considering the limitations imposed by practicality, regulation, safety, and cost.
5	Environmental engineering	Designer of solutions to protect human health, nature's beneficial ecosystems, and to improve environmental-related enhancement of the quality of human life
6	Energy engineering	Responsible for the optimization of energy usage, as well as the sources from which the energy is

		derived. Responsible for the EPCs.
7	Construction management	Responsible for quality assurance during on-site construction works in the realization of sustainable buildings
8	Building management	Responsible to maintain the real estate as it was realized at the end of the building process. Responsible for overall operation of the building, monitoring of performance, and maintenance.
9	Financing and procurement	Responsible for facilitating the process of tenders and (sub)contracts. Responsible for the associated risks involved in the building process for the customer and hands over the project to the tenant / buyer after completion and use of the building

Irbid - Jordanie

Project Management Team

Name	Sur-name	Work Field	Expertise
Dr. Raed	Al Tal	Project Manager and Team Leader	AssociateProfessor of Architecture at German Jordanian University; project manager (international funded projects / World Bank, SDC,USAID,GIZ, EU projects).
Arch. Tala	Mukhaimer	Assistant Manager	Assistant to the Director of the Presidency Department Instructor at the School of Architecture and Built Environment German Jordanian University (GJU)
Eng.Alia	Al-Tal	Coordinator Civil Engineer	Civil engineer, award among the top five finalists of the Digital Innovation Award competition in Saudi Arabia (creator, programmer, and developer), Community Mobilizer at Un Ponte Per (UPP); managing social mobilization and capacity development activities for NGOs, Trainer for Water Innovations Technologies (WIT) with Jordan River Foundation, Computing quantities,Presentation Design, Inventory management, and data entry, coordinating .

Arch.Dana	Dabbas	Coordinator Architectural Engineer	Architectural Engineer; designermember;master planning, 3D drawings, and infrastructure work. Project management, Coordination and communicationin Irbid Regional Wholesale Vegetable and Fruit Market with German Jordanian University team .

Technical Team : Energy Efficiency and Energy Management

Name	Sur-name	Work Field	Expertise
Dr.Farah	AlAtrash	Architectural Engineer	Sustainable Planning, smart cities, green buildings, energy efficient design, thermal comfort, and occupant behaviour.
Dr.Murad	Samhouri	Mechanical Engineer	Economic & socio-economic development, evaluation, diagnosis, and planning with public and private sectors
Arch. Tala	Awadallah	Architecture/ Urban Planning	Energy simulation, sustainable buildings, and energy-efficient buildings.
Arch. Nibal	Hameed	Architecture/ Urban Planning	Microclimate simulations, nature-based solutions, and climate change adaptation.
Arch. Rawan	Khattab	Architecture/ Urban Planning	Sustainable cities and communitiesassessment,evaluating urban quality, sustainable analyst, qualifications strategies in urban development,housing, SDG(s), climate change

Urban and architectural studies Team/Team Members

Name	Sur-name	Work Field	Expertise
Dr.Raed	Al-Tal	Architecturaldesigner, urban and strategic planner, project manager	Urban planner, architect and project manager (international funded projects / World Bank, SDC,USAID,GIZ, EU projects).Participated in international workshops on urban planning and studies facilitated by European Union DAAD and EURSMUS.
Arch.Thana	Jawabreh	Architectural Engineer	Head of the Architectural Design Department.Subeh Consult anting Engineering. Specializes in public buildings design (hospitals, schools and mixed use design buildings) energy systems and special mechanical, electrical, and electronic design standards..
Eng.Odai	Al-Zayadin	Traffic and Road Engineer	Traffic,roadengineering and pedestrian safety. Experience in the private and public sectors; currently works for the Ministry of Public Works and Housing.Transportation. .
Eng. Ahmad	Al Tal	Civil Engineer	Expert assistant and field researcher Traffic, road engineering and pedestrian safety
Arch.Dana	Al-Lafi	Architectural Engineer	PMP candidate, an architect and spatial planner; specialized in urban studies with concentration on housing policies and strategies in Irbid;Geographic analysis (GIS, ArcGIS); numeric and urban analysis
Eng.Alia	Al-Tal	Coordinator Civil Engineer	Civil engineer, award among the top five finalists of the Digital Innovation Award competition in Saudi Arabia (creator, programmer, and developer), Community Mobilizer at Un Ponte Per (UPP); managing social

			mobilization and capacity development activities for NGOs, Trainer for Water Innovations Technologies (WIT) with Jordan River Foundation, Computing quantities ,Presentation Design, Inventory management, and data entry, coordinating .
Eng. Malak	Alghadi	Renewable Energy Engineer	Renewable Energy Engineering, Energy Auditing, Energy Efficiency and Energy Management

Sousse - Tunisia

Municipality of Sousse

Name	Surname	Work Field	Expertise	Definition of the profession
DAGA	Noureddine	Engineer	Chief Engineer Municipality of Sousse	Head of the project – Municipality of Sousse

Team leader - Consultant

Name	Surname	Work Field	Expertise	Definition of the profession
EL JENZRI	Kais	Architect	Urban Planification	Architects investigate, design and oversee the implementation of buildings taking into account functional, architectural, aesthetic, structural, technical, regulatory, cost and contextual requirements with due regard to public health and safety. Specialization is possible on topics like construction safety, thermal performance, acoustics, quality of air, daylighting.

Coordinator

Name	Surname	Work Field	Expertise	Definition of the profession
ZAOUI	Maher	Civil Engineer	Engineering and Urban Development	

Members Consultants

Name	Surname	Work Field	Expertise	Definition of the profession
SOUILEM	Baligh	Engineer	Energetician	Responsible for the optimization of energy usage, as well as the sources from which the energy is derived. Responsible for the EPCs.
BEN HADJ SLAMA	Amani	Engineer	Electrician	Designer of power, lighting, data and or communication installations, considering the limitations imposed by practicality, regulation, safety, and cost. Designer of building automation systems, system engineer / system integrator, considering the limitations imposed by practicality, regulation, safety, and cost.
BOUHLEL	Mohamed	Engineer	Hydraulician	
MABROUK	Awatef	Master in Sociology	Sociologist	
BOUJARRA	Ahmed	Doctoratein geography	SpecialistinEnvironnement	Designer of solutions to protect human health, nature's beneficial ecosystems, and to improve environmental-related enhancement of the quality of human life
CHAIBI	Maissa	Master in transport	Specialist in mobility	

1.5: Stakeholders in each pilot city

Stakeholder	IRBID	MOUKHTARA	SOUSSE
Category of the stakeholder	Governmental	Tourism	Administrative Actors
Organisation	The Ministry of Public Works and Housing.	Ain Merched	Municipality of Sousse
Activity of the organisation	Providing safe roads with economic and developmental efficiency and constructing and maintaining government buildings.	Restaurant	the municipality of Sousse is the project manager and is the direct beneficiary of the project
Role in the decision-making process	It contributes to setting and amending building codes, related to the issue of thermal insulation of walls.	Advisory	Commitee Leader
Contact person	Secretary General of the Ministry + 962 6 5803803 Mpwh@Mpwh.gov.jo	Majed Hosneldine	NOUREDDINE DAGA Noureddinedaga@yahoo.fr

Stakeholder			
Category of the stakeholder	Governmental	Commercial	Administrative Actors
Organisation	The Ministry of Environment.	Moukhtara Cooperative	Tunisian Electricity and Gas Company
Activity of the organisation	Maintaining and improving the quality of Jordan's environment, and contributing to sustainable development and preserving natural resources.	Grocery + Butchery + Bakery	the electricity company is the sole supplier of electrical energy
Role in the decision-making process	Contributing to developing effective strategies and policies and disseminating environmental concepts into development plans.	Advisory	Permanent membre
Contact person	Secretary General of the Ministry + 962 65560113 ncc@nitc.gov.jo	Atef Kanso	CHOKRI BEN SASSI chokri.bensassi@gmail.com

Stakeholder			
Category of the stakeholder	Governmental	Public school	Administrative Actors
Organisation	Ministry of Energy and Mineral Resources	Moukhtara Public School	National agency for energy management
Activity of the organisation	Providing electrical energy, oil and its derivatives to citizens, exchanging electrical energy with neighbouring countries, attracting investors to invest in the field of electrical energy generation and production to benefit from local sources.	Teaching	its mission is to design and implement State policy in the field of energy management.
Role in the decision-making process	Develop comprehensive and general plans and ensure their implementation to save energy consumption in its various forms to achieve sustainable development.	Participatory	Permanent membre
Contact person	Director of the Directorate of Renewable Energy and Energy Efficiency. +96265803060 memr@memr.gov.jo	Manal Hdaifeh	AYMEN SOUII aymen.souii@anme.nat.tn

Stakeholder			
Category of the stakeholder	Non-Governmental	Tourism	Administrative Actors
Organisation	Royal Scientific Society	Shouf Biosphere Reserve	Foncière Habitation agency
Activity of the organisation	Providing specialized technical consultations to the public and private sectors and developing scientific and technological co-operation with similar institutions around the world.	Tourism and Natural park	is a public company, with legal personality and financial autonomy. It is responsible for developing housing estates and contributing to the creation of a healthy and harmonious urban environment. It also participates, through its global approach, in the creation of modern cities, adapted to the cultural and economic changes experienced in Tunisia.
Role in the decision-making process	Solving development problems, the ability to provide the necessary equipment in multiple fields such as food, medicine, health, water and the environment. In addition, it leads scientific research in various fields such as energy and water and applies it on the ground.	advisory	Permanent membre
Contact person	Head of the National center for Energy Research. +962 6 533 8043minaret@rss.jo	Ramzi Breik	AYMENGHRISSI a2sconcept@gmail.com

Stakeholder			
Category of the stakeholder	A non-profit Jordanian business association.		Social Actors
Organisation	EDAMA- Energy, Water & Environment.		Order of Tunisian Engineers
Activity of the organisation	Sustaining energy, water and the environment, seeks to provide a good climate by encouraging the use of alternative energy sources and encouraging scientific research and innovation.		The order of Engineers works to ensure the quality of engineering training and defend the profession's material and moral interests. The order also contributes to assessing the country's needs within the scope of economic and social development plans
Role in the decision-making process	Supporting policies that would advance important sectors such as energy and water to achieve more sustainable development in Jordan.		Permanent membre
Contact person	The president of the association or his deputy. +962 797863945info@edama.jo		Mohamed BEN ESSGHAIER benessghaier@yahoo.fr

Stakeholder			
Category of the stakeholder	An independent private institution		Social Actors
Organisation	Greater Amman Municipality		Order of Tunisian Architects
Activity of the organisation	Planning, development, optimal investment of resources and building partnerships with stakeholders, providing distinguished, smart, sustainable and flexible municipal services.		The order of architects works to ensure the quality of architecture training and defend the profession's material and moral interests. The order also contributes to assessing the country's needs within the scope of economic and social development plans
Role in the decision-making process	It sets regulations and instructions related to spaces, traffic issues, streets and roads, and their maintenance within the city of Amman, and also instructions related to waste, its transportation, and its collection.		Permanent membre
Contact person	Director of the Institutional Performance Development Directorate. +96262229094info@ammancity.gov.jo		IMEN BEN KEMLA Ben.kemla.imene@gmail.com

Stakeholder			
Category of the stakeholder	An officially registered non-profit association.		Academic Actors
Organisation	Jordanian Investors Association		University Of Sousse
Activity of the organisation	Encouraging the investment and manufacturing sector, developing the activities of investors and industrialists, and holding exhibitions to introduce Jordanian industries.		Study the processes of transformation and governance of the territory, considered in its physical aspects, economic, social, political, cultural and their interrelations, in a perspective of sustainability.
Role in the decision-making process	Planning and implementing programs aimed at developing the industries and exports of Jordanian industrialists.		Permanent membre
Contact person	The president or his deputy +962 6 4023706 info@jia.org.jo		MANEL BOURAOUI manel.bouraoui@u-sousse.tn

Stakeholder			
Category of the stakeholder	Governmental		Administrative Actors
Organisation	Ministry of Water and Irrigation		Regional Directorate for Equipment and Housing
Activity of the organisation	Providing water, increasing the percentage of protected water sources in Jordan and reducing the gap between demand and availability through developing water sources, finding new sources, reducing water loss and raising awareness to rationalize water consumption, treating wastewater in Jordan to benefit from it in the process of irrigating crops.		the planning department is a regional structure which is responsible for supporting municipalities in urban planning
Role in the decision-making process	Building a long-term strategy to confront the difficulties represented by the shortage of water resources, the continuous increase in population, and climate change and achieving water security.		Permanent membre
Contact person	Secretary General of the Water Authority +96265680100 MWIinfo@mwi.gov.jo		KHALED MANNOUBI Khaled.mannoubi@yahoo.fr

Stakeholder			
Category of the stakeholder	Governmental		Administrative Actors
Organisation	German Jordanian University/ Road Safety Center		National Environmental Protection Agency
Activity of the organisation	The German-Jordanian University aspires to become one of the region's leading universities and to be highly regarded for its learning and teaching excellence, focused research and enterprise, multiculturalism, and effective engagement with the community.		the agency's mission is to draw up the guidelines for national policy in the fight against pollution and environmental protection, and its execution through specific and sectoral actions as well as global actions within the framework of the national development plan.
Role in the decision-making process	Contributing to development and modernization in various scientific, economic and other fields.		Permanent membre
Contact person	info@gju.edu.jo Farah.alatrash@gju.edu.jo www.gju.edu.jo 962 6 429 4444		MOHAMED FATHI DHOUIBI dr.sousse@anpe.nat.tn

Stakeholder			
Category of the stakeholder	A public benefit institution		Administrative Actors
Organisation	Irbid Chamber of Commerce		Regional Department of the Environment
Activity of the organisation	It provides many and varied commercial services such as authenticating invoices for goods exported abroad, Certifying guarantees and signatures, resolving disputes and commercial disputes that may occur by resorting to arbitration.		responsible for state environmental policy.
Role in the decision-making process	Participate in studying draft laws related to economic matters, submitting appropriate proposals for them, and reviewing the applicable laws related to trade and economic affairs.		Permanent membre
Contact person	Room manager +96227242077 chamber.irbid@gmail.com		AMEL JELASSI amel.jlassi@hotmail.com

Stakeholder			
Category of the stakeholder	A governmental body with financial and administrative independence.		Administrative Actors
Organisation	Energy and Minerals Regulatory Commission.		National Waste Management Agency
Activity of the organisation	Maintaining an effective structure for the sector, granting permits and licenses to people working in the sector, determining electrical tariffs, and participating in Arab and international projects concerned with the sector's affairs.		The agency works mainly to promote the quality of life of citizens and improve environmental protection through the implementation of integrated and sustainable waste management.
Role in the decision-making process	Establishing the foundations for importing and exporting metals, contributing to setting standard specifications or technical rules for devices and facilities related to the sector in coordination with the concerned authorities, and also setting the necessary requirements to implement the environmental conditions that must be met in sector facilities in accordance with the legislation in force.		Permanent membre
Contact person	The President or one of his deputy commissioners +9625805000 info@emrc.gov.jo		MAALI MRABET mrabet.maali@yahoo.fr

Stakeholder			
Category of the stakeholder	Independent body		Social Actors
Organisation	Land Transport Regulatory Commission		Tunisian Association of Renewable Energy
Activity of the organisation	Regulating and monitoring land transportation services, encouraging investment in the sector in accordance with economic and social development goals, planning the network of land transportation services, its facilities and routes, and developing procedures to prevent land transportation accidents.		the association with an interest in new technologies in the renewable energy sector
Role in the decision-making process	Contributing to developing plans for road construction and maintenance programs, in addition to developing the necessary plans for establishing and operating land transportation facilities.		Permanent membre
Contact person	Head of the Institutional Performance Development Department +962 5100500 info@Ltrc.gov.jo		HAFEDH NOUIR hafedh.nouir@gmail.com

Stakeholder			
Category of the stakeholder	Governmental		Administrative Actors
Organisation	Ministry of Transportation		National statistics institute
Activity of the organisation	Regulating the transportation sector, establishing preventive measures to reduce accidents, and supervising traffic safety.		The National Institute of statistics (L'Institut National de la Statistique: INS) was created in 1969. It is a non-administrative public organization. It also represents a central organ in the national statistics system. According to its status, INS is managed by a governing board chaired by the INS Chief executive officer.
Role in the decision-making process	Developing policies related to developing and sustaining the transportation sector, enhancing the role of the private sector and stimulating investment in the transportation sector, providing transportation services to the community, and implementing major projects related to transportation in Jordan.		Permanent membre
Contact person	Secretary General of the Ministry +96265518111 info@mot.gov.jo		Amir CHETOUI chetoui.amir@ins.tn

Stakeholder			
Category of the stakeholder	A quasi-military government agency		
Organisation	General Directorate of Civil Defence		
Activity of the organisation	Protecting and saving lives and private and public property of citizens or those present in Jordan, providing assistance and first aid to people in the event of accidents and disasters, protecting property from dangers by establishing precautionary measures to avoid accidents such as fires, drowning, traffic accidents, collapses, and force majeure weather conditions.		
Role in the decision-making process	Providing preventive awareness to avoid disasters, accidents and dangers.		
Contact person	Director of the Directorate or his deputy 011-4925033 998@998.gov.sa		

Stakeholder			
Category of the stakeholder	Governmental/affiliated with a ministry		
Organisation	Public Security Directorate		
Activity of the organisation	Spreading security and reassurance for citizens, tourists and visitors, providing services and humanitarian aid and emergency services such as ambulance and fire fighting, protecting the environment and tourism, and licensing vehicles.		
Role in the decision-making process	Providing various security services to investors, such as security approvals, licenses, and following up on investors' affairs in Jordan, whether related to their persons, families, or investments.		
Contact person	Director of the Investment Protection and Promotion Unit +962 770999249 isu@psd.gov.jo		

2. Preparation

2.1: SNTool Selection of Criteria

SustainableNeighborhoods Tool

A	Use of land and biodiversity		Justification Sousse	Justification Irbid	Justification Moukhtara
A1	**Use of land**				
	CODE	**Criterion**			
	A1.1	Population density	*The averagedensity of Sousse isaround 6,500 inhabitants/km², the maximum per district is 23,000 inhabitants/km². It is important to ensurethat a maximum levelis not exceeded in order to guarantee an acceptable quality of life for the population. Results of VoteLPC 16/19*	*To sustain the resources required to maintain the quality of life*	
	A1.2	Urban compactness	*Density and compactness are twoinseparable concepts. Compactnessmakesit possible to create living environmentsthat are both dense and friendly, respectful of the humanscale and favorable to the creation of a city of short distances, a strategic option chosen by Sousse which aspires to be the city of the quarter of 'hour. VoteLPCresult 13/19*	*Support to sustainable mobility policies and environmental quality, increased overall accessibility, reuse of infrastructure*	
	A1.3	Homogeneity of the urbanfabric			

	A1.4	Conservation of land			
A2	**Green urban areas**				*The green areas are very significant to the Moukhtara village*
	CODE	**Criterion**			
	A2.1	Availability of green urban areas	*With 2.16 m² of green spaces per inhabitantcurrently, Sousse is far from international standards (15 m² per inhabitant) Results of VoteLPC 15/19*	*Availability of Green urban areas is a policy priority set by the Municipality in which it can reduce the urban heat island effect And maintain biodiversity for climate control.* *Due to the topography and climate of Irbid Governorate, the majority of the land cover is considered green; 39% of the land use within the governorate is classified as agricultural areas, followed by planned areas at 15%, peripheral areas at 9.6%, rural areas at 0.4% and forests at 3.7%. The planned areas identified are mostly located around Liwa of Irbid Qasabah, with some scattered on the western regions of the governorate*	*This is applicable to Moukhtara landscaping.*

	A2.2	Green areas in relation to the neighborhood population	*This district isamong the best endowedwith green zones withapproximately 8 m² per inhabitant. This data is important for the health, quality of life and well-being of residents in the neighborhood.* *Results of VoteLPC 15/19*	*Support the social, health and wellbeing of neighbourhood residents.* *Green and open spaces, on the other hand, constitute around 1.2% of planned areas in irbid*	*This is applicable to Moukhtara landscaping*
	A2.3	Green Area Accessibility		*To support mental and general health within safe , inclusive and accessible green public spaces.*	*Applicable to Moukhtara urban planning*
	A2.4	Green zones density	*In addition to providingresidentswithbetterhealth (by encouragingphysicalactivity), thisindicatorimproves the air, reduces the effects of climate change on the urbanenvironment (heatislands) and calms the population.* *Results of VoteLPC 15/19*	*To provide healthier environments and balancing the socio-economics and demographic groups within the urban sector* *About 25% of the city's population is served by public parks at the residential-neighbourhood level. Overall, the city lacks parks and green open spaces, especially in the city centre. Some parks and green open spaces are evident at the regional level, but the area per population living near a park is low at approximately 0.48 m²/ person*	
	A2.5	Green zones and ecosystemic services			
A3	**Biodiversity and ecosystems**				
	CODE	**Criterion**			

	A3.1	Connectivity measures for natural areas			
	A3.2	Biodiversity in green zones			
B	**Energy**				
B1	**Energy infrastructure**				
	CODE	**Criterion**			
	B1.1	Access to electrical service	*100% of the neighborhood's population has access to the electricity network.* *Result of the LPC Vote 8/19*	*To provide security and protect the food production and ecosystems as well as to strengthen the local economy. To improve education, entertainment and productivity.* *100% of irbid population has access to electricity*	

B2	**Energy consumptions**			*Energy consumption is a policy priority as Jordan relies heavily on importing most of its energy sources. As approximately 95% of its needs are imported.* *There is a need to strengthen the promotion of renewable energy and energy efficiency in Jordan, which will have a large impact on the reduction of GHG emissions in the country and increase mitigation. To do so, there needs to be a political and legal framework for renewable energy and energy efficiency, as well as a need for strengthening the implementation and enforcement of existing regulations, such as green building codes.*	*The energy consumption in Lebanon is a critical aspect of the daily citizens life*
	CODE	**Criterion**			
	B2.1	Total final thermal energyconsumption for building operations		*Energy consumption is a policy priority as Jordan relies heavily on importing most of its energy sources. As approximately 95% of its needs are imported.* *There is a need to strengthen the promotion of renewable energy and energy efficiency*	*KPI*

				in Jordan, which will have a large impact on the reduction of GHG emissions in the country and increase mitigation. To do so, there needs to be a political and legal framework for renewable energy and energy efficiency, as well as a need for strengthening the implementation and enforcement of existing regulations, such as green building codes	
	B2.2	Total final thermal energyconsumption for residential building operations			
	B2.3	Total final thermal energyconsumption for public office/ educational building operations			
	B2.4	Total final electricalenergyconsumption for building operations		*Total final electrical energy consumption for public building operations represent the economic savings for each unit and used to maintain a comfortable indoor environment in terms of thermal comfort and indoor air quality*	*KPI*

	B2.5	Total final electricalenergyconsumption for residential building operations		*Total final electrical energy consumption for residential building operations represent the economic savings for each unit and used to maintain a comfortable indoor environment in terms of thermal comfort and indoor air quality.*	
	B2.6	Total final electricenergyconsumption for public office/ educational building operations			*Related to the KPI under this category and applicable to the buildings chosen under SB tools*
	B2.7	Total primaryenergydemand for building operations		*Energy consumption is a policy priority as Jordan relies heavily on importing most of its energy sources. As approximately 95% of its needs are imported*	*KPI*
	B2.8	Total primaryenergydemand for residential building operations			
	B2.9	Total primaryenergydemand for public office/educational building operations			
	B2.10	Energy consumption of public lighting	*For more than 20 years, the country isTunisia has been a net importer of energy, the city of Sousse has alreadyopted to*	*Support to safety of the neighbourhood and the opportunity of using solar*	*This is affecting the Energy consumption in*

			rationalizeitsenergyconsumption by opting for LED and intelligent management of its public lighting network. *Result of the LPC Vote 17/19*	*energy in order to reduce the reliance on current used source of public lighting*	*Moukhtara*
B3	**Renewableenergy**				*Renewable energy is becoming a need for the citizen in the country due the electricity shortage.*
	CODE	**Criterion**			
	B3.1	Share of renewableenergy on-site, relative to total final thermal energyconsumption for building operations		*Very important to reduce relying on the imported energy sources and reduce the air pollution*	*KPI*
	B3.2	Share of renewableenergy on-site, relative to total final thermal energyconsumption for residential building operations			
	B3.3	Share of renewableenergy on- site, relative to total final thermal energyconsumption for public office/educational building operations			

	B3.4	Share of renewableenergy on-site, relative to final electricenergyconsumption		*Very important to reduce relying on the imported energy sources and reduce the air pollution*	*KPI*
	B3.5	Share of renewableenergy on-site, relative to total final electricenergyconsumption for residential building operations			*Related to the KPI under this category and applicable to the solution that might be selected in the coming phases*
	B3.6	Share of renewableenergy on-site, on final electricenergyconsumptions for public office/educational building operations			*Related to the KPI under this category and applicable to the solution that might be selected in the coming phases*
	B3.7	Share of renewableenergy on-site, relative to total primaryenergyconsumption for building operations		*Very important to reduce relying on the imported energy sources and reduce the air pollution*	*KPI*
	B3.8	Share of renewableenergy on-site, relative to total primaryenergyconsumption for residential building operations			*The RE share is very important due to the electricity shortage and high cost of electricity provided by the thermal plant and*

					private generators
	B3.9	Share of renewableenergy on-site, on total primaryenergyconsumptions for public office/ educational building operations			*The RE share is very important due to the electricity shortage and high cost of electricity provided by the thermal plant and private generators*
C	**Water**				
C1	**Water infrastructure**				*The water is related to the provision of electricity*
	CODE	**Criterion**			
	C1.1	Availability of a public municipal water supply	*100% of the neighborhood's population has access to the drinking water supply network. Result of the LPC Vote 13/19*	*Water Scarcity is considered to be a pressing environmental challenge in Jordan where Jordan is considered one of the poorest countries in water resources in the world. Water demand in Jordan has increased dramatically over the past several decades, due to natural population growth and immigration from*	*The availability of public water is critical due to the high cost of private water trucking*

				the neighbouring countries as a consequence to the political instability in the region. It is further projected that water demand in Jordan is expected to continue rising, for all uses, due to the rapid socio-economic development, which will significantly widen the already existing gap between available resources and demands. *The percentage of the population served by the water network within the boundaries of the GIM is estimated to be approximately 99%*	
	C1.2	Availability of waste water treatmentsystems	*100% of the neighborhood's population isconnected to the public wastewatersanitation network.* *Result of the LPC Vote 13/19*	*Achievement of sewage treatment to reduce public health risks as it allows industries and residential societies to manage all the wastewater before releasing it to the environment*	*This is to assess the environmental compliance*
C2	**Water consumption**			*The Kingdom of Jordan, nonetheless, is witnessing significant urban challenges to which GI and NBS have been shown effective elsewhere, including water shortages, urban flooding, air*	*This is related to basic needs and economic aspect*

				pollution, amongst others	
	CODE	**Criterion**			
	C2.1	Total water consumption	*Withapproximately 400 m3 of water per inhabitant per year on average, the country isbelow the threshold of "Water Stress", this data is a crucial element to monitor veryclosely. Results of VoteLPC 14/19*	*Water consumption is a policy priority set by national authorities*	*This is important to check the availability of water and citizen consumption*
	C2.2	Efficiency in water use	*As the drinking water supply network isobsolete, itis essential to betterunderstandthis data in order to better plan actions likely to control it. VoteLPCresult 13/19*		
	C2.3	Consumption of potable water in residential buildings			*KPI*
	C2.4	Consumption of potable water in public officies		*To figure out the amount of water loss which could indicate any improper water management*	*Related to SB tool*
	C2.5	Consumption of potable water in educational buildings		*The provision of water at educational buildings is one of the 'highly effective sustainable practices in increasing learning outcomes. And can be considered to indicate the awareness level.*	*Related to SB tool*
	C2.6	Re-use of rainwater in residential buildings		*To reduce the chances of flooding around buildings and the load on the existing drainage system of the urban context.*	

	C2.7	Consumption of potable water in public green spaces	*A criterion to follow because the behavior of municipal authorities must be optimal and serve as a model for the entire population. VoteLPCresult 13/19*	*The Municipality suffers from decreased water supply in the summer, since there are no sufficient pipelines in the municipality to deliver water to all the required places. The difficulty lies in transferring water from the available sources into the city, since they are located at a great distance and their transportation cost is very high, even though the municipality transfers large quantities of water by tankers. There is also an increasing need for municipal water due to the expansion of the construction works and population increase within the city. To estimate the demand of green space water use, this can help in improving irrigation strategies.*	*Related to A2*
	C2.8	Solar powered water desalinisation			
C3	**Effluents management**				*Environmental compliance*
	CODE	**Criterion**			
	C3.1	Water treatment	*Treatment, whichaims to treatwastewaterbeforeits return to the naturalenvironment, is a very important indicator for monitoring and evaluatingsustainability.*	*To improve air and water quality and contributing to the reduction of greenhouse gas emissions and to address*	*To emphasis on Moukhtara as an environmentally friendly village*

			VoteLPCresult 10/19	*competing demands for water, mitigate climate change risks and causes, for better saving of natural resources for the community*	
	C3.2	Public wastewater (fromoutdoor areas) thatisdisposed or treated		*To avoid further pollution of water sources and the opportunity to improve best sustainable practices accordingly.*	
	C3.3	Householdsanitation		*To reduce risks to inhabitants and their neighbourhood. Helps in safeguard families from unpleasant diseases.*	*To emphasis on Moukhtara as an environmentally friendly village*
D	**Solid Waste**				
D1	**Solid waste collection infrastructure**				*Related to the Environmental compliance*
	CODE	**Criterion**			
	D1.1	Availability of solidwaste collection	*All buildings in the neighborhood have a municipal solidwaste collection service, whichis sent to technicallandfill centers (CET), even if the recyclingsectorispractically non-existent in the country.* *Result of the LPC Vote 10/1*	*It's a priority for greater irbidmunicipality , To support the economic welfare, reduce greenhouse gas emissions and the production of toxic gases, also to improve public health, environmental quality and increase employability. According to WASTE SECTOR Green Growth National Action Plan 2021-2025 , the SW that is disposed of in*	*Environmental assessment of Moukhtara village*

				landfills will be reduced from 80% to 60% by 2025 *The municipal solid waste generation in Jordan is 2,077,215 tons/year with per capita waste generation of 0.9 kg/day in urban areas (Solid Waste Exchange of Information and Expertise network. Fast growing cities just like Irbid have a great challenge in collecting and managing solid wastes. This is caused by dramatic demographic change in the city as high percent of the Syrian refugees settled down in Irbid*	
D2	**Solid waste management**			*Solid waste management, collection and transportation consumes a large part of the municipal budget and the development of this sector is of great importance not only to save cost, but also to improve the service, raise its efficiency and transform it into a sustainable society. SWM is considered to be one of the key responsibilities of Municipality in order to help neighbourhood communities in protecting water resources and improving air quality. In addition SWM help in achieving sustainable development goals " SDG 12,*	*Environmental assessment of Moukhtara village*

				SDG 11 " The current system used to collect and transport solid waste in Irbid-Jordan lacks routing plans and depends only on the experiences of the truck drivers. The pressure on the solid waste management infrastructure has increased especially in the northern governorates; where the problem of solid waste management is the major problem for nearly (92%) of the municipalities of those areas, With the increase in the amount of waste to more than (360) tons per day than the capacity that was collected daily before the influx of refugee. There is a lack of strategic plans and annual work plans in general, or for household waste management in particular, and the lack of implemented service programs based on clear criteria, an assessment of actual needs, and an arrangement of the municipality's own priorities.	
	CODE	**Criterion**			
	D2.1	Access to solidwaste and recycling collection points	*The network of waste collection points issatisfactory. This can beviewed on the Sousse city geoportal. Result of the LPC Vote 9/19*	*Approximately 85% of this waste is currently being disposed of at landfills or by uncontrolled dumping, with the remaining 15% being recycled and recovered. There is thus significant scope*	*Related to KPI*

				to increase the level of recycling and recovery for the solid waste in both Governorates in order to improve the reachability to all the inhabitants which will improve the process	
	D2.2	Access to solidwaste and recycling collection points		*Approximately 85% of this waste is currently being disposed of at landfills or by uncontrolled dumping, with the remaining 15% being recycled and recovered. There is thus significant scope to increase the level of recycling and recovery for the solid waste in both Governorates in order to improve the reachability to all the inhabitants which will improve the process*	*KPI*
E	**Environmental quality**				
E1	**Air quality**				*Environmental assessment*
	CODE	**Criterion**			
	E1.1	Fine particulatematter ($PM_{2.5}$) concentration		*PM2.5 is a concern for people's health and causes of air pollution*	
	E1.2	Particulatematter (PM_{10}) concentration		*A concern for people's health and causes of air pollution*	*KPI*

	E1.3	NitrogenDioxide concentration (NO2)		*To help in measuring and judging air pollution stemming from motor vehicle sources*	
	E1.4	SulfurDioxide concentration (SO2)			
	E1.5	Ozone concentration (O3)			
E2	**Noise**				
	CODE	**Criterion**			
	E2.1	Ambient daytime noise conditions	*An indicatorthatprovides information on the comfort of the neighborhood and the quality of life of residents.* *Result of the LPC Vote 3/19*		
	E2.2	Ambient night-time noise conditions	*An indicatorthatprovides information on the comfort of the neighborhood and the quality of life of residents.* *Result of the LPC Vote 1/19*		
E3	**EMF exposure**			*to guide the decision makers in Jordan to take serious and solid steps toward reducing radiation. As the short exposure to very high levels of EMF can be harmful to health, taking into consideration that these fields are highly distributed within the residential neighbourhood*	
	CODE	**Criterion**			

	E3.1	Exposure to high frequency electromagnetifields	*This is a criterion to follow to avoid or minimize risks to the health of residents resulting from exposure to CHEF, especially with the advent of future 5G.* *Result of the LPC Vote 9/19*	*to avoid and minimise health risk resulting from exposure to EMF*	
	E3.2	Percentage of buildings exposed to ELF magneticfileds		*to avoid and minimise health risk resulting from exposure to EMF*	
E4	**Environmental impacts**				
	CODE	**Criterion**			
	E4.1	Degree of atmospheric light pollution caused by exterior public lightingsystems	*Also known as "photopollution", this indicator tracks dazzle avoidance and intrusive light, reduces energy costs and reduces GHGs, which is why it is important for assessing the neighbourhood's sustainability.* *Result of Vote* ***LPC 9/19***		
F	**Transportation and mobility**				
F1	**Performance of mobility service**				*Assess the social aspect within the environmental aspect*
	CODE	**Criterion**			
	F1.1	Performance of the public transport system		*To support and improve the economic and social development to benefit todays and future generations*	*KPI*
	F1.2	Walking distance to public transport for area workers and students			
F2	**Green mobility**				*Assess the social aspect within the*

					environmental aspect
	CODE	**Criterion**			
	F2.1	Sharedvehicles			
	F2.2	Electric-vehicle infrastructure (charging stations)		*To support and improve the economic and social development to benefit todays and future generations.*	
	F2.3	Bicycle network		*Green mobility*	*KPI*
	F2.4	Sharedbycicles			
	F2.5	Availability of bicycle parking facilities			
F3	**Safety in mobility**			*Well being and safety*	
	CODE	**Criterion**			
	F3.1	Pedestrian infrastructure	*Reducingdependence on motorizedvehicles, GreenhouseGases and air pollution are among the objectives pursued by the city of Sousse, by attempting to developpedestrianization.* *Result of the LPC Vote 13/19*	*To reduce vehicle dependence, Greenhouse gas emission as and air pollution. This helps in achieving sustainable urban development from physical, social, environmental, cultural, economic and political aspects.*	
	F3.2	Availability of sidewalks	*This indicatoris important to monitor as ithelpsassess the quality of the pedestrian environment and thereforedevelop soft mobility in the neighborhood.* *Result of the LPC Vote 14/19*	*To promote walkability, social interaction, equity and accessibility to achieve a healthy environment*	

	F3.3	Safety of bicycle lines			
	F3.4	Traffic fatalities	*The country ranks 103/183 in the world in terms of road deathsin 2019. It istherefore important to monitor thisindicator. https://inkyfada.com/fr/2023/07/13/mortalite-accidents-route-tunisie/* *Result of the LPC Vote 12/19*	*Traffic accidents are approximately 38% annually, where 95% accidents occurred on the internal road network in the Irbid Governorate's towns, Traffic fatalities help to suggest an efficient traffic policy that can avoid serious threat to human life, economy, and social consequences. And improve a healthier pedestrian environment and safer mobility.*	
F4	**Urban morphology and trasportation**			*To support social aspects.* *To achieve social sustainability*	
	CODE	**Criterion**			
	F4.1	Cyclomatic complexity of the street network		*To promotes sustainable solutions to the safety and mobility challenges within Nuzha Neighborhood*	
	F4.2	Connectivity of the street network	*Important indicator for monitoring the quarter-hour city objective, with accessible and interconnected neighborhoods.* *Result of the LPC Vote 12/19*	*To achieve the objectives of a smart city , to be accessible and affordable*	
G	**Social Aspects**				
G1	**Accessibility (disabledpersons)**				

	CODE	Criterion			
	G1.1	Public buildings that are accessible for use by physically disabled persons	*This indicator assesses the inclusion and active participation of all people, including people with disabilities, in the life of the neighbourhood. Outcome of the **LPC** Vote **10/19***	*To ensure the inclusion and active participation of all people in the neighbourhood*	
	G1.2	Sidewalks and other pedestrian paths that are accessible for use by physically disabled persons	*This indicator assesses the inclusion and active participation of all people, including people with disabilities, in the life of the neighbourhood. Result of Vote **LPC 4/19***	*Providing walkways for pedestrians could increase how well pedestrians perceive their needs and increase their participation in the community*	
	G1.3	Barrier-free accessibility in local outdoor public areas		*This allows People With Disabilities (PWD) to have the same opportunities to enjoy and explore their community as everyone else*	
G2	**Housing**				
	CODE	**Criterion**			
	G2.1	Affordability of housing property		*The housing in the neighbourhood represents the common housing type and it is financially accessible to the lowest quintile of area.*	
	G2.2	Affordability of housing rental		*The availability of affordable housing units and rent control policies can help make housing more affordable*	
	G2.3	Percent of residential units in the local area that are		*To provide insights into the overall housing dynamics in*	

		vacant		*the local area, and to know the demand and capacity of housing and the challenges faced by residents in crowded areas.*	
	G2.4	Informal settlements	*This indicator provides information on the level of poverty and exclusion in a population. It focuses on priorities for investment in housing and infrastructure, with the aim of ensuring greater social inclusion.* *Result of Vote **LPC 13/19***	*To indicate the level of poverty and inequality in a community. It also helps identify areas that require more investment in housing and infrastructure development*	
G3	**Availability of public and privatefacilities and services**			*To understand the quality of life in the neighbourhood, including access to services such as healthcare, education, and public transportation*	*Assess the social aspect within the environmental aspect and economic aspect*
	CODE	**Criterion**			
	G3.1	Availability and proximity of key services		*To understand the quality of life in the neighbourhood, including access to services such as healthcare, education, and public transportation*	*KPI*
	G3.2	Availability and proximity of a public primary school		*To measure the educational opportunities and accessibility for children. Having a nearby public primary school can greatly benefit families who may not have the transportation to go to long distance schools. It*	

				also helps identify areas that require more investment in education infrastructure	
	G3.3	Availability and proximity of a public secondary school		*To measure the educational opportunities and accessibility for students. Having a nearby public primary school can greatly benefit families who may not have the transportation to go to long distance schools. It also helps identify areas that require more investment in education infrastructure*	
	G3.4	Availability and proximity of childrens' play facilities		*To define the quality of life for families with children as play facilities can greatly impact children's physical and mental health.*	
	G3.5	Outoor public spaces		*Having outdoor public spaces in the neighbourhood provides opportunities for residents to do physical activities, and increase social interaction. Measuring availability helps identify gaps and ensures that residents have equitable access to these spaces.*	
G4	**Education**				*To assess by how much the educational system is*

					prevalent in the surrounding neighbourhood (EDS).
	CODE	**Criterion**			
	G4.1	Primary enrollment rate		*To assess the level of access to education within the neighbourhood and provide insights into whether children in the area are able to enrol in school and access the fundamental education they need for personal development*	
	G4.2	Rate of female scholarship			
	G4.3	Secondary schoolenrollment		*To assess the level of access to education within the neighbourhood and provide insights into whether students in the area are able to enrol in school and access the fundamental education they need for personal development and future opportunities.*	
	G4.4	Terziary education			
G5	**Social inclusion**				*To evaluate by how much the residents are included by the neighbourhood through different social and socio-*

					economic initiatives, activities, resources and places (social and socio-economic sustainability)
	CODE	**Criterion**			
	G5.1	Energy poverty of households		*To understand the level of energy poverty and highlights areas where intervention is needed to ensure that everyone has access to essential energy services*	
	G5.2	Population at risk of poverty or exclusion		*To allow policymakers and key actor to allocate resources, design programs, and implement policies that address the unique challenges faced by vulnerable populations. This approach ensures that resources are directed where they are most needed, maximising their impact and promoting social cohesion.*	
G6	**Safety**				*To ensure the safety of the neighbourhood as this promotes residents' physical and mental health and decreases the risk of harm.*
	CODE	**Criterion**			
	G6.1	Police service		*To assess the capacity of the local police force to respond to and prevent crime, maintain order, and protect*	

				residents	
	G6.2	Fire service		*This helps assess the capacity of the local fire department to handle fire incidents*	
	G6.3	Population living in disasterprone areas			
G7	**Health**				
	CODE	**Criterion**			
	G7.1	In-Patient Hospital Beds			
G8	**Food security**				
	CODE	**Criterion**			
	G8.1	Urban agricoltural land			
G9	**Culture and Heritage**				
	CODE	**Criterion**			
	G9.1	Compatibility of urban design with local cultural values			
	G9.2	Compatibility of public open spacewith local cultural values			
G10	**Perceptual**				*To enhance urban walkability and sustainable practices.*
	CODE	**Criterion**			

	G10.1	Perceived safety of public areas for pedestrians		*This has a significant role in shaping the community's well-being. When individuals feel safe in their neighbourhood, people are more likely to engage in outdoor activities, utilise public spaces, and participate in community events when they feel safe in public areas*	
	G10.2	Impact of commercial signage on the visual environment			
	G10.3	Impact of overhead electric distribution system			
H	**Economy**				
H1	**Economicperformance**			*Jordan's fourth national green growth objective is to achieve resource efficiency. This can be defined as improving the efficiency – reducing the wastefulness – of the economy by achieving a higher efficiency in the production and consumption of economic outputs. The economic performance will assess the level of economic and revenue-generating activities and projects in the neighbourhood and to*	

				evaluate the economic and socio-economic sustainability	
	CODE	**Criterion**			
	H1.1	Average annual per-capita income of residents		*To understand the economic disparity or prosperity within the neighbourhood. This helps identify areas with lower or higher income levels and highlights potential inequalities*	
H2	**Employment**				
	CODE	**Criterion**			
	H2.1	Unemployment rate			
	H2.2	New business registration rate			
H3	**Innovation**				
	CODE	**Criterion**			
	H3.1	New business registration rate			
H4	**ICT infrastructure**			*Smart city development*	
	CODE	**Criterion**			
	H4.1	Fixed Broadband Subscriptions			

	H4.2	Wireless Broadband Coverage		*Nowadays, access to the internet is essential for full participation. Measuring the percentage of the residents served by wireless broadband helps identify areas with limited or no access to high-speed internet. This should be measured to work towards bridging the digital divide and ensuring that all residents have equal opportunities to access online resources*	
	H4.3	Availability of WIFI in Public Areas			
	H4.4	Mobile phone subscriptions		*To identify areas with inadequate coverage, and prioritise investments in network expansion or improvement*	
I	**CLIMATE CHANGE: mitigation and adaptation**				
I1	**Climate change mitigation**				*This is related to the Energy consumption and environmental and economic aspects*
	CODE	**Criterion**			

	I1.1	Greenhousegasemissions		*The Municipality of Greater Irbid is leading the fight inside the city against climate change*	*KPI*
	I1.2	Greenhousegasemissionsfrom residential buildings			*KPI*
	I1.3	Embodiedcarbon for construction and renovation of infrastructures			
	I1.4	Embodiedcarbon for construction/renovation of residential buildings			
	I1.5	Embodiedcarbon for construction/renovation of public offices/educational buildings			
	I1.6	CO_2sequestration			
I2	**Adaptation to the climaticaction:heatwaves and increase of temperature**			*on the adaptive model , leads to reduce energy consumption and using adaptive opportunities*	
	CODE	**Criterion**			
	I2.1	Albedo		*To reduce urban heat island effect*	

	I2.2	Use of vegetation to provide ambient outdoorcooling	*This indicator provides information on a means of reducing urban heat islands.* *Result of Vote* ***LPC 15/19***		
	I2.3	Green roofs		*To reduce urban heat island effect and to minimise stormwater runoff and increase biodiversity and encourage rain water harvesting*	
I3	**Adaptation to the climaticaction: pluvial flood**				*This is related to the environmental aspect and readiness to climate change*
	CODE	**Criterion**			
	I3.1	Stormwaterretentioncapacity on site by buildings			
	I3.2	Susyainable Urban Drainage			
	I3.3	Permeability of land		*To reduce urban heat island effect*	*KPI*
I4	**Adaptation to the climaticaction: fluvial and coastal flood**				
	CODE	**Criterion**			
	I4.1	Flood risk	*This indicator is important data for the public authorities when drawing up the local urban plan.*		

			Result of Vote ***LPC 15/19***		
	I4.2	Protection of vulnerable zones			
	I4.3	Protection of buildings fromflooding			
I5	**Adaptation to the climaticaction:drought**				
	CODE	**Criterion**			
	I5.1	Rainwater collection and storage from buildings for non-potable uses		*Irbid Governorate is highly dependent on groundwater and rainwater collected in dams. The governorate gathersaround 54% of Jordan's water sources. rainwater collection and storage from buildings for non-potable uses is vital to lower the use of potable water consumption for irrigation and other uses*	
	I5.2	Raiwater collection ajdstoragefromoutdoor areas		*To maximise water supply resources in Irbid which will decrease the pressure on water supply*	
	I5.3	Greywater collection in buidings for non-potable uses		*To conserve water using onsite sources for uses and for best planning of water management.*	
	I5.4	Local vegetation			

I6	**Adaptation to the climatichazard:wildfire**				
	CODE	**Criterion**			
	I6.1	Wildfirerisk			
	I6.2	Fire protection			
	I6.3	Fireproofground			
I7	**Climatichazarrd:wind**				
	CODE	**Criterion**			
	I7.1	Windproofurbanform			
J	**GOVERNANCE**				
J1	**Urban Planning**				
	CODE	**Criterion**			
	J1.1	Community involvement in urban planning activities	*An indicator that informs citizens' awareness of public affairs and their role in shaping their living environment.* *Result of the vote* ***LPC 13/19***		
J2	**Management and communityinvolvement**				
	CODE	**Criterion**			
	J2.1	Involvement of residents in communityaffairs			
J3	**Public buildings operation**				

	CODE	Criterion			
	J3.1	Public buildings sustainability	*An indicator that provides information on the level of government commitment to the sustainability theme.* *Result of Vote* ***LPC 14/19***	*Indication of the neighbourhood's commitment to environmental stewardship. Such certifications often take into account factors like energy efficiency, water conservation, waste management, etc.*	
	J3.2	Operating energycosts for public buildings		*To identify opportunities for energy conservation and cost reduction. This could involve implementing energy-efficient technologies, or adopting renewable energy sources*	
	J3.3	Energy consumption of public buildings	*An indicator that provides information on the level of government commitment to the sustainability theme.* *Result of Vote* ***LPC 15/19***		

2.2: SNTool data sources

SustainableNeighborhoods Tool

A	Use of land and biodiversity		SNTool data sources**Sousse**	SNTool data sources**Irbid**	SNTool data sources**Moukhtara**
A1	**Use of land**				
	CODE	**Criterion**			
	A1.1	Population density	- *National Institute of Statistics (INS)* - *Atlas of neighbourhoods* [(http://pduisousse.tn/documents/)](http://pduisousse.tn/documents/)	- *Department of Statistics (DOS)* *GIS Mapping*	
	A1.2	Urban compactness	- *Atlas of neighbourhoods* [(http://pduisousse.tn/documents/)](http://pduisousse.tn/documents/) -*Aerial photo (Ministry of Equipment)* -*Qgis*	- *GIS Mapping* *Site assessment through physical visits and observation.*	
	A1.3	Homogeneity of the urbanfabric			
	A1.4	Conservation of land			
A2	**Green urban areas**				
	CODE	**Criterion**			
	A2.1	Availability of green urban	- *Atlas of neighbourhoods*	- *GIM*	Moukhtara Municipality

		areas	(http://pduisousse.tn/documents/) *-Google Earth* *-Geoportal of the city of Sousse* *-Municipality of Sousse*	*GIS Mapping*	Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants.
	A2.2	Green areas in relation to the neighborhood population	*- Atlas of neighbourhoods* (http://pduisousse.tn/documents/) *-Geoportal of the city of Sousse*	- *Department of Statistics (DOS)* - *GIM* *GIS Mapping*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants.
	A2.3	Green Area Accessibility		- *GIM* *GIS Mapping*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants.
	A2.4	Green zones density	*- Atlas of neighbourhoods* (http://pduisousse.tn/documents/) *-Geoportal of the city of Sousse*	- *GIM* *GIS Mapping*	
	A2.5	Green zones and ecosystemic services			
A3	**Biodiversity and**				

	ecosystems				
	CODE	**Criterion**			
	A3.1	Connectivity measures for natural areas			
	A3.2	Biodiversity in green zones			
B	**Energy**				
B1	**Energy infrastructure**				
	CODE	**Criterion**			
	B1.1	Access to electrical service	*-Tunisian Electricity and Gas Corporation (STEG)*	*Ministry of Energy and Miniral Resources* *Ideco" Irbid Electricity Company"* *Questionnaire Survey*	
B2	**Energy consumptions**			- *Electricity bills samples* - *Ministry of Energy and Miniral Resources* - *Ideco" Irbid Electricity Company"* - *Questionnaire Survey*	
	CODE	**Criterion**			
	B2.1	Total final thermal energyconsumption for building operations		- *Electricity bills samples* - *Ministry of Energy and Miniral*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator

				Resources - *Ideco“ Irbid Electricity Company”* - *Questionnaire Survey*	conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B2.2	Total final thermal energy consumption for residential building operations			
	B2.3	Total final thermal energy consumption for public office/ educational building operations			
	B2.4	Total final electricalenergyconsumption for building operations		*Electricity bills samples*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values

					were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B2.5	Total final electrical energy consumption for residential building operations		*Ministry of Energy and Miniral Resources*	
	B2.6	Total final electricen ergy consumption for public office/ educational building operations			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. Data verification and analysis was conducted by the SMC Team Lead and Quality Management consultants. Calculation of the target and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B2.7	Total primary energy demand for building operations		*Electricity bills samples*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants.

					Calculation of the target and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B2.8	Total primary energy demand for residential building operations			
	B2.9	Total primary energy demand for public office/educational building operations			
	B2.10	Energy consumption of public lighting	*-Tunisian Electricity and Gas Corporation (STEG)* *-Municipality of Sousse*	*Ministry of Energy and Miniral Resources*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4

B3	Renewableenergy				
	CODE	**Criterion**			
	B3.1	Share of renewable energy on-site, relative to total final thermal energy consumption for building operations		*Ministry of Energy and Miniral Resources*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the target and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B3.2	Share of renewable energy on-site, relative to total final thermal energy consumption for residential building operations			
	B3.3	Share of renewable energy on- site, relative to total final thermal energy consumption for public office/educational building operations			

	B3.4	Share of renewable energy on-site, relative to final electric energy consumption		*Ministry of Energy and Miniral Resources*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the target and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B3.5	Share of renewable energy on-site, relative to total final electricen ergy consumption for residential building operations			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the target and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4

	B3.6	Share of renewable energy on-site, on final electricen ergy consumptions for public office/educational building operations			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the target and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B3.7	Share of renewable energy on-site, relative to total primary energy consumption for building operations		*Ministry of Energy and Miniral Resources*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the target and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4

	B3.8	Share of renewable energy on-site, relative to total primary energy consumption for residential building operations			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B3.9	Share of renewable energy on-site, on total primary energy consumptions for public office/ educational building operations			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4

C	Water				
C1	Water infrastructure				
	CODE	Criterion			
	C1.1	Availability of a public municipal water supply	*-Société Nationale d'Exploitation et de Distribution des Eaux (SONEDE)* *- Atlas of neighbourhoods* [(http://pduisousse.tn/documents/)](http://pduisousse.tn/documents/)	- *Yarmouk Water Company* - *Questionnaire Survey*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants.
	C1.2	Availability of waste water treatment systems	*-National Office for Sanitation (ONAS)* *- Atlas of neighbourhoods* [(http://pduisousse.tn/documents/)](http://pduisousse.tn/documents/)	- *Yarmouk Water Company*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants.
C2	Water consumption				*This is related to basic needs and economic aspect*
	CODE	Criterion			
	C2.1	Total water consumption	*-Société Nationale d'Exploitation et de Distribution des Eaux (SONEDE)*	- *Yarmouk Water Company* *Building water bills samples*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality

					Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	C2.2	Efficiency in water use	*-Société Nationale d'Exploitation et de Distribution des Eaux (SONEDE)*		
	C2.3	Consumption of potable water in residential buildings			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	C2.4	Consumption of potable water in public offices		- *Building water bills samples* *Questionnaire Survey*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator

					conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	C2.5	Consumption of potable water in educational buildings		- *Building water bills samples* *Questionnaire Survey*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	C2.6	Re-use of rainwater in residential buildings		- *GIM* - *Questionnaire Survey*	

	C2.7	Consumption of potable water in public green spaces	*-Municipality of Sousse*	- *GIM* *Yarmouk Water Company*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	C2.8	Solar powered water desalinisation			
C3	**Effluents management**				
	CODE	**Criterion**			
	C3.1	Water treatment	*-National Office for Sanitation (ONAS)*	*Yarmouk Water Company*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local

					standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	C3.2	Public wastewater (fromoutdoor areas) that is disposed or treated		*Yarmouk Water Company*	
	C3.3	Household sanitation		*- Yarmouk Water Company Questionnaire Survey*	**Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants.
D	**Solid Waste**				
D1	**Solid waste collection infrastructure**				
	CODE	**Criterion**			
	D1.1	Availability of solidwaste collection	*-Municipality of Sousse* *- Geoportal of the city of Sousse* *-National Waste Management Agency (ANGED)*	*- GIM Questionnaire Survey*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants

D2	Solid waste management				
	CODE	Criterion			
	D2.1	Access to solidwaste and recycling collection points	*-Municipality of Sousse - Geoportal of the city of Sousse -National Waste Management Agency (ANGED)*	*- GIM - Questionnaire Survey Site assessment through physical visits and observation.*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4.
	D2.2	Access to solidwaste and recycling collection points		*Approximately 85% of this waste is currently being disposed of at landfills or by uncontrolled dumping, with the remaining 15% being recycled and recovered. There is thus significant scope to increase the level of recycling and recovery for the solid waste in both Governorates in order to improve the reachability to all the inhabitants which will improve the process*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through

					coordination between all the members of the SMC team listed under template 1.4.
E	**Environmental quality**				
E1	**Air quality**				*Environmental assessment*
	CODE	**Criterion**			
	E1.1	Fine particulatematter ($PM_{2.5}$) concentration		- *Ministry of Environment*	
	E1.2	Particulatematter (PM_{10}) concentration		- *Ministry of Environment*	*Based on available data from local studies and assumptions based on Moukhatara context.*
	E1.3	NitrogenDioxide concentration (NO2)		- *Ministry of Environment*	
	E1.4	SulfurDioxide concentration (SO2)			
	E1.5	Ozone concentration (O3)			
E2	**Noise**				
	CODE	**Criterion**			
	E2.1	Ambient daytime noise conditions	*-National Agency for Environmental Protection (ANPE)*		
	E2.2	Ambient night-time noise conditions	*-National Agency for Environmental Protection (ANPE)*		

E3	**EMF exposure**				
	CODE	**Criterion**			
	E3.1	Exposure to high frequency electromagnetifields	*-National Agency for Environmental Protection (ANPE)* *-Neighbourhood tour*	*National Telecommunication Company*	
	E3.2	Percentage of buildings exposed to ELF magneticfileds		*Ideco" Irbid Electricity Company"*	
E4	**Environmental impacts**				
	CODE	**Criterion**			
	E4.1	Degree of atmospheric light pollution caused by exterior public lightingsystems	*-National Agency for Environmental Protection (ANPE)*		
F	**Transportation and mobility**				
F1	**Performance of mobility service**				
	CODE	**Criterion**			
	F1.1	Performance of the public transport system			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants
	F1.2	Walking distance to public transport for area workers			

		and students			
F2	**Green mobility**				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants
	CODE	**Criterion**			
	F2.1	Sharedvehicles			
	F2.2	Electric-vehicle infrastructure (charging stations)		- *Site assessment through physical visits and observation.*	
	F2.3	Bicycle network			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants
	F2.4	Sharedbycicles			
	F2.5	Availability of bicycle parking facilities			

F3	**Safety in mobility**				
	CODE	**Criterion**			
	F3.1	Pedestrian infrastructure	*-Local Urban Plan (PLU) of the city of Sousse* *- Atlas of neighbourhoods* *(http://pduisousse.tn/documents/)* *- Tour of the neighbourhood*	*- GIM* *- GIS Mapping* *- Questionnaire Survey* *Site assessment through physical visits and observation.*	
	F3.2	Availability of sidewalks	*-Local Urban Plan (PLU) of the city of Sousse* *- Atlas of neighbourhoods* *(http://pduisousse.tn/documents/)* *-Tour of the neighbourhood* *-Aerial photo (Ministry of Equipment)*	*- GIM* *- GIS Mapping* *- Questionnaire Survey* *Site assessment through physical visits and observation.*	
	F3.3	Safety of bicycle lines			
	F3.4	Traffic fatalities	*-National Observatory for Road Safety Information, Training, Documentation and Studies.*	*- Department of Statistics* *Public Security Department*	
F4	**Urban morphology and trasportation**				
	CODE	**Criterion**			
	F4.1	Cyclomaticcomplexity of the street network		*- GIS Mapping* *Site assessment through physical visits and observation.*	
	F4.2	Connectivity of the street network	*- Atlas of neighbourhoods* *(http://pduisousse.tn/documents/)* *-Qgis*	*- GIS Mapping* *Site assessment through physical visits and observation.*	

G	**Social Aspects**				
G1	**Accessibility (disabledpersons)**				
	CODE	**Criterion**			
	G1.1	Public buildings that are accessible for use by physicallydisabledpersons	*-Municipality of Sousse* *-Tour of the neighbourhood*	- *Site assessment through physical visits and observation.*	
	G1.2	Sidewalks and other pedestrian pathsthat are accessible for use by physicallydisabledpersons	*-Municipality of Sousse* *-Tour of the neighbourhood*	- *GIM* - *Site assessment through physical visits and observation.* - *Questionnaire Survey*	
	G1.3	Barrier-free accessibility in local outdoor public areas		- *GIM* - *Site assessment through physical visits and observation.* *Questionnaire Survey*	
G2	**Housing**				
	CODE	**Criterion**			
	G2.1	Affordability of housingproperty		*Questionnaire Survey*	

	G2.2	Affordability of housingrental		*Questionnaire Survey*	
	G2.3	Percent of residentialunits in the local area that are vacant		*Site assessment through physical visits and observation.*	
	G2.4	Informal settlements	*- National Institute of Statistics (INS)* *-Municipality of Sousse*	*- GIM* *Site assessment through physical visits and observation.*	
G3	**Availability of public and privatefacilities and services**				
	CODE	**Criterion**			
	G3.1	Availability and proximity of key services		*GIS Mapping*	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4. Assumptions

					and **additional data** from google earth
	G3.2	Availability and proximity of a public primaryschool		*GIS Mapping*	
	G3.3	Availability and proximity of a public secondaryschool		*GIS Mapping*	
	G3.4	Availability and proximity of childrens' playfacilities		*GIS Mapping*	
	G3.5	Outoor public spaces		- *GIM* *GIS Mapping*	
G4	**Education**				
	CODE	**Criterion**			
	G4.1	Primaryenrollment rate		- *Ministry of Education* - *Site assessment through physical visits to primary schools*	
	G4.2	Rate of femalescholarship			
	G4.3	Secondaryschoolenrollment		- *Ministry of Education* *Site assessment through physical visits to secondary*	

				schools	
	G4.4	Terziaryeducation			
G5	**Social inclusion**				
	CODE	**Criterion**			
	G5.1	Energy poverty of households		- *Ideco" Irbid Electricity Company"* *Questionnaire Survey*	
	G5.2	Population at risk of poverty or exclusion		- *Department of statistics* *Questionnaire Survey*	
G6	**Safety**				
	CODE	**Criterion**			
	G6.1	Police service		- *Site assessment through physical visits to secondary schools* *Department of Statistics*	
	G6.2	Fire service		- *Civil Defense Department* *Department of Statistics*	
	G6.3	Population living in disasterprone areas			
G7	**Health**				
	CODE	**Criterion**			

	G7.1	In-Patient Hospital Beds			
G8	**Food security**				
	CODE	**Criterion**			
	G8.1	Urban agricoltural land			
G9	**Culture and Heritage**				
	CODE	**Criterion**			
	G9.1	Compatibility of urban design with local cultural values			
	G9.2	Compatibility of public open spacewith local cultural values			
G10	**Perceptual**				
	CODE	**Criterion**			
	G10.1	Perceivedsafety of public areas for pedestrians		*Questionnaire Survey*	
	G10.2	Impact of commercial signage on the visualenvironment			
	G10.3	Impact of overheadelectric distribution system			
H	**Economy**				
H1	**Economic performance**				

	CODE	**Criterion**			
	H1.1	Averageannual per-capita income of residents		- *Department of Statistics* - *Questionnaire Survey*	
H2	**Employment**				
	CODE	**Criterion**			
	H2.1	Unemployment rate			
	H2.2	New business registration rate			
H3	**Innovation**				
	CODE	**Criterion**			
	H3.1	New business registration rate			
H4	**ICT infrastructure**				
	CODE	**Criterion**			
	H4.1	Fixed Broadband Subscriptions			
	H4.2	Wireless Broadband Coverage		- *National Telecommunication Company*	

				Questionnaire Survey	
	H4.3	Availability of WIFI in Public Areas			
	H4.4	Mobile phone subscriptions		- *National Telecommunication Company* *Questionnaire Survey*	
I	**CLIMATE CHANGE: mitigation and adaptation**				
I1	**Climate change mitigation**				
	CODE	**Criterion**			
	I1.1	Greenhousegasemissions		- *Ministry of Environment*	**Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4. ***Calculations*** *based on the data collected for category B and available studies for* ***assumptions*** *of coefficient factor*

	I1.2	Greenhousegasemissionsfrom residential buildings			**Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4. ***Calculations*** *based on the data collected for category B and available studies for* ***assumptions*** *of coefficient factor*
	I1.3	Embodiedcarbon for construction and renovation of infrastructures			
	I1.4	Embodiedcarbon for construction/renovation of residential buildings			
	I1.5	Embodiedcarbon for construction/renovation of public offices/educational buildings			
	I1.6	CO_2sequestration			
I2	**Adaptation to the climaticaction:heatwaves and increase of temperature**				

	CODE	**Criterion**			
	I2.1	Albedo		*Site assessment through physical visits and observation*	
	I2.2	Use of vegetation to provide ambient outdoorcooling	*-Google Earth* *-Aerial photo (Ministry of Equipment)*		
	I2.3	Green roofs		- *GIM* - *Site assessment through physical visits and observation*	
I3	**Adaptation to the climaticaction: pluvial flood**				
	CODE	**Criterion**			
	I3.1	Stormwaterrétentioncapacity on site by buildings			
	I3.2	Susyainable Urban Drainage			
	I3.3	Permeability of land		- *GIM* *Site assessment through physical visits and observation*	***Calculation****s based on data collected from local and international studies and* ***assumptions*** *based on Moukhatara context.*
I4	**Adaptation to the climaticaction: fluvial and coastal flood**				

	CODE	**Criterion**			
	I4.1	Flood risk	*- Atlas of neighbourhoods* [(http://pduisousse.tn/documents/)](http://pduisousse.tn/documents/) *-Qgis*		
	I4.2	Protection of vulnerable zones			
	I4.3	Protection of buildings fromflooding			
I5	**Adaptation to the climaticaction:drought**				
	CODE	**Criterion**			
	I5.1	Rainwater collection and storage from buildings for non-potable uses		- *GIM* - *Questionnaire Survey* *Site assessment through physical visits and observation*	
	I5.2	Raiwater collection ajdstoragefromoutdoor areas		- *GIM* *Yarmouk Water Company*	
	I5.3	Greywater collection in buidings for non-potable uses		- *GIM* *Questionnaire Survey*	
	I5.4	Local vegetation			
I6	**Adaptation to the climatichazard:wildfire**				
	CODE	**Criterion**			
	I6.1	Wildfirerisk			
	I6.2	Fire protection			

	I6.3	Fire proof ground			
I7	**Climatichazarrd:wind**				
	CODE	**Criterion**			
	I7.1	Windproofurbanform			
J	**GOVERNANCE**				
J1	**Urban Planning**				
	CODE	**Criterion**			
	J1.1	Community involvement in urban planning activities	*-Municipality of Sousse* *-Sousse governorate*		
J2	**Management and communityinvolvement**				
	CODE	**Criterion**			
	J2.1	Involvement of residents in community affairs			
J3	**Public buildings operation**				
	CODE	**Criterion**			
	J3.1	Public buildings sustainability	*-National Energy Management Agency (ANME)*	- *GIM*	
	J3.2	Operating energycosts for public buildings		- *GIM* - *Electricity bills samples* - *Ideco" Irbid*	

				Electricity Company"	
	J3.3	Energy consumption of public buildings	*-Tunisian Electricity and Gas Corporation (STEG)* *-Municipality of Sousse* *-Regional Directorates of Public Departments and Agencies* *- Atlas of neighbourhoods* [(http://pduisousse.tn/documents/)](http://pduisousse.tn/documents/)		

2.3: SNTool Benchmarks

1/ SOUSSE :

A. Use of *land and biodiversity*

Criterion	Indicator	Unit of measure	Benchmark		Rationale
A1.1.	Human Density	Hab./Ha	0:	**60**	*This is the average density value of the city in 2020*
			5:	**200**	*The densest neighbourhood in Sousse, has a density of 218 inhabitants/Ha*
A1.2.	Urban Compactness	m3/m²	0:	**2**	*The generic benchmark is consistent with the local context*
			5:	**3**	*The generic benchmark is consistent with the local context*
A2.1.	Availability of green areas	%	0:	**30**	*The generic benchmark is consistent with the local context*
			5:	**40**	*The generic benchmark is consistent with the local context*
A2.2.	Green spaces compared to the	m²/Hab.	0:	**5**	*The generic benchmark is consistent with the local context*

	neighbourhood population		5:	**50**	*The generic benchmark is consistent with the local context*
A2.4.	Density of green areas	%	0:	**15**	*Participation of roads, equipment and green space*
			5:	**25**	*The operation of the town site requires a 25% transfer to the municipality*

B. Energy

Criterion	Indicator	Unit of measure	Benchmark		Rationale
B1.1	Access to electrical service	%	0:	**89**	*The generic benchmark is consistent with the local context*
			5:	**100**	*The generic benchmark is consistent with the local context*
B2.10	Energy consumption of public lighting	Kwh/Km/year	0:	**15000**	*Studies on the average consumption of public lighting in the city*
			5:	**8000**	*Aim to halve consumption by using low-energy lamps.*

C. Water

Criterion	Indicator	Unit of measure	Benchmark		Rationale
C1.1	Availability of public water supply	%	0:	**5**	*The generic benchmark is consistent with the local context*
			5:	**2**	*The generic benchmark is consistent with the local context*
C1.2	Availability of wastewater treatment systems	%	0:	**95**	*The generic benchmark is consistent with the local context*
			5:	**100**	*The generic benchmark is consistent with the local context*
C2.1	Total water consumption	Bed / day / per	0:	**400**	*The total consumption is measured by the water distribution company's figures*
			5	**300**	*The total consumption is measured by the water distribution company's figures*
C2.2	Efficiency in water use	%	0:	**20**	*The generic benchmark is consistent with the local context*
			5:	**30**	*The generic benchmark is consistent with the local context*

D. Solid Waste

Criterion	Indicator	Unit of measure	Benchmark		Rationale
D2.1	Access to solid waste collection and recycling points	%	0:	**75**	*The generic benchmark is consistent with the local context*
			5:	**95**	*The generic benchmark is consistent with the local context*

E. Environmental quality

Criterion	Indicator	Unit of measure	Benchmark		Rationale
E2.1	Ambient daytime noise	%	0:	**45**	*Regulations in effect in cities with similar urban characteristics.*
			5:	**35**	*The generic benchmark is consistent with the local context*
E2.2	Night ambient noise	%	0:	**20**	*Regulations in effect in cities with similar urban characteristics.*
			5:	**5**	*The generic benchmark is consistent with the local context*
E3.1	Exposure to high frequency electromagnetic fields	%	0:	**80**	*The generic benchmark is consistent with the local context*
			5:	**100**	*The generic benchmark is consistent with the local context*
E4.1	Degree of light pollution caused by outdoor public lighting systems	%	0:	**2**	*The generic benchmark is consistent with the local context*
			5	**0.5**	*The generic benchmark is consistent with the local context*

F. Transportation and mobility

Criterion	Indicator	Unit of measure	Benchmark		Rationale
F3.1	Pedestrian infrastructure	%	0:	**10**	*The public transit system is not effective at planning a large pedestrian area*
			5:	**25**	*The generic benchmark is consistent with the local context*
F3.2	Sidewalk Availability	%	0:	**80**	*The generic benchmark is consistent with the local context*
			5:	**100**	*The generic benchmark is consistent with the local context*
F3.4	Fatal traffic accidents	No. / 1000 Hab.	0:	**18**	*The generic benchmark is consistent with the local context*

			0:	**0**	*The generic benchmark is consistent with the local context*
F4.2	Connectivity of the road network	Nbr / km²	5:	**70**	*The generic benchmark is consistent with the local context*
			0:	**200**	*The generic benchmark is consistent with the local context*

G. Social aspects

Criterion	Indicator	Unit of measure	Benchmark		Rationale
G1.1	Public buildings accessible to people with physical disabilities	%	0:	**50**	*The generic benchmark is consistent with the local context*
			5:	**90**	*The generic benchmark is consistent with the local context*
G1.2	Sidewalks and other pedestrian trails accessible to physically disabled people	%	0:	**50**	*The generic benchmark is consistent with the local context*
			5	**100**	*The generic benchmark is consistent with the local context*
G2.4	Informal settlements	%	0:	**5**	*The generic benchmark is consistent with the local context*
			5:	**0**	*The generic benchmark is consistent with the local context*

I. Climate change: mitigation and adaptation

Criterion	Indicator	Unit of measure	Benchmark		Rationale
I2.2	Use of vegetation for ambient outdoor cooling	Index	0:	**20**	*The generic benchmark is consistent with the local context*
			5:	**50**	*The generic benchmark is consistent with the local context*
I4.1	Risk of flooding	%	0:	**10**	*The generic benchmark is consistent with the local context*
			5:	**5**	*The generic benchmark is consistent with the local context*

J. Governance

Criterion	Indicator	Unit of measure	Benchmark	Rationale

J1.1	Community participation in urban planning activities	Level	0:	**0**	*The generic benchmark is consistent with the local context*
			5:	**5**	*The generic benchmark is consistent with the local context*
J3.1	Sustainability of public buildings	%	0:	**20**	*The generic benchmark is consistent with the local context*
			5:	**100**	*The generic benchmark is consistent with the local context*
J3.3	Energy consumption of public buildings	kWh/m²	0:	**25**	*The generic benchmark is consistent with the local context*
			5:	**10**	*The generic benchmark is consistent with the local context*

1/ IRBID :

A. Use of land and biodiversity				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
A1.1	*Population density in built-up areas (neighborhood area minus green and blue)*	*Inhabitants per km²*	*0: (15,000)*	*Promoting high-density neighborhoods based on sustainable neighborhood planning principles, to alleviate urban sprawl and maximize land efficiency.* *Source: UN-Habitat Urban Planning Discussion note*
			5: (60,000)	*Promoting high-density neighborhoods based on sustainable neighborhood planning principles, to alleviate urban sprawl and maximize land efficiency.* *Source: UN-Habitat Urban Planning Discussion note*
A1.2	Relation between the usable space of the buildings (volume) and the urban space (area	m^3 / m^2	*0: (2)*	*https://iopscience.iop.org/article/10.1088/1755-1315/323/1/012071/pdf*
			5: (3)	*https://iopscience.iop.org/article/10.1088/1755-1315/323/1/012071/pdf*
	Proportion of all vegetated areas within the neighborhoodboundaries in relation		*0: (15)*	*Global average for green spaces percentage in cities* *Source: Urban future with a purpose- Deloitte*

A2.1	to the total area	%	*5: (20)*	*Suggested improvement strategy*
A2.2	Total area of green in the city divided by neigborhood's total population	m²/inhabitant	*0: (0.48)*	*Current average within Irbid Greater Muncipality's borders* *Ref: Irbid Spatial Profile 2022, UN-Habitat*
			5: (11.25)	*Suggested according to LEED v4.1 Cities - Plan & Design*
A2.3	Number of inhabitants living with 300m of a publicly accessible green space of at least 0.5ha divided by the total number of neighborhood inhabitants	%	*0: (48)*	*Total percent of population with access to public spaces within a 15 minutes walking distance within Irbid Greater Municipality's borders* *Ref: Irbid Spatial Profile 2022, UN-Habitat*
			5: (100)	*The World Health Organization recommends that all people should reside within 300 m of a public green space*
A2.4	Density of green spaces within the area	%	*0: (15%)*	*percentage of per capita green area in irbid * the current population* *Irbid Spatial Profile— Un Habitat*
			5: (20%)	*Suggested improvement strategy*
B. Energy				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
B1.1	*Percentage of households with authorized access to electricity*	*%*	*0: (98%)*	According to Irbid Spatial Profile (99.1%) https://unhabitat.org/sites/default/files/2022/04/220411-final_irbid_profile.pdf

			5: (100%)	*According to the international standards in 2021 (https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS)*
B2.1	Total final thermal energy consumption for building operations	kWh/m²/a	*0: 100*	- *Ideco" Irbid Electricity Company"* - *Questionnaire Survey*
			5: 30	
B2.4	Total final electrical energy consumption for building operations	kWh/m²/a	*0: 25*	- *Ideco" Irbid Electricity Company"* - *Questionnaire Survey*
			5: 5	
B2.5	Aggregated annual final electrical energy consumption of residential buildings per aggregated indoor useful floor area	kWh/m²/year	*0: 15*	*Useable floor area 186* m² *https://www.lmaleidykla.lt/ojs/index.php/energetika/article/download/4857/4226/*
			5: 5	*Useable floor area 186* m² *https://www.lmaleidykla.lt/ojs/index.php/energetika/article/download/4857/4226/*
B2.7	Total primary energy demand for building operations	kWh/m²/a	*0: 50*	- *Ideco" Irbid Electricity Company"* - *Questionnaire Survey*
			5: 15	
B2.10	Total electricity consumption of public street lighting divided by the total distance of streets where street lights are present	kWh/Km year	*0: (38,616)*	*Sustainable Energy and Climate Action Plan (SECAP) https://www.climamed.eu/wp-content/uploads/files/SECAP_Greater-Irbid-Municipality_Jordan.pdf*
			5: (14,771)	*Sustainable Energy and Climate Action Plan (SECAP) https://www.climamed.eu/wp-content/uploads/files/SECAP_Greater-Irbid-Municipality_Jordan.pdf*

B3.1	Share of renewable energy on-site, relative to total final thermal energy consumption for building operations	%	*0: 25*	- *Questionnaire Survey* - *Current situation observations*
			5: 90	
B3.4	Share of renewable energy on-site, relative to final electric energy consumption	%	*0: 35*	- *Questionnaire Survey* - *Current situation observations*
			5: 75	
B3.7	Share of renewable energy on-site, relative to total primary energy consumption for building operations	%	*0: 30*	- *Questionnaire Survey* - *Current situation observations*
			5: 100	

C. Water

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
C1.1	*Percentage of the buildings within the neighborhood that are served by a municipal water supply*	*%*	*0: (99%)*	*1.*https://doi.org/10.1080/1573062X.2012.709255 *2. IRBID SPATIAL PROFILE* https://unhabitat.org/sites/default/files/2022/04/220411-final_irbid_profile.pdf
			5: (100%)	*International Laws*

C1.2	Percentage of buildings within the neighbourhood that are served by wastewater collection	%	*0: (63%)*	*1. Water Sector Indicators and Targets 2025 at* *https://www.pseau.org/outils/ouvrages/mwi_national_water_strategy_2016_2025_2016.pdf*
			5: (80%)	*Irbid Spatial Profile 2022* *https://www.pseau.org/outils/ouvrages/mwi_national_water_strategy_2016_2025_2016.pdf*
C2.1	Total amount of the area's water consumption in liters per day divided by the total area population	Liters/day/person	*0: (135)*	*International laws and standards*
			5: (80)	*Statistics from Yarmouk Water Company* *https://jjce.just.edu.jo/issues/paper.php?p=64.pdf*
C2.3	Consumption of potable water in residential buildings	Liters/day/person	0: (250)	*Yarmouk Water Company and statistics*
			5: (60)	
C2.4	Annual potable water consumption per occupant (offices)	Liters/day/person	*0: (50)*	*Yarmouk Water Company*
			5: (20)	*International Laws and standards*
C2.5	Annual potable water consumption per occupant (educational buildings)	Liters/day/person	*0: (63)*	*Yarmouk Water Company*
			5: (48)	*https://www.sciencedirect.com/science/article/pii/S1877705811049307?via%3Dihub*
C2.6	Share of rainwater collected from roofs of residential buildings for reuse	%	*0: (0%)*	*statistics and simulations*

			5: (30%)	*International Laws* *https://www.oas.org/dsd/publications/unit/oea59e/ch10.htm*
C2.7	Potable water used for irrigation purposes in public green spaces	m³/m²	*0: (5)*	*https://www.climamed.eu/wp-content/uploads/files/SECAP_Greater-Irbid-Municipality_Jordan.pdf?fbclid=IwAR2THB-Z5WIGwwHc5U06hSAlRV4McISJo27EVRCh9o2dkdFLFTBIxegpqGQ*
			5: (0)	*https://doi.org/10.1016/j.landurbplan.2018.10.006*
C3.1	Total volume of wastewater collected for at least secondary treatment in centralized wastewater treatment facilities divided by the total volume of wastewater produced in the area	%	*0: (56%)*	*1rbid Spatial profile 2022*
			5: (63%)	*National water strategy 2016-2025*
C3.2	Percent of public wastewater that is disposed or treated	%	*0: (56%)*	*1.Amman Green City Action Plan* *2. Irbid Spatial profile 2022*
			5: (63%)	*Irbid Spatial profile 2022*
C3.3	Percentage of households with access to basic sanitation facilities	%	*0: (98.8)*	*Yarmouk Water Company*
			5: (100%)	*International laws*

D. Solid waste

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*

D1.1	*Percentage of buildings with regular solid waste collection*	*%*	*(60%)*	*According to Jordan Waste value chain :* *file:///C:/Users/My%20Laptop/Downloads/Jordan%20Waste%20Value%20Chain%20Report_FINAL%20(2).pdf* *Jordan Water Utilities* *Monitoring Report 2020* *https://www.climamed.eu/wp-content/uploads/files/SECAP_Greater-Irbid-Municipality_Jordan.pdf?fbclid=IwAR2THB-Z5WIGwwHc5U06hSAlRV4McISJo27EVRCh9o2dkdFLFTBIxegpqGQ* https://www.undp.org/sites/g/files/zskgke326/files/migration/jo/Jordan-Waste-Value-Chain-Report_FINAL.PDF
			5: (90%)	*According to world bank data (low-middle income)* *https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html* *WASTE SECTOR Green Growth National Action Plan 2021-2025* *https://www.undp.org/sites/g/files/zskgke326/files/migration/jo/Jordan-Waste-Value-Chain-Report_FINAL.PDF* *https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html* *https://jjce.just.edu.jo/issues/paper.php?p=4328.pdf* *https://www.researchgate.net/publication/6745643_Techno-economic_assessment_of_municipal_solid_waste_management_in_Jordan* *https://www.retech-germany.net/fileadmin/retech/05_mediathek/laenderinformationen/Jordanien_RA_ANG_WEB_Laenderprofile_sweep_net.pdf*

D2.1	Proximity of the resident population to the solid waste and recycling collection point	%	*0: (0)*	*10.1016/j.promfg.2020.02.221*
			5: (19)	*International laws and standards*
D2.2	Access to solid waste and recycling collection points	%	*0: (0)*	*International laws and standards*
			5: (19)	
E. Environmental Quality				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
E1.1	*Number of days within a year that PM2.5 concentration exceeds the daily limit*	*days / y*	*0: (3)*	*Standard for ambient air quality JS 1140 / 2006, Ministry of Environment*
			5: (0)	*Previous studies*
E1.2	Number of days within a year that PM10 concentration exceeds the daily limit	days / y	*0: (10)*	*Previous studies*
			5: (5)	
E1.3	Number of days within a year that NO2 concentration exceeds the daily limit	$\mu g/m^3$	*0: (40)*	*Previous studies*
			5: (20)	*Previous studies*
E3.1	Percentage of mobile network antenna sites in compliance with EMF exposure	%	*0: (80%)*	*https://www.gsma.com/publicpolicy/wp-content/uploads/2021/10/GSMA_EMF_Exposure_Compliance_Policies*

	guidelines		*5: (100%)*	*_for_Mobile_Network_Sites_Oct21.pdf*
E3.2	Percentage of buildings in the area located not respecting the safety distance from high voltage lines	%	*0: (50)*	- *Ideco" Irbid Electricity Company"* - *Questionnaire Survey*
			5: (5)	

F. Transportation and mobility

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
F1.1	*Performance of the public transport system*	*%*	*0: (30)*	*Observations*
			5: (70)	
F2.2	*Electric vehicle charging stations per inhabitant*	*n/inhabitant*	*0: (0.01)*	*Minimum number of planned private and public electric vehicle charging stations is 1.07 per 10,000 residents according to LEED v4.1 Cities - Plan & Design*
			5: (0.05)	*The Executive Action Plan of Jordan Energy Strategy 2020-2030 states that one of its goals is to provide sufficient of electric charging stations. According to desk research, the best practice currently implemented in London with number of electric vehicles stations 62.8 per 100,000*
F2.3	Bicycle network	m/inhabitant	*0: (5)*	*Current Situation*
			5: (40)	
F3.1	Percentage of the city designated as a pedestrian/car free zone	%	*0: (0)*	*No existing Car-free zones in Irbid*
			5: (10)	*Cultural norms and values*
F3.2	Percentage of roads' length that has dedicated sidewalks	%	*0: (50)*	*According to Planning and Urban Design Standards, APA* *at least one side coverage for residential areas and two sides coverage for commercial areas. " Data based on AASHTO Green Book 1995"*

			5: (100)	*According to Planning and Urban Design Standards, APA* *at least one side coverage for residential areas and two sides coverage for commercial areas. " Data based on AASHTO Green Book 1995"*
F3.4	Traffic fatalities per 1,000 inhabitants.	n/1000 inhabitants	*0: (10)*	*According to SDG target 3.6 to reduce traffic fatalities in halve by 2030.* *In Jordan, the latest traffic fatalities accounts for 14-20 per 100,000 inhabitants.* *Reference : World Health Organization https://www.who.int/data/gho/data/themes/topics/sdg-target-3_6-road-traffic-injuries*
			5: (0)	*According to SDG target 3.6 to reduce traffic fatalities in halve by 2030.* *In Jordan, the latest traffic fatalities accounts for 14-20 per 100,000 inhabitants.* *Reference : World Health Organization https://www.who.int/data/gho/data/themes/topics/sdg-target-3_6-road-traffic-injuries*
F4.1	Cyclomatic number	number	*0: (30)*	*Cyclomatic number for 800 m *800 m mesh According to Bourdic et. al, 2012 " Assessing cities: a new system of cross-scale spatial indicators, Building Research & Information, 40:5, 592-605, DOI: 10.1080/09613218.2012.703488*
			5: (100)	*Cyclomatic number for 800 m *800 m mesh According to Bourdic et. al, 2012 " Assessing cities: a new system of cross-scale spatial indicators, Building Research & Information, 40:5, 592-605, DOI: 10.1080/09613218.2012.703488*
F4.2	Number of intersections related to the overall surface area	number/km²	*0: (54)*	*Minimum number of intersections for internal connectivity according to: LEED standard for Nieghborhood Development V.04*
			5: (154)	*Ideal number of intersections for internal connectivity according to: LEED standard for Nieghborhood Development V.04*
G. Social Aspects				

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
G1.1	*Percent of key public buildings that are accessible for use by physically disabled persons*	%	*0: (2%)*	*The percentage of buildings equipped for people with disabilities out of the total number of establishments in Jordan is only about 2% ... The buildings are not fully equipped, as they are considered partially equipped.* *https://www.almamlakatv.com/news/22950-2-%D9%85%D9%86-%D8%A7%D9%84%D9%85%D8%A8%D8%A7%D9%86%D9%8A-%D8%A7%D9%84%D8%B1%D8%B3%D9%85%D9%8A%D8%A9-%D9%85%D9%87%D9%8A%D8%A3%D8%A9-%D9%84%D8%AE%D8%AF%D9%85%D8%A9-%D8%B0%D9%88%D9%8A-%D8%A7%D9%84%D8%A5%D8%B9%D8%A7%D9%82%D8%A9*
			5: (80%)	*(regional) In qatar (80%),* قرار «مواصفاتالمباني» خطوةضروريةلدمجذويالاحتياجاتبالمجتمع *(alarab.qa)*
G1.2	Percent of sidewalks and other pedestrian ways that are accessible for use by physically disabled persons	%	*0: (25)*	*https://www.access-board.gov/prowag/draft-2002.html*
			5: (80)	*https://www.access-board.gov/prowag/draft-2002.html*
G1.3	Adequacy of barrier-free accessible public outdoor areas compared to the total public area	%	*0: (50%)*	*https://open.alberta.ca/dataset/8be7ac63-a101-4fe0-b3a0-8c09e0185a6b/resource/4c80d928-85ba-4a75-ac90-12a92ce61b05/download/ma-barrier-free-design-guide-fifth-edition-2017.pdf*
			5: (90%)	*https://open.alberta.ca/dataset/8be7ac63-a101-4fe0-b3a0-8c09e0185a6b/resource/4c80d928-85ba-4a75-ac90-12a92ce61b05/download/ma-barrier-free-design-guide-fifth-edition-2017.pdf*

G2.1	Housing properties in the local area that are financially accessible to the lowest quintile of area population	%	*0: (5%)*	[*https://ifs.org.uk/publications/housing-quality-and-affordability-lower-income-households*](https://ifs.org.uk/publications/housing-quality-and-affordability-lower-income-households)
			5: (30%)	[*https://ifs.org.uk/publications/housing-quality-and-affordability-lower-income-households*](https://ifs.org.uk/publications/housing-quality-and-affordability-lower-income-households)
G2.2	Percentage of the average salary of the lowest quintile of the population used for rental payments	%	*0: (50%)*	[*https://www.census.gov/library/stories/2023/03/low-income-renters-spent-larger-share-of-income-on-rent.html*](https://www.census.gov/library/stories/2023/03/low-income-renters-spent-larger-share-of-income-on-rent.html)
			5: (30%)	[*https://www.census.gov/library/stories/2023/03/low-income-renters-spent-larger-share-of-income-on-rent.html*](https://www.census.gov/library/stories/2023/03/low-income-renters-spent-larger-share-of-income-on-rent.html)
G2.3	Percentage of vacant residential units	%	*0: (8%)*	[*https://www.nytimes.com/2022/03/10/realestate/vacancy-rate-by-state.html*](https://www.nytimes.com/2022/03/10/realestate/vacancy-rate-by-state.html)
			5: (20%)	[*https://www.nytimes.com/2022/03/10/realestate/vacancy-rate-by-state.html*](https://www.nytimes.com/2022/03/10/realestate/vacancy-rate-by-state.html)
G2.4	Percentage of inhabitants living in slums, informal settlements or	%	*0: (17%)*	*Population living in slums (% of urban population) - Jordan in 2020* [*https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS?locations=JO*](https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS?locations=JO)

	inadequate housing		*5: (0.8%)*	*Population living in slums (% of urban population) - Kazakhstan in 2020* *https://data.worldbank.org/indicator/EN.POP.SLUM.UR.ZS?locations=JO*
G3.1	Availability and proximity of key services	%	*0: (50%)*	GIS
			5: (100%)	
G3.2	Percentage of population near a public primary school	%	*0: (50%)*	*https://www.seo.nl/wp-content/uploads/2019/01/Annex_B_Jordan.pdf*
			5: (87%)	*https://data.unicef.org/topic/education/primary-education/*
G3.3	Percentage of population near a public secondary school	%	*0: (15%)*	*https://www.seo.nl/wp-content/uploads/2019/01/Annex_B_Jordan.pdf*
			5: (65%)	*https://data.unicef.org/topic/education/secondary-education/*
G3.4	Percentage of population near a childrens' play facilities	%	*0: (16%)*	*https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7795-9*
			5: (30%)	*https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7795-9*
G3.5	Availability of outdoor public spaces	Index	*0: (25%)*	*https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf*

				More green spaces and respect for them | Jordan Times
			5: (34%)	*https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf* *% of public green space (parks and gardens) (worldcitiesculturforum.com)*
G4.1	Net primary enrolment rate	%	*0: (50%)*	*https://www.seo.nl/wp-content/uploads/2019/01/Annex_B_Jordan.pdf*
			5: (98%)	*in 2020* *https://www.unicef.org/jordan/media/5501/file/OSC-Report-EN.pdf*
G4.3	Lower secondary completion rate	%	*0: (69%)*	***in 2021, https://tradingeconomics.com/jordan/lower-secondary-completion-rate-total-percent-of-relevant-age-group-wb-data.html***
			5: (94%)	*in 2020, Lower secondary enrollment rate is 94%* ***https://www.unicef.org/jordan/media/5501/file/OSC-Report-EN.pdf***
G5.1	Percentage of households unable to afford the most basic levels of energy (more than 10% of the income spent on energy bills)	%	*0: (10)*	*https://energy.ec.europa.eu/topics/markets-and-consumers/energy-consumer-rights/energy-poverty-eu_en*
			5: (7)	*https://energy.ec.europa.eu/topics/markets-and-consumers/energy-consumer-rights/energy-poverty-eu_en*
G5.2	Share of persons with an equivalised disposable income below 60 % of the national median income	%	*0: (25%)*	*https://www.gov.uk/government/statistics/households-below-average-income-for-financial-years-ending-1995-to-2022/households-below-average-income-an-analysis-of-the-uk-income-distribution-fye-1995-to-*

				fye-2022
			5: (13%)	https://www.gov.uk/government/statistics/households-below-average-income-for-financial-years-ending-1995-to-2022/households-below-average-income-an-analysis-of-the-uk-income-distribution-fye-1995-to-fye-2022
G6.1	Number of police officers per 1,000 inhabitants.	n/1000 inhabitants	0: (3)	*in jordan, 25,000 police officer per 256,000 inhabitants in 2012* https://en.wikipedia.org/wiki/List_of_countries_and_dependencies_by_number_of_police_officers
			5: (5)	*in Vatican City, 15,439 per 100,000 inhabitant* https://www.worldatlas.com/articles/countries-with-the-most-police-officers-per-capita.html
G6.2	Number of firefighters per 1,000 inhabitants	n/1000 inhabitants	0: (0.75)	*According to the european system, minimum 750 fire fighters / 1 million inhabitants* https://journals.ju.edu.jo/JJSS/article/download/100845/8312
			5: (0.99)	https://www.firefightingincanada.com/proper-protection-10994/
G10.1	Perceived safety of public places and pedestrian routes, as determined by a sample of pedestrians	Score	0: (1)	https://www.diva-portal.org/smash/get/diva2:826168/FULLTEXT01.pd
			5: (5)	https://www.diva-portal.org/smash/get/diva2:826168/FULLTEXT01.pd

H. Economy

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*

H1.1	*Average per-capita income of residents in the local area* *relative to that of the urban region as a whole*	*%*	*0: (60)*	*https://www.unicef.cn/en/figure-23-capita-disposable-income-urban-rural-19902017*
			5: (90)	*https://www.unicef.cn/en/figure-23-capita-disposable-income-urban-rural-19902017*
H4.2	Percentage of the neighborhood served by wireless broadband (3G, 4G, 5G)	*%*	*0: (67%)*	*in jordan (67% of the population using the internet) https://www.ebrd.com/documents/ogc/broadband-sector-jordan.pdf*
			5: (98%)	*https://www.pwc.com/us/en/services/consulting/library/consumer-intelligence-series/promise-5g.html#:~:text=Once%20defined%2C%20the%20idea%20of,find%205G%20%E2%80%9Cvery%E2%80%9D%20appealing.*
H4.4	Total number of mobile phone subscriptions in the area divided by one 1000th of the area's total population	n/1000 inhabitants	*0: (80)*	*In Jordan, in Q1 of 2022 = 7.3 million subscriptions (Population in 2022=11.3 million) https://jordantimes.com/news/local/mobile-phone-subscriptions-amounted-around-73m-q1-2022#:~:text=Mobile%20phone%20subscriptions%20amounted%20to%20around%207.3m%20in%20Q1%202022,-By%20Maria%20Weldali&text=AMMAN%20%E2%80%94%20Recent%20statistics%20conducted%20by,the%20first%20quarter%20of%202022.*
			5: (90)	*in china in 2021 https://data.worldbank.org/indicator/IT.CEL.SETS.P2*

I. Climate change: mitigation and adaptation

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
I1.1	*Greenhouse gas emissions*	*Tons CO2 eq. / inhabitant*	*0: (5)*	*Site measurements*
			5: (2)	

I2.1	Mean Solar Reflectance Index of paved surfaces and roofs in the area	SRI	*0: (70)*	*https://www.kalzip.com/wp-content/uploads/2020/01/Kalzip-Solar-Reflectance-Index.pdf* *https://coolroofs.org/documents/CRRC-SRI-Document_2022-07-12.pdf*
			5: (0)	*https://www.kalzip.com/wp-content/uploads/2020/01/Kalzip-Solar-Reflectance-Index.pdf* *https://coolroofs.org/documents/CRRC-SRI-Document_2022-07-12.pdf*
I2.3	Aggregate area of building roofs covered with vegetated material	%	*0: (0)*	*statistics and observations*
			5: (5%)	*Estimations based on irbid current situation ;its difficult to irrigate and for applications due to climate conditions and awareness level in sustainable solutions*
I3.3	Permeability of land	%	*0: (20)*	*GIS*
			5: (100)	
I5.1	Share of buildings in the area with a rainwater collection system	%	*0: (0%)*	*Estimations based on irbid current situation*
			5: (15%)	*Estimations based on irbid current situation*
I5.2	Share of rainwater collected from paved (not permeable) surfaces in the area (excluding buildings' roofs and plots)	%	*0: (0%)*	*Estimations based on irbid current situation*
			5: (8%)	*Fayez Abdulla (2020) Rainwater harvesting in Jordan: potential water saving, optimal tank sizing and economic analysis, Urban Water*

				Journal, 17:5, 446-456, DOI:10.1080/1573062X.2019.1648530
I5.3	Share of building in the area with a greywater collection system	%	0: (0%)	*Yarmouk Water Company*
			5: (60%)	*https://jjce.just.edu.jo/issues/paper.php?p=64.pdf*

J. Governance

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
J3.1	*Percentage area of public buildings with recognized sustainability certifications for ongoing operations*	*%*	*0: (0.13%)*	*6 buildings in 2017 https://www.hashtagarabi.com/50154/%D8%A7%D9%84%D8%AE%D8%B6%D8%B1%D8%A7%D8%A1-%D9%8A%D9%83%D8%B1%D9%85-%D8%A7%D9%84%D8%A3%D8%A8%D9%86%D9%8A%D8%A9-%D8%A7%D9%84%D8%AD%D8%A7%D8%B5%D9%84%D8%A9-%D8%B9%D9%84%D9%89-%D8%B4%D9%87%D8%A7/#:~:text=%D9%88%D8%A3%D8%B4%D8%A7%D8%B1%D8%AA%20%D8%B9%D8%B6%D9%88%20%D9%85%D8%AC%D9%84%D8%B3%20%D8%A5%D8%AF%D8%A7%D8%B1%D8%A9%20%D8%A7%D9%84%D9%85%D8%AC%D9%84%D8%B3,%D8%A7%D9%86%20%D9%87%D9%86%D8%A7%D9%83%20%D8%A7%D9%8A%D8%B6%D8%A7%D9%8B%2020%20%D9%85%D8%B4%D8%B1%D9%88%D8%B9%D8%A7* *Jordan Number of Buildings Completed: Amman | Economic Indicators | CEIC (ceicdata.com)* *total number of buildings:* 4,564
			5: (0.44%)	*20 buildings registered to be certified https://www.hashtagarabi.com/50154/%D8%A7%D9%84%D8%AE%D8%B6%D8%B1%D8%A7%D8%A1-%D9%8A%D9%83%D8%B1%D9%85-%D8%A7%D9%84%D8%A3%D8%A8%D9%86%D9%8A%D8%A9-*

				%D8%A7%D9%84%D8%AD%D8%A7%D8%B5%D9%84%D8%A9-%D8%B9%D9%84%D9%89-%D8%B4%D9%87%D8%A7/#:~:text=%D9%88%D8%A3%D8%B4%D8%A7%D8%B1%D8%AA%20%D8%B9%D8%B6%D9%88%20%D9%85%D8%AC%D9%84%D8%B3%20%D8%A5%D8%AF%D8%A7%D8%B1%D8%A9%20%D8%A7%D9%84%D9%85%D8%AC%D9%84%D8%B3,%D8%A7%D9%86%20%D9%87%D9%86%D8%A7%D9%83%20%D8%A7%D9%8A%D8%B6%D8%A7%D9%8B%2020%20%D9%85%D8%B4%D8%B1%D9%88%D8%B9%D8%A7 *total number of buildings: 4,564*
J3.2	Aggregated annual operating energy cost per aggregated indoor useful floor area	€/m²/year	*0: (7)*	*https://www.enerdata.net/about-us/company-news/energy-prices-and-costs-in-europe.pdf* *https://www.sciencedirect.com/science/article/abs/pii/S0957178715300552*
			5: (3.5)	*https://www.enerdata.net/about-us/company-news/energy-prices-and-costs-in-europe.pdf* *https://www.sciencedirect.com/science/article/abs/pii/S0957178715300552*

1/ MOUKHTARA :

A. Use of land and biodiversity				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
Availability of green urban areas	*Proportion of all vegetated areas within the neighborhood boundaries in relation to the total area*	*Percentage*	*0: (60)* *5: (70)*	Since there is no baseline in Lebanon to set the Benchmark for green areas, the context for the Chouf caza was considered the baseline to set the Benchmark and then Moukhtara area was compared to this Benchmark.
Green areas in relation to the neighborhood population	*Total area of green in the city divided by neigborhood's total population*	*m2/inhabitant*	*0: (500)* *5: (1000)*	Since there is no baseline in Lebanon to set the Benchmark for green areas, the context for the Chouf caza was considered the baseline to set the Benchmark and then Moukhtara area was compared to this Benchmark.
Green Area Accessibility	*Number of inhabitants living with 300m of a publicly accessible green space of at least 0.5ha divided by the total number of neighborhood inhabitants*	*Percentage*	*0: (20)* *5: (150)*	*The Benchmark provided was adopted since there is no public green area in Moukhtara.*

B. Energy				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
Access to electrical service	Percentage of households with authorized access to electricity	*Percentage*	*0: (89)* *5: (100)*	All the houses in Moukhtara are legally connected to public electricity grid and therefore a high percentage was adopted for these benchmarks.

Total final thermal energy consumption for building operations	*Aggregated annual total final thermal energy consumption per aggregated indoor useful floor area*	*kWh/m2/year*	*0: (100)* *5: (170)*	These Benchmark were adopted based on the Moukhtara geographical location (900 meters above sea level) and the social and economic aspects describing the reliance on fuel-based boilers for thermal energy
Total final electrical energy consumption for building operations	*Aggregated annual total final electric energy consumption per aggregated internal useful floor area*	*kWh/m2/year*	*0: (25)* *5: (5)*	These Benchmark were adopted based on the average areas of houses in Moukhtara and taking into consideration a factor related to the power shortage electricity in the country.
Total final electric energy consumption for public office/ educational building operations	*Aggregated annual final electric energy consumption of public office and educational buildings per aggregated internal useful floor area*	*kWh/m2*	*0: (25)* *5: (10)*	The same benchmark set by the provided SN tool excel sheet were adopted since it was agreed among the SMC team that the same approach adopted by residential building can be applied to the public buildings since all the urban area is affected by the power electricity shortage.
Total primary energy demand for building operation	*Aggregated annual total primary energy consumption per aggregated indoor useful floor area*	*kWh/m2/year*	*0: (170)* *5: (100)*	These Benchmarks were adopted taking into consideration the factors adopted to set the benchmarks for the thermal energy and electrical energy.
Energy consumption of public lighting	*Total electricity consumption of public street lighting divided by the total distance of*	*kWh/Km year*	*0: (50)* *5: (20)*	These benchmarks were adopted after verifying the street layout in Moukhtara urban area, the type of streetlights lamps and the needs to reduce the electricity bills paid by the municipality and

	streets where streetlights are present			associated to the streetlights.
Share of renewable energy on-site, relative to total final thermal energy consumption for building operations	*Total consumption of final thermal energy generated from renewable sources on-site divided by total final thermal energy consumption*	*Percentage*	*0: (30)* *5: (100)*	These benchmarks were adopted same as the SN tool excel sheet, since after coordination between the SMC team members and taking into consideration that the main source of households heating in Moukhtara is fuel-based boilers while a fair number of households rely on solar water heaters for shower water heating.
Share of renewable energy on-site, relative to final electric energy consumption	*Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption*	*Percentage*	*0: (30)* *5: (100)*	These Benchmarks were adopted taking into consideration the huge change in the Lebanese local market toward moving to PV solar system for electricity generation mainly after the 2021 power crisis and then the Moukhtara context was adopted assuming a coefficient factor for the economic capability of the Moukhtara residents and the topology of the village.
Share of renewable energy on-site, relative to total final electric energy consumption for residential building operations	*Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption of residential buildings*	*Percentage*	*0: (30)* *5: (100)*	These Benchmarks were adopted taking into consideration the huge change in the Lebanese local market toward moving to PV solar system for electricity generation mainly after the 2021 power crisis and then the Moukhtara context was adopted assuming a coefficient factor for the economic capability of the Moukhtara residents and the topology of the village.
Share of	*Total consumption of final*		*0: (30)*	The same approach adopted for residential

renewable energy on-site, on final electric energy consumptions for public office/educational building operations	*electric energy generated from renewable sources on-site divided by total final electric energy consumption of public offices/educational buildings*	*MWh/year*	*5: (100)*	buildings was adopted for public building since the power shortage is affecting all the urban area and the access to RE for public and private sector fall within the same range of economic capability.
Share of renewable energy on-site, relative to total primary energy consumption for building operations	*Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption*	*Percentage*	*0: (30)* *5: (100)*	These Benchmarks were adopted taking into consideration the huge change in the Lebanese local market toward moving to PV solar system for electricity generation mainly after the 2021 power crisis and then the Moukhtara context was adopted assuming a coefficient factor for the economic capability of the Moukhtara residents and the topology of the village
Share of renewable energy on-site, relative to total primary energy consumption for residential building operations	*Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption of residential buildings*	*Percentage*	*0: (30)* *5: (100)*	These Benchmarks were adopted taking into consideration the huge change in the Lebanese local market toward moving to PV solar system for electricity generation mainly after the 2021 power crisis and then contextualize to the Moukhtara context assuming a coefficient factor for the economic capability of the Moukhtara residents and the topology of the village. In addition, the availability of solar water heaters and biomass boilers were added to the assumptions with lower weight since it will affect minimally the upper and lower benchmark.
Share of renewable energy on-site, on total primary energy	*Total consumption of primary energy generated from renewable sources on-site divided by total primary energy*	*Percentage*	*0: (30)* *5: (100)*	The same approach adopted for residential buildings was adopted for public building since the power shortage is affecting all the urban area and the access to RE for public and private sector fall within the same range of economic capability.

consumptions for public office/ educational building operations	*consumption of public offices/educational buildings*			
C. Water				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
Availability of a public municipal water supply	*Percentage of the buildings within the neighborhood that are served by a municipal water supply*	*Percentage*	*0: (80)* *5: (100)*	These benchmarks were adopted taking into consideration an overall assumption for Lebanon in general and then contextualized for the Moukhtara context based on data from the Beirut and Mount Lebanon water Establishment online platform
Availability of waste water treatment systems	*Percentage of buildings within the neighbourhood that are served by wastewater collection*	*Percentage*	*0: (95)* *5: (100)*	These benchmarks were adopted taking into consideration an overall assumption for Lebanon in general and then contextualized for the Moukhtara context based on data from the Beirut and Mount Lebanon water Establishment online platform
Total water consumption	*Total amount of the area's water consumption in liters per day divided by the total area population.*	*Liters/day/person*	*0: (500)* *5: (300)*	These benchmarks were adopted taking into consideration an overall assumption for Lebanon in general and then contextualized for the Moukhtara context based on data from the Beirut and Mount Lebanon water Establishment online platform
			0: (250)	

Consumption of potable water in residential buildings	*Annual potable water consumption per occupant*	*Liters/day/person*	*5: (60)*	These benchmarks were adopted taking into consideration an overall assumption for Lebanon in general and then contextualized for the Moukhtara context based on data from the Beirut and Mount Lebanon water Establishment online platform
Consumption of potable water in public offices	*Annual potable water consumption per occupant*	*Liters/occupant/year*	*0: (50)* *5: (20)*	These benchmarks were kept as indicated in the SN Tool excel sheet since there is no baseline in Lebanon for specific consumption of potable water in public buildings. The value calculated based on the data provided by the SMC team from the municipality Engineering department was on the limit of the benchmark and therefore it was agreed among the SMC team members to keep the benchmark at it is
Consumption of potable water in educational buildings	*Annual potable water consumption per occupant*	*Liters/day/person*	*0: (200)* *5: (100)*	These benchmarks were adopted based on triangulation of data from UNICEF resources related to public and private schools, common water filtration systems sizes adopted at private schools in Lebanon and volume of water gauge adopted by Beirut and Mount Lebanon water establishment for schools building.
Consumption of potable water in public green spaces	*Potable water used for irrigation purposes in public green spaces*	*m3/m2*	*0: (5)* *5: (0)*	*These Benchmark were kept as indicated in the SN tool excel sheets since there is no public green spaces in Moukhtara.*
			0: (90)	

Water treatment	*secondary treatment in centralized wastewater treatment facilities divided by the total volume of wastewater produced in the area*	*Percentage*	*5: (100)*	These Benchmark were adopted taking into consideration the Chouf caza as a baseline and contextualize for Moukhtara village
Household sanitation	*Percentage of households with access to basic sanitation facilities*	*Percentage*	*0: (90)* *5: (100)*	These Benchmark were adopted taking into consideration the Chouf caza as a baseline and contextualize for Moukhtara village
D. Solid waste				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
Availability of solid waste collection	*Percentage of buildings with regular solid waste collection*	*Percentage*	*0: (75)* *5: (90)*	These Benchmark were adopted taking into consideration the Chouf caza as a baseline and contextualize for Moukhtara village. The assumed low and high benchmark were very close to the benchmark set at the SN Tool excel sheet therefore it was agreed within the SMC team to adopt the benchmarks already set.
Access to solid waste and recycling collection points	*Proximity of the resident population to the solid waste and recycling collection point*	*Percentage*	*0: (75)* *5: (95)*	These Benchmark were adopted taking into consideration the Chouf caza as a baseline and contextualize for Moukhtara village. The assumed low and high benchmark were very close to the benchmark set at the SN Tool excel sheet therefore it was agreed within the SMC team to adopt the benchmarks already set.
		Percentage	*0: (75)*	Since there is no baseline in Lebanon for the

Access to solid waste and recycling collection points	*Percentage of inhabitants with access to solid waste and recycling collection points within 400 meters walking distance*		*5: (95)*	specific distance to be adopted between the inhabitant and the recycling collection points whether 400 meters or less, the benchmarks indicated in the SN Tool were adopted

E. Environmental Quality

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
Particulate matter (PM10) concentration	*Sum of daily concentrations for the whole year divided by 365 days*	*days / y*	*0: (12)* *5: (6)*	There are no specific studies in this field related to Lebanon or Moukhtara area and therefore the benchmarks indicated in the SN Tool were adopted

F. Transportation and mobility

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
Performance of the public transport system	*Percentage of inhabitants that are within 500 meters walking distance of at least one public transportation service stop.*	*Percentage*	*0: (30)* *5: (70)*	There is no public transportation with service stops in Lebanon and this is also applicable to Moukhtara village and therefore the benchmarks were adopted.
			0: (5)	Due to the landscape of Moukhtara village and it

Bicycle network	*Aggregate length of bicycle paths in the city per inhabitant*	*m/inhabitant*	*5: (40)*	is heritage houses, there is no specific paths for bicycle and therefore the benchmarks indicated in the SN Tool excel sheet were adopted

G. Social Aspects

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
Availability and proximity of key services	*Percentage of inhabitants that are within 800 meters walking distance of at least 3 key services.*	*Percentage*	*0: (50)* *5: (100)*	Since there is no baseline in Lebanon for the specific distance to be adopted between the inhabitant and the public services location whether 800 meters or less, the benchmarks indicated in the SN Tool were adopted

I. Climate change: mitigation and adaptation

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
Greenhouse gas emissions	*Total amount of greenhouse gases in tonnes (equivalent carbon dioxide units) generated over a calendar year divided by the current neighborhood population*	*Tons CO2 eq. / inhabitant*	*0: (2)* *5: (1)*	These benchmarks were adopted based on available studies conducted by the world bank and the American University of Beirut for greenhouse gases emissions produced by the electricity generated from fuel-based power plant and transmitted by the public grid
Greenhouse gas emissions from	*Total amount of greenhouse gases in*	*Kg CO2 eq / m2*	*0: (120)* *5: (30)*	These benchmarks were adopted based on available studies conducted by the world bank and the American University of Beirut for greenhouse gases emissions produced by the

residential buildings	*Kg (equivalent carbon dioxide units) generated over a calendar year per aggregated indoor useful floor area.*			electricity generated from fuel-based power plant and transmitted by the public grid
Permeability of land	*Share of the urban area that is permeable to water.*	*Percentage*	*0: (20)* *5: (100)*	There is no baseline in Lebanon and in specific for Moukhtara related to the permeability of water and therefore is was agreed among the SMC team to adopt the benchmarks indicated in the SN Tool excel sheet

2.4: SNToolWeightsAssessment

1/ SOUSSE :

4.1 Assignment of priority values to themes and calculation of weights

THEME	PRIORITY FACTOR (1-5)	JUSTIFICATION
A. Use of land and biodiversity	**4**	*The development of urban space and land use through the urban planning regulation plays a* ***very important*** *role in the topic under consideration.*
B. Energy	**4**	*Since 2000, Tunisia has been a net importer of hydrocarbons, in addition to only 3% of electricity is produced by renewable energy (wind and solar) https://fr.wikipedia.org/wiki/%C3%89nergie_en_Tunisie , 2 reasons that make energy a* ***very important*** *subject in the topic studied.*
C. Water	**4**	*A* ***key*** *theme for Tunisia, which records about 400 m3 of water per capita and per year on average, is below the threshold of "Water Stress", according to the World Resources Institute (WRI)*
D. Solid Waste	**4**	*The waste is sent to 85% of technical landfills (CETs) and the rest accumulates in landfills, while recycling is virtually non-existent in the country https://www.lexpress.fr/monde/la-gestion-des-dechets-en-tunisie-un-gachis-economique_2166513.html#:~:text=Les%20d%C3%A9chets%20sont%20envoy%C3%A9s%20dans,autre%20sp%C3%A9cialiste%20contact%C3%A9%20en%20Allemagne.* *This shows* ***the major importance*** *of this topic for the topic under consideration*
E. Environmental quality	**3**	*(72.7%) of those surveyed believe that the current environmental situation in Tunisia is bad (25.7%) to very bad (47.0%), according to a survey carried out by One To One Polling on behalf of the Heinrich Böll Foundation in Tunisia. https://tn.boell.org/fr/2019/06/30/la-perception-de-lenvironnement-la-lumiere-du-nouveau-code-des-collectivites-locales-0#:~:text=Sans%20aucune%20surprise%2C%20une%20grande,%C3%A0%20tr%C3%A8s%20mauvaise%20(47.0%25).This is consistent with the* ***average priority*** *order given to this topic in the topic under consideration.*

F. Transportation and mobility	**3**	*The concept of sustainable mobility remains an elite affair…The transport sector in Tunisia is the largest polluter of the atmosphere while the fleet of passenger cars and services is growing exponentially. https://africanmanager.com/mobilite-durable-en-tunisie-rien-ne-vaut-la-rehabilitation-du-transport-en-commun/ This is consistent with the* ***average priority*** *order given to this topic in the topic under consideration.*
G. Social aspects	**3**	*The components of this theme are directly related to the daily lives of the inhabitants, which explains the* ***average priority*** *given to this topic in the theme studied.*
H. Economics	**2**	*The lack of a direct relationship between the parts of this theme and sustainability explains the* ***low importance*** *it has been given.*
I. Climate change: mitigation and adaptation	**4**	*Climate change is a major challenge for the Mediterranean region and Tunisia, where July 2023 was the hottest on record since 1950.* *https://www.meteo.tn/fr/changement-climatique This shows* ***the major importance*** *of this topic for the topic under consideration*
J. Governance	**3**	*Governance as a new form of participatory democracy is essential for the reflection and effective implementation of sustainable development issues. This is consistent with the* ***average priority*** *order given to it*

.2 Assigning priority values to categories and calculating weights

A	Use of land and biodiversity	Priority Factor (1-5)	JUSTIFICATION
A1	*Land use*	**4**	*Urban planning is* ***fundamental*** *to a sustainable neighbourhood*
A2	*Urban green spaces*	**4**	*This aspect is* ***crucial*** *for the quality of life and development of a sustainable neighbourhood*
A3	*Biodiversity and ecosystems*	**2**	***Low importance*** *for a highly urbanized city*

B	***Energy***	***Priority Factor (1-5)***	***JUSTIFICATION***
B1	*Energy infrastructure*	**3**	***Medium priority*** *because the neighbourhood is well connected to energy networks (Electricity and Gas)*
B2	*Energy consumption*	**4**	*It is* ***crucial*** *to ensure this, especially as the country is far from achieving energy self-sufficiency*
B3	*Renewable energies*	**4**	*Reducing the environmental impacts of fossil fuels is* ***crucial****, using renewable energy, including solar energy, which the city has a wealth of.*
C	***Water***	***Priority Factor (1-5)***	***JUSTIFICATION***
C1	*Hydraulic infrastructure*	**4**	*A* ***fundamental*** *topic because these antiquated and inadequate infrastructure must be renovated and improved, in order to reduce waste and be able to meet growing demand.*
C2	*Water consumption*	**4**	*A* ***fundamental*** *topic, as Tunisia needs to rationalize/optimize water consumption as much as possible, facing "High Water Stress"*
C3	*Effluent Management*	**3**	***Medium priority*** *because the neighbourhood is well connected to the public wastewater system*
D	***Solid Waste***	***Priority Factor (1-5)***	***JUSTIFICATION***
D1	*Solid waste collection infrastructure*	**3**	***Medium priority*** *as the neighbourhood is well served by a public solid waste collection network*
D2	*Solid waste management*	**3**	***Medium priority*** *because the neighbourhood is properly short by a good public solid waste collection mesh*
E	***Quality of the environment***	***Priority Factor (1-5)***	***JUSTIFICATION***
E1	*Air quality*	**3**	***Medium priority*** *as this topic of air pollution is not considered a priority by citizens*
E2	*Noise*	**2**	***Low importance*** *for a predominantly residential neighbourhood*
E3	*EMF exposure*	**3**	***Medium priority*** *as this topic of air pollution is not considered a priority by citizens*

E4	*Environmental Impacts*	3	***Medium priority** as this topic of air pollution is not considered a priority by citizens*
F	***Transportation and mobility***	***Priority Factor (1-5)***	***JUSTIFICATION***
F1	*Mobility Service Performance*	2	***Low importance** for residents who prefer motor transport by private vehicle*
F2	*Green Mobility*	3	***Medium priority** for lack of adequate infrastructure and sensitive mindset*
F3	*Security in Mobility*	4	*A **fundamental** factor in improving the walking experience for pedestrians by providing them with safe, connected, convenient and comfortable streets.*
F4	*Urban morphology and transport*	2	***Not very important** because the road network in the neighbourhood is completely built*
G	***Social Aspects***	***Priority Factor (1-5)***	***JUSTIFICATION***
G1	*Accessibility (persons with disabilities)*	3	***Medium priority** despite the importance of this fundamental theme of social inclusion*
G2	*Housing*	3	***Medium priority** for a neighbourhood with good quality housing, despite runaway inflation*
G3	*Public and private facilities and services available*	3	***Medium priority** for a well-equipped neighbourhood*
G4	*Education*	3	***Medium priority** for a neighbourhood well equipped with public and private educational facilities*
G5	*Social Inclusion*	2	***Low importance** for a neighbourhood inhabited by the upper middle class*
G6	*Security*	2	***Low importance** to a relatively safe neighbourhood*
G7	*Health*	2	***Low importance** for a neighbouring neighbourhood with a large CHU University Hospital Centre*
G8	*Food security*	3	***Medium priority** even if the neighbourhood and city do not have*

G9	*Culture and heritage*	**1**	*Thematic* ***unimportant*** *to participants, for lack of direct relationship with sustainability*
G10	*Perception*	**1**	*Thematic* ***unimportant*** *to participants, for lack of direct relationship with sustainability*
H	***Economy***	***Priority Factor (1-5)***	***JUSTIFICATION***
H1	*Economic performance*	**2**	***Low importance*** *for a neighbourhood with upper middle class residents*
H2	*Employment*	**2**	***Low importance*** *for an economically dynamic neighbourhood*
H3	*Innovation*	**2**	***Low importance*** *for an economically dynamic neighbourhood*
H4	*ICT Infrastructure*	**2**	***Low importance*** *despite the role for a Smart-City*
I	***Climate Change: Mitigation and Adaptation***	***Priority Factor (1-5)***	***JUSTIFICATION***
I1	*Mitigating climate change*	**3**	***Medium priority*** *as there is awareness of GHG participants*
I2	*Adapting to climate action: heat waves and temperature rise*	**3**	***Medium priority*** *because it is important to reduce the urban heat island that directly affects the micro-climate in the neighbourhood*
I3	*Adaptation to climate action: storm surge*	**3**	***Medium priority*** *because the neighbourhood is relatively spared from urban flooding (due to its topography)*
I4	*Adaptation to climate action: river and coastal flooding*	**3**	***Medium priority*** *because the neighbourhood is relatively free from urban flooding (far from the wadis and the coast)*
I5	*Adaptation to climate action: drought*	**2**	***Low importance***
I6	*Climate risk adaptation: wildfire*	**1**	*Thematic* ***unimportant*** *to the participants, for lack of forest in or near the neighbourhood*
I7	*Climate Hazard: Wind*	**1**	*Theme* ***unimportant*** *to participants, due to lack of climate background in the neighbourhood*

J	Governance	Priority Factor (1-5)	JUSTIFICATION
J1	Urban Planning	3	**Medium priority** because residents have been experiencing the participatory approach for several years through the municipality's PAIs
J2	Community Management and Participation	2	**Low importance**
J3	Operation of public buildings	3	**Medium priority** for a neighbourhood well equipped with public facilities

4.3 Assignment of priority values to Criteria and Weights calculation

A. Use of land and biodiversity

A1. *Use of land*

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
A1.1.	24	3	2	4	
A1.2.	24	3	2	4	
Total:	100				

A2. *Urban green spaces*

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
A2.1.	8	2	2	2	
A2.2.	8	2	2	2	

A2.4.	*8*	2	2	2	

Total: 100

B. Energy

B1. *Energy infrastructure*

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
B1.1	*30*	3	5	2	

Total: 100

B2. *Energy consumption*

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
B2.10	*30*	3	5	2	

Total: 100

C. Water

C1.*Hydraulic infrastructure*

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
C1.1	*18*	3	3	2	
C1.2	*18*	3	3	2	

Total: 100

C2.*Water consumption*					
Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
C2.1	*12*	3	2	2	
C2.2	*12*	3	2	2	
C2.7	*8*	2	2	2	

Total: 100

C3.*Effluent Management*					
Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
C3.1	*24*	2	4	3	

Total: 100

D. Solid Waste

D1. ***Solid waste collection infrastructure***					
Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
D1.1	*16*	4	4	2	

Total: 100

D2. ***Solid waste management***					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
D2.1	*8*	1	4	2	

Total: 100

E. Environmental quality

E2. ***Noise***					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
E2.1	*27*	3	3	3	
E2.2	*27*	3	3	3	

Total: 100

E3. ***Exposure to EMFs***					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
E3.1	*27*	3	3	3	

Total: 100

E4. ***Environmental Impacts***					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*

E4.1	18	3	3	2	

Total: 100

F. Transportation and mobility

F3. *Security in Mobility*

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
F3.1	27	3	3	3	
F3.2	27	3	3	3	
F3.4	27	3	3	3	

Total: 100

F4. *Urban morphology and transport*

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
F4.2	60	3	4	5	

Total: 100

G. Social aspects

G1.*Accessibility (persons with disabilities)*

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment

G1.1	*27*	3	3	3	
G1.2	*27*	3	3	3	

Total: 100

G2. *Housing*

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G2.4	*27*	3	3	3	

Total: 100

I. Climate Change: Mitigation And Adaptation

I2. *Adapting to climate action: heat waves and temperature rise*

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
I2.2	*18*	3	3	2	

Total: 100

I4. *Adaptation to climate action: river and coastal flooding*

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
I4.1	*27*	3	3	3	

Total: 100

J. Governance

J1. *Urban Planning*

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
J1.1	*18*	3	3	2	

Total: 100

J3. *Operation of public buildings*

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
J3.1	*36*	3	4	3	
J3.3	*30*	3	5	2	

Total: 100

2/ IRBID :

4.1 Assignment of priority values to issues and weights calculation

ISSUE	*PRIORITY FACTOR (1-5)*	*JUSTIFICATION*
A. Use of land and biodiversity	*(3)*	*A)Use of land and biodiversity* *The availability of green urban areas will be considered as a main initiative aiming to increase the proportion of all vegetated areas within the neighbourhood* *B)Energy* *One of the most critical issues in Irbid city* *C)Water & D)Solid waste* *Another pressing environmental issues* *F) Mobility and transportation* *Regarding the green mobility, the electric-vehicle is a clear weak point in the neighbourhood.* *G) Social aspects* *No accessibility for disabled persons* *H) Economy* *The economic activity will affect the resident livelihoods.* *I) Climate change mitigation* *Regarding the climate change mitigation, the adaptation to the climatic action in the neighbourhood was diagnosed as a weak point.*
B. Energy	*(5)*	
C. Water	*(4)*	
D. Solid waste	*(5)*	
E. Environmental Quality	*(3)*	
F. Transportation and Mobility	*(3)*	
G. Social aspects	*(3)*	
H. Economy	*(4)*	
I. Climate change: mitigation and adaptation	*(4)*	
J. Governance	*(2)*	

4.2 Assignment of priority values to categories and weights calculation

A	*Use of land and biodiversity*	*Priority factor (1-5)*	*JUSTIFICATION*
A1	Use of land	*3*	*Medium priority because the neighbourhood is already developed and defined by city administration and local legislations*

A2	Green urban areas	*4*	*The aspect is crucial for sustainable city development*
B	Energy	*Priority factor (1-5)*	*JUSTIFICATION*
B1	Energy infrastructure	*5*	*Very important need for energy assessment*
B2	Energy consumption	*5*	*Jordan is very dependent on importing energy resources*
B3	Renewable energy	*5*	*Very high priority to reduce the environmental and economic impacts associated with fossil fuel energy by increasing self-generation of renewable energy. Also Jordan is rich in renewable resources as it has the highest solar irradiance wich can be used in sustainable energy production.*
C	Water	*Priority factor (1-5)*	*JUSTIFICATION*
C1	Water infrastructure	*4*	*High opportunities for improving the current system,*
C2	Water consumption	*5*	*Jordan is one of the poorest countries in water sector. Important to reduce indoor/outdoor water consumption*
C3	Effluents management	*4*	*Important factor to reduce pollution from wastewater and grey water reuse.*
D	Solid waste	*Priority factor (1-5)*	*JUSTIFICATION*
D1	Solid waste collection infrastructure	*5*	*Based on GIM Initiatives, in order to reduce the volume of waste conveyed to landfills and promote the proper disposal of hazardous waste*
D2	Solid waste management	*5*	*Based on GIM Initiatives, in order to reduce the volume of waste conveyed to landfills and promote the proper disposal of hazardous waste*
E	Environmental quality	*Priority factor (1-5)*	*JUSTIFICATION*
E1	Air quality	*5*	*Crucial aspect for health and well being of the residents, Annual mean levels of air pollutants e.g fine particulate matter is one of the indicators to achieve SDG11.6*

E3	EMF exposure	*2*	*Low quantity.*
F	Transportation and mobility	*Priority factor (1-5)*	*JUSTIFICATION*
F1	Performance of mobility services	*5*	*High sustainable development priority*
F2	Green mobility	*2*	*Infrastructure and cultural restrictions*
F3	Safety in mobility	*5*	*Important factor to enhance pedestrian mobility experience, providing safe, connected, and comfortable streets and walkways that encourage daily physical activity and avoid pedestrian injuries.*
F4	Urban morphology and transportation	*2*	*Low priority because the roads network in the study area is already planned and implemented*
G	Social aspects	*Priority factor (1-5)*	*JUSTIFICATION*
G1	Accessibility (Disabled People)	*5*	*Important global sustainability need for social inclusion, to increase the proportion of areas usable by all people, regardless their disability.*
G2	Housing	*3*	*Represent common housing type that is socially equitable and engaging.*
G3	Availability of public and private facilities and services	*3*	*Common service availability*
G4	Education	*3*	*Common educational system EDS*
G5	Social inclusion	*4*	*Economic sustainability*
G6	Safety	*5*	*Enhance neighborhood safety and inclusivity*
G10	Perceptual	*4*	*To enhance urban walkability and sustainble practices*

H	Economy	Priority factor (1-5)	JUSTIFICATION
H1	Economic performance	4	To enhance economic and social sustainability
H2	Employment	3	NA
H3	Innovation	4	Future vision
H4	ICT Infrastructure	5	Important Factor for Smart city development
I	Climate change: mitigation and adaptation	Priority factor (1-5)	JUSTIFICATION
I1	Climate change mitigation	5	Priority for country's climate change policies
I2	Adaptation to the climatic action: heatwaves and the increase of the temperature	5	Important to reduce the urban heat island which directly affects urban microclimate, achieving urban thermal comfort and minimizing the effects on human and habitat.
I3	Adaptation to the climatic action: pluvial flood	3	Low possibility for urban flooding
I5	Adaptation to the climatic action: drought	5	Jordan is currently facing long drought periods which may lead to putting livelihoods and ecosystems at risk, and this might trigger famines, displacement and conflict.
J	Governance	Priority factor (1-5)	JUSTIFICATION
J1	Urban Planning	1	no motivation/ lack of participatory approach
J2	Management and community involvement	1	no motivation/ lack of participatory approach
J3	Public buildings operation	4	Important for sustainable development

4.3 Assignment of priority values to criteria and weights calculation

A. Use of land and biodiversity

A1. Use of Land

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
A1.1	*24*	*3*	*2*	*4*	*1*
A1.2	*24*	*3*	*2*	*4*	*1*

A2. Green Urban Areas

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
A2.1	*8*	*2*	*2*	*2*	*1*
A2.2	*8*	*2*	*2*	*2*	*1*
A2.3	*8*	*2*	*2*	*2*	*1*
A2.4	*8*	*2*	*2*	*2*	*1*
Total:	*100*				

B. Energy

B1. Energy Infrastructure

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
B1.1	*30*	*3*	*5*	*2*	*1*

B2. Energy Consumptions

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
B2.1	*30*	*3*	*5*	*2*	*1*
B2.4	*30*	*3*	*5*	*2*	*1*
B2.5	*30*	*3*	*5*	*2*	*1*
B2.7	*30*	*3*	*5*	*2*	*1*
B2.10	*30*	*3*	*5*	*2*	*1*

B3. Renewable Energy

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
B3.1	*18*	*3*	*2*	*3*	*1*
B3.4	*18*	*3*	*2*	*3*	*1*
B3.7	*18*	*3*	*2*	*3*	*1*
Total:	*100*				

C. Water

C1. Water Infrastructure

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
C1.1	*18*	*3*	*3*	*2*	*1*
C1.2	*18*	*3*	*3*	*2*	*1*

C2. Water Consumptions

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
C2.1	12	3	2	2	1
C2.3	12	3	2	2	1
C2.4	12	3	2	2	1
C2.5	12	3	2	2	1
C2.6	8	2	2	2	1
C2.7	8	2	2	2	1

C3. Effluents Management

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
C3.1	24	2	4	3	1
C3.2	24	2	4	3	1
C3.3	12	3	2	2	1
Total:	100				

D. Solid waste

D1. Solid Waste Collection Infrastructure

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
D1.1	32	4	4	2	1

D2. Solid Waste Management					
Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
D2.1	*8*	*1*	*4*	*2*	*1*
D2.2	*8*	*1*	*4*	*2*	*1*
Total:	*100*				

E. Environmental quality					
E1. Air Quality					
Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
E1.1	*36*	*3*	*4*	*3*	*1*
E1.2	*36*	*3*	*4*	*3*	*1*
E1.3	*36*	*3*	*3*	*4*	*1*
E2. EMF Exposure					
Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
E3.1	*27*	*3*	*3*	*3*	*1*
E3.2	*27*	*3*	*3*	*3*	*1*
Total:	*100*				

F. Transportation and mobility

F1. Performance of mobility service

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
F1.1	*45*	*3*	*3*	*5*	*1*

F2. Green mobility

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
F2.2	*27*	*3*	*3*	*3*	*1*
F2.3	*27*	*3*	*3*	*3*	*1*

F3. Safety in mobility

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
F3.1	*27*	*3*	*3*	*3*	*1*
F3.2	*27*	*3*	*3*	*3*	*1*
F3.4	*27*	*3*	*3*	*3*	*1*

F4. Urban morphology and Transportation

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
F4.1	*60*	*3*	*4*	*5*	*1*
F4.2	*20*	*3*	*4*	*5*	*1*

Total: *100*

G. Social aspects

G1. Accessibility (disabled persons)

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G1.1	*27*	*3*	*3*	*3*	*1*
G1.2	*27*	*3*	*3*	*3*	*1*
G1.3	*27*	*3*	*3*	*3*	*1*

G2. Housing

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G2.1	*27*	*3*	*3*	*3*	*1*
G2.2	*18*	*3*	*3*	*2*	*1*
G2.3	*9*	*3*	*3*	*1*	*1*
G2.4	*27*	*3*	*3*	*3*	*1*

G3. Availability of public and private facilities and services

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G3.1	*27*	*3*	*3*	*3*	*1*
G3.2	*27*	*3*	*3*	*3*	*1*
G3.3	*27*	*3*	*3*	*3*	*1*
G3.4	*27*	*3*	*3*	*3*	*1*
G3.5	*27*	*3*	*3*	*3*	*1*

G4. Education

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
G4.1	*60*	*3*	*4*	*5*	*1*
G4.3	*60*	*3*	*4*	*5*	*1*
G5. Social Inclusion					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G5.1	*36*	*3*	*4*	*3*	*1*
G5.2	*36*	*3*	*4*	*3*	*1*
G6. Safety					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G6.1	*24*	*3*	*4*	*2*	*1*
G6.2	*24*	*3*	*4*	*2*	*1*
G10. Perceptual					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G10.1	*18*	*3*	*3*	*2*	*1*
Total:	*100*				

H. Economy

H1. Economic Performance

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H1.1	*18*	*3*	*3*	*2*	*1*

H2. ICT Infrastructure

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H4.2	*16*	*2*	*4*	*2*	*1*
H4.4	*16*	*2*	*4*	*2*	*1*
Total:	*100*				

I. Climate change: mitigation and adaptation

I1. Climate Change Mitigation

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
I1.1	*75*	*3*	*5*	*5*	*1*

I2. Adaptation to the Climatic Action: Heatwaves and Increase of Temperature

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
I2.1	*27*	*3*	*3*	*3*	*1*
I2.3	*18*	*3*	*3*	*2*	*1*

I3. Adaptation to the Climatic Action: Pluvial Floods

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
I3.3	*36*	*3*	*4*	*3*	*1*

I5. Adaptation to the Climatic Action: Drought					
I5.1	*18*	*3*	*3*	*2*	*1*
I5.2	*18*	*3*	*3*	*2*	*1*
I5.3	*18*	*3*	*3*	*2*	*1*
Total:	*100*				

J. Governance

J3. Public Buildings Operation

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
J3.1	*36*	*3*	*4*	*3*	*1*
J3.2	*36*	*3*	*4*	*3*	*1*
Total:	*100*				

3/ MOUKHTARA :

4.1 Assignment of priority values to issues and weights calculation

ISSUE	PRIORITY FACTOR (1-5)	JUSTIFICATION
A. Use of land and biodiversity	(2)	Low priority for Moukhtara
B. Energy	(4)	Main issue of interest for Moukhtara
C. Water	(3)	Second issue of interest as related to energy.
D. Solid waste	(3)	Second issue of interest as related to basic services
E. Environmental Quality	(2)	Low priority for Moukhtara as air quality
F. Transportation and Mobility	(2)	Low priority for Moukhtara
G. Social aspects	(2)	Low priority for Moukhtara
I. Climate change: mitigation and adaptation	(1)	Low priority since basic services are more of interest.

4.2 Assignment of priority values to categories and weights calculation

A	Use of land and biodiversity	Priority factor (1-5)	JUSTIFICATION
A1	Use of land	0	
A2	Green urban areas	3	Main interest under this category
A3	Biodiversity and ecosystems	0	

B	Energy	*Priority factor (1-5)*	*JUSTIFICATION*
B1	Energy infrastructure	*1*	*Low interest since the public services are not reliable*
B2	Energy consumption	*3*	*Main interest to lower consumption*
B3	Renewable energy	*2*	*Interest in installing RE*
C	Water	*Priority factor (1-5)*	*JUSTIFICATION*
C1	Water infrastructure	*3*	*High priority since water distribution is related to energy*
C2	Water consumption	*1*	*Low interest since it is a flat consumption no meters*
C3	Effluents management	*2*	*Middle priority as a treatment plant is available*
D	Solid waste	*Priority factor (1-5)*	*JUSTIFICATION*
D1	Solid waste collection infrastructure	*2*	*Collection of solid waste is more important that the accessibility since citizens are willing to pass distance in case bins are available*
D2	Solid waste management	*1*	*Collection of solid waste is more important that the accessibility since citizens are willing to pass distance in case bins are available*
E	Environmental quality	*Priority factor (1-5)*	*JUSTIFICATION*
E1	Air quality	*1*	*Mokhtara is a village with no industrial area therefore air quality is much important than noise and other factors.*

E2	Noise	*0*	
E3	EMF exposure	*0*	
E4	Environmental impacts	*0*	
F	Transportation and mobility	*Priority factor (1-5)*	*JUSTIFICATION*
F1	Performance of mobility services	*1*	*To highlight the missing of public transportation*
F2	Green mobility	*1*	*To highlight the possibility of green mobility*
F3	Safety in mobility	*0*	
F4	Urban morphology and transportation	*0*	
G	Social aspects	*Priority factor (1-5)*	*JUSTIFICATION*
G1	Accessibility (Disabled People)	*0*	
G2	Housing	*0*	
G3	Availability of public and private facilities and services	*1*	*To Highlight the availability of public services*
G4	Education	*0*	
G5	Social inclusion	*0*	
G6	Safety	*0*	

G7	Health	*0*	
G8	Food security	*0*	
G9	Culture and heritage	*0*	
G10	Perceptual	*0*	
I	Climate change: mitigation and adaptation	*Priority factor (1-5)*	*JUSTIFICATION*
I1	Climate change mitigation	*3*	*Higher priority than flood since it is directly related to energy*
I2	Adaptation to the climatic action: heatwaves and the increase of the temperature	*0*	
I3	Adaptation to the climatic action: pluvial flood	*1*	*Higher priority than flood since it is directly related to energy*
I4	Adaptation to the climatic action: fluvial and coastal flood	*0*	
I5	Adaptation to the climatic action: drought	*0*	
I6	Adaptation to the climatic hazard: wildfire	*0*	
I7	Climatic hazard: wind	*0*	

4.3 Assignment of priority values to criteria and weights calculation

A. Use of land and biodiversity

A2 Green urban areas

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
A2.1	8	2	2	2	1
A2.2	8	2	2	2	1
A2.3	8	2	2	2	1
Total:	*100*				

B. Energy

B2 Energy Consumption

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
B2.1	30	3	5	2	1
B2.4	30	3	5	2	1
B2.6	30	3	5	2	1
B2.7	30	3	5	2	1
B2.10	30	3	5	2	1

B3 Renewable Energy

B3.1	18	3	2	1	1

B3.4	*18*	*3*	*2*	*1*	*1*
B3.5	*18*	*3*	*2*	*1*	*1*
B3.6	*18*	*3*	*2*	*1*	*1*
B3.7	*18*	*3*	*2*	*1*	*1*
B3.8	*18*	*3*	*2*	*1*	*1*
B3.9	*18*	*3*	*2*	*1*	*1*

Total: *100*

C. Water

C1 Water infrastructure

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
C1.1	*18*	*3*	*3*	*2*	*1*
C1.2	*18*	*3*	*3*	*2*	*1*

C2 Water consumption

C2.1	*12*	*3*	*2*	*2*	*1*
C2.3	*12*	*3*	*2*	*2*	*1*
C2.4	*12*	*3*	*2*	*2*	*1*
C2.5	*12*	*3*	*2*	*2*	*1*
C2.7	*12*	*3*	*2*	*2*	*1*

C3 Effluent management					
C3.1	*24*	*2*	*4*	*3*	*1*
C3.3	*12*	*3*	*2*	*2*	*1*
Total:	*100*				

D. Solid waste

D1 Solid waste collection infrastructure

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
D1.1	*32*	*4*	*4*	*2*	*1*
D2 Solid waste management					
D2.1	*8*	*1*	*4*	*2*	*1*
D2.2	*8*	*1*	*4*	*2*	*1*
Total:	*100*				

E. Environmental quality

E1 Air quality

Criterion	*Impact (PK)* *(I x E x D x A)*	*I* *Intensity*	*E* *Extent*	*D* *Duration*	*A* *Adjustment*
E1.2	*36*	*3*	*4*	*3*	*1*
Total:	*100*				

F. Transportation and mobility					
F1 Performance of mobility service					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
F1.1	*45*	*3*	*3*	*5*	*1*
F2 Green mobility					
F2.3	*27*	*3*	*3*	*3*	*1*
Total:	*100*				

G. Social aspects					
G3 Availability of public and private facilities and services					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G3.1		*3*	*3*	*3*	*1*
Total:	*100*				

I. Climate change: mitigation and adaptation					
I1 Climate change mitigation					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
I1.1	*75*	*3*	*5*	*5*	*1*

I1.2	*75*	*3*	*5*	*5*	*1*
I3 Adaptation to the climatic action: pluvial flood					
I3.3	*36*	*3*	*4*	*3*	*1*
Total:	*100*				

2.5: SBTool Selection of Criteria

A	.Site regeneration and deve urban design, and infrastru		Sousse	Irbid		Moukhtara
A1	Site Selection			Public Buildings	Residentiel Buildings	
	A1.2	Proximity of the site to public transport	*The city of Sousse has decided to focus its strategy on sustainable mobility.* *Outcome of the* ***LPC*** *Vote* ***12/20***	*Improve sustainable transportation by lowering dependence on private vehicle use and increase dependence on public transportation including the use of Medium sized buses " Coaster Buses" , Service taxis " Multiple passengers", and private taxis. And to lower the need for accommodating parking lots, as a result, lowering UHI effect.*	*Improve sustainable transportation by lowering dependence on private vehicle use and increase dependence on public transportation including the use of (Medium sized buses " Coaster Buses" , Service taxis " Multiple passengers", and private taxis. And to lower the need for accommodating parking lots, as a result, lowering UHI effect.*	
	A1.3	Adjacency to existing service infrastructure	Easy access to the public building is one of the criteria that urban planners must consider *Outcome of the* ***LPC*** *Vote* ***14/20***			
	A1.4	Proximity to main services	The municipality of Sousse has chosen the quarter-hour city as the concept	*Increase dependence on walkability for neighborhood residents promoting health and well being, and to lower*	*Increase dependence on walkability for neighborhood residents promoting health and*	

			for its future PAU. The availability of the main public facilities is desirable within a 15-minute walk or bike perimeter for any citizen of the city. *Result of Vote* ***LPC 18/20***	*dependence on transportation modes as a result lowering GHG emissions.*	*well being, and to lower dependence on transportation modes as a result lowering GHG emissions.*	
A2	**Site Development**	**Site Selection**	**Justification**	***Justification***	**Justification**	**Justification**
	A2.1			*-lower dependence on irrigation.* *-lower maintenance needed.* *-lower UHI effect* *-lower the risk of flash flooding effects.* *Increase ecosystem balance in the site.*	*-lower dependence on irrigation.* *-lower maintenance needed.* *-lower UHI effect* *-lower the risk of flash flooding effects.* *Increase ecosystem balance in the site.*	
	A2.2	Development of outdoor recreational areas	*These spaces ensure a better quality of life for citizens.* *Outcome of the* ***LPC*** *Vote* ***12/20***			
	A2.3	Support for cycling	*This criterion is in line with the actions of the PNMU National Sustainable Mobility Policy.* *http://www.transport.tn/fr/article/345/le-ministere-des-transports-organise-le-forum-*			

			de-la-mobilite-urbaine Outcome of the **LPC 4/20** Vote			
	A2.4					
B	**B. Energy and resources consun**		**Sousse**	**Irbid**		**Moukhtara**
B1	**Electricalpeakdemand**			Public Buildings	Residentiel Buildings	
	B1.1	*Primary energy consumption*				*KPI*
	B1.2	*Delivered thermal energy consumption*				*KPI*
	B1.3	*Delivered electrical energy consumption*				*KPI*
	B1.4	*Energy from renewable sources in total thermal energy consumption*				*KPI*
	B1.5	*Energy from renewable sources in total electrical energy consumption*				*KPI*
	B1.6	*Embodied non-renewable primary energy*				*KPI*

B2	**Electricalpeakdemand**			**Public Buildings**	**Residentiel Buildings**	
	B2.1		*Electrical peak demand for building operations.*	*To regulate electrical supply per building unit, for a more sustainable distribution of electrical services.*		
B3	**Materials**			Public Buildings	Residentiel Buildings	
	B3.2	*Material intensity*	*In the context of the City of Sousse's commitment to environmental certification of buildings (the 'ecobat label' Act program), reducing the weight per useful surface area can contribute to reducing the building's carbon footprint, which can be an important objective.* *Result of Vote* ***LPC 1/20***			
	B3.4	*Recycled materials*				*KPI*
	B3.5	*Renewable materials*	*The City of Sousse is committed in its local SVS strategy to take carbon footprint reduction measures*	*To encourage local economy and labour.* *To lower CO2 emissions resulting from importing non-local materials.* *Local materials*	*To encourage local economy and labour .* *To lower CO2 emissions resulting from importing non-local materials.* *Local materials*	

			The use of renewable materials contributes significantly to this process. [*https://medcities.org/documents/SDVS_Phase+de+diagnostic.pdf*](https://medcities.org/documents/SDVS_Phase+de+diagnostic.pdf) *Outcome of Vote* ***LPC14/20***	*manufacturing and construction is more adapted to local application, therefore making it easier and less time consuming.*	*manufacturing and construction is more adapted to local application, therefore making it easier and less time consuming.*	
	B3.6	*Design for Deconstruction*	*The City of Sousse has adopted a comprehensive approach in the context of sustainable development by minimizing construction waste and maximizing the reuse of materials. Green Waste and Construction Waste Management Project (GODEM)* [*https://medcities.org/documents/SDVS_Phase+de+diagnostic.pdf*](https://medcities.org/documents/SDVS_Phase+de+diagnostic.pdf) *Outcome of the* ***LPC 2/20*** *Vote*			
	B3.7	*Designed for adaptability*	*In the current context of the economic crisis and the costs that*			

			are becoming too expensive in the construction sector, the city encourages the use of a process of reduction of construction costs, better use of resources, the creation of more functional spaces and the ability to adapt to social, economic and technological changes. *It also allows buildings to remain relevant and attractive for many decades, which is essential for long-term sustainability.* *Tunisian regulations provide for laws concerning (building permits, energy saving...)* *Outcome of the **LPC 2/20** Vote*			
B4	***Use of drinking water, stormwater and greywater***			Public Buildings	Residentiel Buildings	
	B4.1	*Embedded water*	*Water management and consumption is a topical criterion at*			

			the local level. According to the prospective study of the city of Sousse, there is a high risk of drought in the coming years. The Municipality of Sousse will take management and control measures in its buildings http://pduisousse.tn/documents/ Result of Vote **LPC 1/20**			
	B4.2	*Total water consumption*	*Water management and consumption is a topical criterion at the local level. According to the prospective study of the city of Sousse, there is a high risk of drought in the coming years. The Municipality of Sousse will take management and control measures in its buildings* http://pduisousse.tn/documents/ *Outcome of the*	*Jordan is currently one of the poorest countries in potable water resources, therefore water consumption in buildings is a major concern by governmental strategies and national agenda. Special care should be given to water fixtures in buildings such as toilets, showers and faucets*	*Jordan is currently one of the poorest countries in potable water resources, therefore water consumption in buildings is a major concern by governmental strategies and national agenda. Special care should be given to water fixtures in buildings such as toilets, showers and faucets*	

			LPC** Vote **14/20			
	B4.4	*Drinking water consumption for irrigation*	*Water management and consumption is a topical criterion at the local level. According to the prospective study of the city of Sousse, there is a high risk of drought in the coming years. The Municipality of Sousse will take management and control measures in its buildings* [*http://pduisousse.tn/documents/*](http://pduisousse.tn/documents/) *Result of Vote **LPC 5/20***	*Jordan is currently one of the poorest countries in potable water resources, therefore water consumption in buildings is a major concern by governmental strategies and national agenda. In Jordan, irrigation consumes high portion of the water available. Special care should be given to using drip irrigation and rainwater water harvesting and other resources.*	*Jordan is currently one of the poorest countries in potable water resources, therefore water consumption in buildings is a major concern by governmental strategies and national agenda. In Jordan, irrigation consumes high portion of the water available. Special care should be given to using drip irrigation and rainwater water harvesting and other resources.*	
C	**Environmental loading**		**Sousse**	**Irbid**		**Moukhtara**
C1	**Greenhouse Gas Emissions**			Public Buildings	Residentiel Buildings	
	C1.1	*Embodied carbon*				*KPI*
	C1.2	*GHG gas emissions during operation*				*KPI*
	C1.3	*Life cycle global warming potential*				*To reflect the adaptive measures in 50 years*

C3	Solid Waste			Public Buildings	Residentiel Buildings	
	C3.1	*Construction waste*	*The City of Sousse has adopted a comprehensive approach in the context of sustainable development by minimizing construction waste and maximizing the reuse of materials. Green Waste and Construction Waste Management Project (GODEM) https://medcities.org/documents/SDVS_Phase+de+diagnostic.pdf Result of Vote* ***LPC 6/20***			
	C3.2	*Solid waste from building operations*		*The importance of solid waste management for sustainable development and achieving GIM sustainable goals becoming a pioneer in the application of Solid waste management systems for Jordan.*	*The importance of solid waste management for sustainable development and achieving GIM sustainable goals becoming a pioneer in the application of Solid waste management systems for Jordan.*	

D	Indoor environmental quality		Sousse		Irbid	Moukhtara
D1	**Indoor Air Quality and Ventilation**			Public Buildings	Residentiel Buildings	
	D1.2	*TVOC concentration*				*KPI*
	D1.3	*CO2 concentrations*		*Increase occupants health, well being and productivity through lowering CO2 concentrations inside the buildings since Jordanians spend more than 80% of their time indoors.*	*Increase occupants health, well being and productivity through lowering CO2 concentrations inside the buildings since Jordanians spend more than 80% of their time indoors.*	
	D1.6	*Relative humidity*		*Achieving 40%-70% of relative humidity indoors secures reaching comfortable environment indoors therefore, increase health, wellbeing, and productivity of occupants.*	*Achieving 40%-70% of relative humidity indoors secures reaching comfortable environment indoors therefore, increase health, wellbeing, and productivity of occupants.*	
	D1.7	*Ventilation*				*KPI*
D2	**Air Temperature and Relative Humidity**			Public Buildings	Residential Buildings	
	D2.1	*Time outside of the thermal comfort range*				*Related to GHG and climate change*
	D2.2	*Time outside of the thermal*				*Related to GHG and climate change*

		comfort range				
	D2.3	*Thermal comfort index -*				*KPI*
D3	**Daylighting and Illumination**			Public Buildings	Residential Buildings	
	D3.1	*Daylight*				*KPI*
	D3.2	*Daylight Provision*	There are regulations and building standards that encourage the use of natural lighting to reduce energy consumption. The use of daylight can help meet these standards. Legislation requires a minimum threshold for the energy classification of public buildings https://www.anme.tn/fr/content/batiment-0 *Result of Vote* ***LPC 7/20***	*Daylight admittance inside buildings through windows and other penetrations is a major pillar of Jordanian Code for Energy Efficient Buildings which would guarantee lower dependence on active energy (electricity) and provide a productive indoor environment. Increasing health and well being.*	*Daylight admittance inside buildings through windows and other penetrations is a major pillar of Jordanian Code for Energy Efficient Buildings which would guarantee lower dependence on active energy (electricity) and provide a productive indoor environment. Increasing health and well being.*	
D4	***Noise and Acoustics***			*Public Buildings*	*Residential Buildings*	
	D4.1	*Noise protection: facade insulation*	For Occupant Well-being: Acoustic comfort of a space compared to noise from the outside is desirable; this can improve the quality of the indoor environment, reduce			

			fatigue and promote productivity. *Result of Vote* ***LPC 7/20***			
D5	***Electromagnetic pollution***			*Public Buildings*	*Residential Buildings*	
	D5.1	*Minimizing exposure to ELF magnetic fields*	There is a high concentration of wireless communication antennas, which makes a significant exposure of the different buildings receiving public. As such, Tunisian standards exist regarding the authorized radius of installation of these structures. *https://www.anf.tn/fr/texte-juridiques* *Outcome of the* ***LPC 3/20*** *Vote*			
E	**Service quality**		**Sousse**		**Irbid**	**Moukhtara**
E1	**Service Quality**			**Public Buildings**	**Residentiel Buildings**	
	E1.1	*Effectiveness of facility management control system.*				*Related to the KPI*
	E1.2	*Smart readiness indicator*				*KPI*
E2	**Optimization and**			**Public Buildings**	**Residentiel Buildings**	

	Maintenance of Operating Performance					
	E2.1	*Existence and implementation of a maintenance management plan.*	New BIM technologies allow better management of building maintenance. Designers frequently use this tool and can provide the necessary information. *Result of Vote* ***LPC10/20***			*Important to be used as baseline for any possible intervention/project*
	E2.2	*On-going monitoring and verification of performance.*	This allows the building owner to extend asset life, reduce maintenance costs, and ensure equipment availability and reliability, which is essential for many businesses, governments, and organizations. *Outcome of the* ***LPC 4/20*** *Vote*			*Important to be used as baseline for any possible intervention/project*
	E2.3	*Retention of as-built documentation.*				*Important to be used as baseline for any possible intervention/project*

F	Social, cultural and Perceptual aspec	Sousse		Irbid		Moukhtara
F1	Social Aspects			Public Buildings	Residentiel Buildings	
	F1.1	Universal access on site and within the building.	There are standards and laws that require easier design of access and use of spaces by People with Reduced Mobility (PRMs). In terms of building permit authorizations, the dossier must take into account the various Tunisian regulations concerning universal access. *Outcome of the* ***LPC*** *Vote* ***11/20***	Jordan policies have been updated to enforce inclusion by the provision of a new Building code for the Disabled in all new buildings, allowing people with disabilities to access all buildings without preference or prejudice, reaching social sustainability through inclusion.	Jordan policies have been updated to enforce inclusion by the provision of a new Building code for the Disabled in all new buildings, allowing people with disabilities to access all buildings without preference or prejudice, reaching social sustainability through inclusion.	*Related to equal human rights*
	F1.2	Exposure to sunlight		Allowances of solar admittance between buildings in outdoor areas, and inside occupied spaces in buildings, ensures lower dependence on heating and artificial lighting, and create better social interaction environments.	Allowances of solar admittance between buildings in outdoor areas, and inside occupied spaces in buildings, ensures lower dependence on heating and artificial lighting, and create better social interaction environments.	

F2	Perceptual			Public Buildings	Residentiel Buildings	
	F2.1	View out		Jordan Providing indoor-outdoor integration promotes well being of users and occupants reaching social sustainability goals.dated to enforce inclusion	Jordan Providing indoor-outdoor integration promotes well being of users and occupants reaching social sustainability goals dated to enforce inclusion	*Chosen based on the topography of Moukhtara*
G	**Costs and economic aspects**		**Sousse**		**Irbid**	**Moukhtara**
G1	***Costs and economics***			**Public Buildings**	**Residentiel Buildings**	
	G1.4	*Energy cost*				*KPI*
	G1.5	*Cost of water*	By knowing the cost per useful area, building managers can better control water-related expenses. This allows			*Related to energy cost and availability*

			them to identify sources of water waste and put measures in place to reduce costs. *Outcome of the* ***LPC*** *Vote* ***14/20***			
H	**Adaptation to climate change**		**Sousse**		**Irbid**	**Moukhtara**
H1	**Climatic action: increase of temperature**			**Public Buildings**	**Residentiel Buildings**	
	H1.2	*Time outside of the thermal comfort range – 2050*				*Related to energy, GHG emissions and climate change*
	H1.3	*Shading of the building envelope by vegetation*	By reducing heat absorption from the exterior surfaces of the building and increasing surrounding vegetation, vegetation shading helps reduce the urban heat island effect, which is beneficial for air quality and occupant well-being. Shading the exterior walls can protect building materials and the building envelope from damage	Indoor temperature and relative humidity are considered major factors affecting occupants thermal comfort and well being. Shading elements such as trees, green facades, etc. helps in regulating indoor air temperature and relative humidity values.	Indoor temperature and relative humidity are considered major factors affecting occupants thermal comfort and well being. Shading elements such as trees, green facades, etc. helps in regulating indoor air temperature and relative humidity values.	

			caused by direct sun exposure. This extends their lifespan. *Result of Vote* ***LPC11/20***.			
	H1.4	*Use of vegetation to improve microclimate and cooling during summer*	To improve the aesthetic appearance of the building, greenery must be added and a more pleasant environment for workers and visitors. This can have psychological and social benefits by promoting a sense of well-being. *Result of Vote* ***LPC14/20***.			
H2	***Climate Action: Storm Flood***			**Public Buildings**	**Residentiel Buildings**	
	H2.1	*Storm water retention capacity on site*	Tunisian regulations and the new urban planning regulations of the city of Sousse require the permits to build water reservoirs to collect and store rainwater. Government Decree No.			

			1194/2019 of 19/12/20219. *Outcome of Vote* ***LPC14/20***			
	H2.2	*Soil permeability*	The urban planning regulations of the city of Sousse require certain conditions in direct relation to sustainable development. Among these, mention may be made of the permeability index/green index of each land intended for construction. *Outcome of Vote* ***LPC14/20***	Porosity of outdoor exposed site materials is very crucial for regulating solar heat admittance and water penetration to enhance ground water supply and lower risk of site flooding.	Porosity of outdoor exposed site materials is very crucial for regulating solar heat admittance and water penetration to enhance ground water supply and lower risk of site flooding.	
H3	***Climate action: river and coastal flooding***			**Public Buildings**	**Residentiel Buildings**	
	H3.1	*Risk of flooding to occupants and facilities*	The local town planning plan (PLU) of the city of Sousse indicates flooded areas and floodplains throughout the municipality. *Outcome of the* ***LPC*** *Vote* ***11/20***			

H4	***Climate Action: Drought***			**Public Buildings**	**Residentiel Buildings**	
	H4.1	*Capacity to collect and store rainwater for non-potable uses*	This criterion can contribute to the conservation of drinking water by partially using these resources for irrigation, or other needs such as cleaning. *Outcome of the* ***LPC*** *Vote* ***13/20***			
	H4.2	*Capacity of greywater collection and storage for non-potable uses*		The importance of providing other water sources for on-site irrigation other that potable water by encouraging the use of greywater treatment retrofits to be used in irrigation. Jordanian codes have been updated to encourage providing greywater collection systems mainly for public sector buildings.	The importance of providing other water sources for on-site irrigation other that potable water by encouraging the use of greywater treatment retrofits to be used in irrigation. Jordanian codes have been updated to encourage providing greywater collection systems mainly for public sector buildings.	*Related to environment*
H5	***Climate Action: Exposure to Fire***			**Public Buildings**	**Residentiel Buildings**	
	H5.1	*Envelope Fire Resistance*	Tunisian regulations in force concerning fire safety of new buildings require standards to be met in order to			

			accommodate the public. *Outcome of the **LPC 3/20** Vote*			
H6	***Climate action: wind action***			**Public Buildings**	**Residentiel Buildings**	
	H6.1	*Windproof Envelope*	The design and construction of buildings must be resilient in the face of climate-related natural disasters, which are becoming a common phenomenon. A well-designed casing maintains high-quality structural stability. *Result of Vote **LPC 1/20***			

2.6: SBTool Data Sources

A	.Site regeneration anc development, urban c infrastructure		Sousse	Irbid		Moukhtara
A1	**Site Selection**			Public Buildings	Residentiel Buildings	
	A1.2	Proximity of the site to public transport	• *Atlas of neighbourhoods (http://pduisousse.tn/documents/)* • *Google map* • *Open Street Map*	- GIM Transportation Department - GIS Mapping - Site assessment through physical visits and observation.	- GIM Transportation Department - GIS Mapping - Site assessment through physical visits and observation.	
	A1.3	Adjacency to existing service infrastructure	• *Atlas of neighbourhoods (http://pduisousse.tn/documents/)* • *Google map* • *Open Street Map*			
	A1.4	Proximity to main services	• *Atlas of neighbourhoods (http://pduisousse.tn/documents/)* • *Google map* • *Open Street Map* • *PLU of the municipality of Sousse*	- GIM - GIS Mapping site assessment through physical visits and observation.	- GIM - GIS Mapping site assessment through physical visits and observation.	

A2	**Site Development**	**Site Selection**		***Justification***	**Justification**	**Justification**
	A2.1			- Site assessment through physical visits and observation Ministry of Envirnoment	Site assessment through physical visits and observation Ministry of Envirnoment	
	A2.2	Development of outdoor recreational areas	• *Google earth* • *Building Permit Plan*			
	A2.3	Support for cycling	• *Building Tour*			
	A2.4					
B	**B. Energy and resources c**			**Irbid**		**Moukhtara**
B1	**Electricalpeakdemand**			Public Buildings	Residentiel Buildings	
	B1.1	*Primary energy consumption*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values

						were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B1.2	*Delivered thermal energy consumption*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4

	B1.3	*Delivered electrical energy consumption*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B1.4	*Energy from renewable sources in total thermal energy consumption*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and

						analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B1.5	*Energy from renewable sources in total electrical energy consumption*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local

						standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B1.6	*Embodied non-renewable primary energy*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4

B2	**Electricalpeakdemand**			**Public Buildings**	**Residentiel Buildings**	
	B2.1			- Building electricity bills samples - Ministry of Energy and Mineral Resources - Ideco" Irbid Electricity Company" - Questionnaire Survey	- Building electricity bills samples - Ministry of Energy and Mineral Resources - Ideco" Irbid Electricity Company" - Questionnaire Survey	
B3	**Materials**			Public Buildings	Residentiel Buildings	
	B3.2	*Material intensity*	• *Municipality: "Structure" and "Architecture" Execution Folder*			
	B3.4	*Recycled materials*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management

						consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B3.5	*Renewable materials*	• *Municipality: "Structure" and "Architecture" Execution Folder Construction Company*	- Ministry of Public Works and Housing - Contractors Association Site assessment through physical visits and observation	- Ministry of Public Works and Housing - Contractors Association Site assessment through physical visits and observation	
	B3.6	*Design for Deconstruction*	• *Municipality: SPA File -DPA-Project Delivery*			
	B3.7	*Designed for adaptability*	• *Municipality: SPA files - DPA - Project execution*			
B4	***Use of drinking water, stormwater and greywater***			Public Buildings	Residentiel Buildings	
	B4.1	*Embedded water*	• *Municipality: Site SONEDE counter invoice*			Moukhtara Municipality Engineering team listed under the SMC team

						members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B4.2	*Total water consumption*	• *Municipality: SONEDE Invoice*	- Yarmouk Water Company - Building water bills samples - Site assessment through physical visits and observation	- Yarmouk Water Company - Building water bills samples - Site assessment through physical visits and observation	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management

						consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	B4.3	*Potable water consumption for indoor uses*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between

						all the members of the SMC team listed under template 1.4
	B4.4	*Drinking water consumption for irrigation*	• *Municipality: SONEDE Invoice*	- Building water bills samples - Site assessment through physical visits and observation	- Building water bills samples - Site assessment through physical visits and observation	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
C	**Environmental loa**			**Irbid**		**Moukhtara**
C1	**Greenhouse Gas Emissions**			Public Buildings	Residentiel Buildings	
	C1.1	*Embodied carbon*				Moukhtara Municipality

						Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	C1.2	*GHG gas emissions during operation*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the

						SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	C1.3	*Life cycle global warming potential*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were

						confirmed through coordination between all the members of the SMC team listed under template 1.4
C3	**Solid Waste**			Public Buildings	Residentiel Buildings	
	C3.1	*Construction waste*	• *Municipality: Environmental Service Waste collection undertaking* • *National Waste Management Agency ANGED*			
	C3.2	*Solid waste from building operations*		- GIM - Site assessment through physical visits and observation -	- GIM - Site assessment through physical visits and observation -	
D	**Indoor environmental quality**				**Irbid**	**Moukhtara**
D1	**Indoor Air Quality and Ventilation**			Public Buildings	Residentiel Buildings	
	D1.2	*TVOC concentration*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**.

						Data verification and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	D1.3	*CO_2 concentrations*	*Onsite measurements through detectors*			
	D1.6	*Relative humidity*	*Onsite measurements through detectors*			
	D1.7	*Ventilation*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the

						SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
D2	**Air Temperature and Relative Humidity**			Public Buildings	Residential Buildings	
	D2.1	*Time outside of the thermal comfort range*				***Calculations** based on data collected from local and international studies and **assumptions** based on Moukhatara context*
	D2.2	*Time outside of the thermal comfort range*				***Calculations** based on data collected from local and international studies and **assumptions** based on Moukhatara context*
	D2.3	*Thermal comfort index -*				***Calculations** based on data collected from local and international studies and **assumptions** based on*

D3						*Moukhatara context*
	Daylighting and Illumination			Public Buildings	Residential Buildings	
	D3.1	*Daylight*				***Calculations*** *based on data collected from local and international studies and* ***assumptions*** *based on Moukhatara context*
	D3.2	*Daylight Provision*	*Building Tour*	- Site assessment through physical visits and observation - Buildings architectural plans and sections.	- Site assessment through physical visits and observation - Buildings architectural plans and sections.	
D4	***Noise and Acoustics***			*Public Buildings*	*Residential Buildings*	
	D4.1	*Noise protection: facade insulation*	*Building Tour*			
D5	***Electromagnetic pollution***			*Public Buildings*	*Residential Buildings*	
	D5.1	*Minimizing exposure to ELF magnetic fields*	• *Atlas of neighbourhoods (http://pduisousse.tn/documents/)* • *Google map*			

E	Service quality			Irbid		Moukhtara
E1	Service Quality			Public Buildings	Residentiel Buildings	
	E1.1	*Effectiveness of facility management control system.*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	E1.2	*Smart readiness indicator*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the

						SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
E2	**Optimization and Maintenance of Operating Performance**			**Public Buildings**	**Residentiel Buildings**	
	E2.1	*Existence and implementation of a maintenance management plan.*	• *Municipality: Maintenance and maintenance service*			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**.

	E2.2	*On-going monitoring and verification of performance.*	• *Municipality: Audit Department*			Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**.
	E2.3	*Retention of as-built documentation .*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**.
F	**Social, cultural and Perceptual aspec**				**Irbid**	**Moukhtara**
F1	**Social Aspects**			**Public Buildings**	**Residentiel Buildings**	
	F1.1	Universal access on site and within the building.	• *Municipality: SPA files - DPA - Project execution Building Tour*	- Site assessment through physical visits and observation - Buildings architectural plans and sections. -	- Site assessment through physical visits and observation - Buildings architectural plans and sections. -	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**.
	F1.2	Exposure to		- Site	- Site assessment	

		sunlight		assessment through physical visits and observation - Buildings architectural plans and sections	through physical visits and observation - Buildings architectural plans and sections	
F2	**Perceptual**			Public Buildings	Residentiel Buildings	
	F2.1	View out		- Site assessment through physical visits and observation - Buildings architectural plans and sections.	- Site assessment through physical visits and observation - Buildings architectural plans and sections.	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**.

G	Costs and economic aspects			Irbid		Moukhtara
G1	*Costs and economics*			Public Buildings	Residentiel Buildings	
	G1.4	*Energy cost*				Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
	G1.5	*Cost of water*	• *Municipality SONEDE Invoices - Société Nationale d'Exploitation et*			Moukhtara Municipality Engineering team listed under the SMC team members, led by the

			de Distribution des Eaux-***SONEDE***			SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4
H	**Adaptation to climate change**				**Irbid**	**Moukhtara**
H1	**Climatic action: increase of temperature**			**Public Buildings**	**Residentiel Buildings**	
	H1.2	*Time outside of the thermal comfort range – 2050*				***Calculations** based on data collected from local and international studies and **assumptions** based on Moukhatara context*
	H1.3	*Shading of the building envelope by vegetation*	*Building Tour*	- Site assessment through physical visits and	- Site assessment through physical visits and observation	

				observation -	-	
	H1.4	*Use of vegetation to improve microclimate and cooling during summer*	*Building Tour*			
H2	***Climate Action: Storm Flood***			**Public Buildings**	**Residentiel Buildings**	
	H2.1	*Storm water retention capacity on site*	• *Municipality: SPA files - DPA - Project execution* • *Building Tour*			
	H2.2	*Soil permeability*	• *Municipality: SPA Records - DPA - Project Delivery Building Permit Plan.* • *Google earth*	- Site assessment through physical visits and observation	- Site assessment through physical visits and observation	
H3	***Climate action: river and coastal flooding***			**Public Buildings**	**Residentiel Buildings**	
	H3.1	*Risk of flooding to occupants and facilities*	• *Atlas of neighbourhoods (http://pduisousse.tn/documents/)*			
H4	***Climate Action: Drought***			**Public Buildings**	**Residentiel Buildings**	

	H4.1	*Capacity to collect and store rainwater for non-potable uses*	• *Municipality: SPA Records - DPA - Project Delivery Building Permit Plan Building Tour*			
	H4.2	*Capacity of greywater collection and storage for non-potable uses*		- - Site assessment through physical visits and observation - Mechanical and Construction plans and drawings. - Building specifications.	- Site assessment through physical visits and observation - Mechanical and Construction plans and drawings. - Building specifications.	Moukhtara Municipality Engineering team listed under the SMC team members, led by the SMC team Coordinator conducted the **data collection**. **Data verification** and analysis was conducted by the SMC Team Lead and Quality Management consultants. **Calculation** of the targets and values were based on assumptions and local standards (Libnor). Final values were confirmed through coordination between all the members of the SMC team listed under template 1.4

H5	***Climate Action: Exposure to Fire***			**Public Buildings**	**Residentiel Buildings**	
	H5.1	*Envelope Fire Resistance*	• *Municipality: SPA Records - DPA - Project Delivery Building Permit Plan*			
H6	***Climate action: wind action***			**Public Buildings**	**Residentiel Buildings**	
	H6.1	*Windproof Envelope*	• *Municipality: SPA Records - DPA - Project Delivery Building Permit Plan*			

2.7: SBTool Benchmarks

1/ SOUSSE:

A. Site regeneration and development, urban design and infrastructure				
Criterion	***Indicator***	***Unit of Measure***	***Landmark***	***Rationale***
A2.2.	*Number of recreational services offered outside the building*		*0:3*	*Context-independent indicator*
			5:5 a.m.	*Context-independent indicator*
A2.3	*Percentage of bicycle parking spaces available*	*%*	*0:4*	*Context-independent indicator*
			5:20 a.m.	*Context-independent indicator*
B. Energy and resource consumption				
Criterion	***Indicator***	***Unit of Measure***	***Landmark***	***Rationale***
B1.1	Primary energy consumption per internal useful area per year	kWh/m²/a	*0:312*	*Modified repository taking into account local climatic conditions and energy conversion factors*
			5:200 a.m.	
B1.2	Thermal energy demand provided	kWh/m²/a	*0:100*	*modified repository taking into account local climatic conditions and Tunisian regulations and materials*
			5:65 a.m.	
B1.3	Power Consumption Provided	kWh/m²/a	*0:15*	*modified reference system taking into account local climatic conditions and tunisian regulations*
			5:5 a.m.	

B1.4	Energy from renewable sources in total thermal energy consumption	kWh/m²/a	*0:20* *5:100 a.m.*	*Context-independent indicator*
B1.5	Energy from renewable sources in total electricity consumption	kWh/m²/a	*0:20* *5:100 a.m.*	*Context-independent indicator*
B1.6	Non-renewable primary energy integrated by usable floor area of the building	MJ/m²	*0:20* *5:100 a.m.*	*No data available*
B3.4	Recycled materials	%	*0:20* *5:100 a.m.*	*No data available*
B3.5	Local materials	%	*12:80 a.m.* *5:30 a.m.*	*test bench valid for context*
B4.3	Drinking water consumption indoors	%	*0:100* *5:30 a.m.*	*test bench valid for context*
B4.4	Drinking water consumption for irrigation	%	*0:20* *5:0*	*test bench valid for context*

C. Environmental loadings

Criterion	***Indicator***	***Unit of Measure***	***Landmark***	***Rationale***
C1.1	Embedded carbon	kg{eq. CO2}/m²	*0: 3.1* *5: 2.2*	*test bench valid for context*
C1.4	Greenhouse gas emissions during operation	kg eq. CO_2/m²/a	*12:54 a.m.* *5:28 a.m.*	*test bench valid for context*
C3.1	Construction waste	kg/m²	*12:54 a.m.* *5:28 a.m.*	*No data available*

D. Indoor Environment quality

Criterion	Indicator	Unit of Measure	Landmark	Rationale
D1.2	VOC concentration		0: 0.5 5:0.1	test bench valid for context
D1.7	Mechanical Venting	l/s/m²	0: 0.6 5: 1.2	test bench valid for context
D2.3	Thermal comfort index	%	0:20 5:10 a.m.	test bench valid for context
D3.1	Daylight	%	0:2 5:4 a.m.	test bench valid for context
D3.2	Daylight Supply	%	0:1 5:3 a.m.	test bench valid for context
D4.1	Noise protection: facade insulation	dB	0: 27.5 5:38.5	test bench valid for context

E. Service Quality

Criterion	Indicator	Unit of Measure	Landmark	Rationale
E1.2	Intelligent readiness indicator	%	12:40 a.m. 5:100 p.m.	test bench valid for context
E2.1	Existence and implementation of a maintenance management plan	%	0:0 5:5 a.m.	test bench valid for context

F. Social, cultural and perceptual aspects

Criterion	Indicator	Unit of Measure	Landmark	Rationale
F1.1	Universal access on site and inside the building	%	0:0 5:5 a.m.	test bench valid for context

G. Cost and economic aspects

Criterion	Indicator	Unit of Measure	Landmark	Rationale
G1.4	Cost of energy	DT/m²	0:20 5:70 p.m.	modified energy and local currency reference index
G1.5	water cost	DT/m²	0:2 5:7 a.m.	amended benchmark for water prices and local currency

H. Adaptation to climate change

Criterion	Indicator	Unit of Measure	Landmark	Rationale
H1.2	Thermal island effect	index	12:50 a.m. 5:100 a.m.	test bench valid for context
H1.3	Shading of the building envelope by vegetation	%	12:30 a.m. 5:70 a.m.	modified reference system taking into account local climatic conditions

H1.4	Shading of the building envelope by vegetation	%	*12:30 a.m.* *5:70 a.m.*	*modified reference system taking into account local climatic conditions*
H2.1	Stormwater retention capacity on site	%	*0:00* *5:50 a.m.*	*modified reference system taking into account local climatic conditions*
H2.2	Soil permeability	%	*12:50 a.m.* *5:100 a.m.*	*test bench valid for context*
H4.1	Capacity to collect and store rainwater for non-potable uses	%	*12:50 a.m.* *5:100 a.m.*	*test bench valid for context*

2/ IRBID:

Public Buildings

A. Site regeneration and development, urban design and Infrastructure				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
A1.2	*Accessibility index to public transportation*	*n*	*0: (1.5)* *5: (12)*	*the min value index, indicates that buildings are far away from public transport access or stations by more than 1000m walking distance,* *However, a maximum value index would indicate that a user would walk for less than 50 m from the entrance of the building to the public transportation station.*
A1.4	Average distance from key services	m	*0: (2000)*	*According to the green building guideline in Jordan, buildings distance should be less than 1000m from services, the closer it is, the more green it is. Regular standard buildings can be 2000m away from services, not*

				more, or they will be considered remote.
			5: (50)	*The best service location is to be very close to the building.*
A2.1	The extent of vegetated landscaped area that is planted with native plants	%	*0: (0)*	*Not all buildings accommodate land for the plantation of gardens or green roofs.*
			5: (100)	*If a garden exists, it is best to plant it with native, or adapted plants for the total area, to encourage water saving and lower maintenance efforts.*

B. Energy and resources consumption

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
B1.1	*Primary energy consumption per internal useful floor area per year*	*kWh/m²/a*	*0: (155)*	*Surveys and Standards*
			5: (80)	*Surveys and Standards*
B1.2	*Delivered thermal energy consumption per internal useful floor area per year*	*kWh/m²/a*	*0: (30)*	*Surveys and Standards*
			5: (15)	*Surveys and Standards*
B1.3	*Delivered electrical energy consumption per internal useful floor area per*	*kWh/m²/a*	*0: (120)*	*Surveys and Standards*
			5: (90)	*Surveys and Standards*

	year			
B1.4	*Share of renewable energy in final thermal energy consumptions*	*%*	*0: (20)*	*Surveys and legislations*
			5: (100)	*Surveys and legislations*
B1.5	*Share of renewable energy in final electric energy consumption*	*%*	*0: (20)*	*Surveys and legislations*
			5: (100)	*Surveys and legislations*
B1.6	*Embodied primary non-renewable energy per building's useful internal floor area*	*MJ/m²*	*0: (432)*	*Surveys and bills of quantities*
			5: (400)	*Surveys and bills of quantities*
B2.1	*Average of peak monthly electrical demand for one year*	*W/m²*	*0: (100)*	*If consumption increases above this value, this indicates lower efficient energy equipment, systems or applications, and bad energy related occupant behaviour.*
			5: (20)	*if consumption is lower than this value in full occupancy, without compromising the comfort of the occupant, this indicates higher efficient energy equipment, systems or*

				applications, and very good energy related occupant behaviour.
B3.4	Weight of recycled materials on total weight of materials	%	*0: (15)*	*Green standards*
			5: (50)	*Green standards*
B3.5	Weight of local materials on total weight of materials	%	*0: (30)*	*it is highly recommended to encourage local material use in building construction for sustainable income and social development, in addition to encouraging lowering GHG emissions resulting from transport of building materials.*
			5: (80)	*if all materials are local, this would give a higher sustainability value.*
B4.2	Total consumption of water per building occupant	m3/occupant yr	*0: (12)*	*Surveys and Jordanian Standards*
			5: (5)	*Surveys and Jordanian Standards*
B4.3	Potable water consumption per occupant per year	m^3/{occupant}/a	*0: (100)*	*Surveys and Jordanian Standards*
			5: (30)	*Surveys and Jordanian Standards*

B4.4	Potable water consumption / standardised potable water consumption	%	*0: (80)*	*Surveys and Jordanian Standards*
			5: (0)	*Surveys and Jordanian Standards*
C. Environmental loadings				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
C1.1	*Embodied carbon dioxide equivalents per building's useful internal floor area*	*kg{CO2-eq}/m²*	*0: (3.1)*	*Technical Standards*
			5: (2.2)	
C1.2	*CO2 equivalent emissions per useful internal floor area per year*	*CO_2 eq./m²/a*	*0: (54)*	*Technical Standards*
			5: (28)	
C3.2	*Ratio of the number of collectable solid waste categories within a 100 m distance from the building's entrance to the reference solid waste categories*	%	*0: (0)*	*The higher the number of collectables, the higher the positive impact on the environment and closer to achieving sustainable goals and GIM strategy in solid waste management. When all collectables are within a walking distance of 100m from the entrance of the building, it is given a full score of 5.*
			5: (100)	

D. Indoor environmental quality

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
D1.2	*TVOC concentration in indoor air*	*µg/ m3*	*0: (0.5)*	*Technical Standards*
			5: (0.1)	
D1.3	*CO_2 concentration in indoor air*	*ppm*	*0: (2600)*	*According to the ventilation building code, and the green building guideline, each space use and occupancy type has a maximum allowed CO_2 concentration allowed, which can reach 2600 ppm for multi use halls. and concentrations can be as low as the outdoor concentration which can be 400 ppm.*
			5: (400)	
D1.6	Relative humidity in indoor air	%	*0: (60)*	*According to comfort levels of indoor relative humidity, higher than 60% would be too humid.*
			5: (30)	*According to comfort levels of indoor relative humidity,lower than 30% would be too dry.*

D1.7	Mechanical ventilation rate per useful internal floor area	l/s/m²	*0: (0.6)*	*Ventilation possibilities and limitations indoors according to standards*
			5: (1.2)	*Ventilation possibilities and limitations indoors according to standards*
D2.3	Thermal comfort index	%	*0: (20)*	*Thermal comfort standards*
			5: (10)	*Thermal comfort standards*
D3.1	Mean Daylight Factor	%	*0: (2)*	*Standards of efficient illumination range between 100 to 1000 lux, depending on the nature of the task. And it would be a sustainable option to provide the space with the required illumination indoors from daylight, without compromising solar radiation admittance.*
			5: (4)	
D3.2	Level of daylight provision	Level	*0:(1)*	*Jordan responding climate*
			5: (3)	

E. Service Quality

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*

E1.2	*Total smart readiness of buildings for responding to the needs of occupants, optimizing energy performance, and interacting with energy grids*	*%*	*0:(40)*	*According to market availability and maturity and legislations*
			5: (100)	*According to market availability and maturity and legislations*

F. Social, cultural and perceptual aspects

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
F1.1	*The scope and quality of design measures planned to facilitate access and use of building facilities by persons with disabilities*	*Score*	*0: (0)*	*Special care should be given to accessibility of people with disabilities through buildings. According to the new (Building for the disabled) building code of Jordan, it is mandatory for all public buildings to accommodate people with disabilities, and minimum requirements for residential buildings. score 5 is considered the full adaptation of the code in the building.*
			5:(5)	

F1.2	Hours of sunlight	Hours	*0: (1)*	*Access to solar radiation and daylight is very important for well-being, productivity and health, therefore, full time exposure of 12 hours in a moderate day is given a full score.*
			5: (8)	
F2.1	Quality of view out	*Score*	*0: (25)*	*if an opening can provide A view that comprises of all the following three distinct layers,It can achieve a full score of 5: 1. A layer of sky; 2. A layer of landscape; 3. A layer of ground. If it doesn't open to any layer, the score is 0.*
			5: (75)	
G. Cost and economic aspects				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
G1.4	*Annual energy cost per useful internal floor area*	*€/m2/year*	*0: (20)*	Questionnaire and Surveys
			5: (5)	Questionnaire and Surveys
H. Adaptation to climate change				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
H1.2	*Mean Solar Reflectance Index*	*{index}*	*0: (50)*	*Standard and green criteria*

	of paved surfaces and roofs in the area		*5: (100)*	*Standard and green criteria*
H1.3	*Percent of building envelope with orientation between West and South East that will be covered by vegetation during the warm season (June 12st)*	%	*0: min (20)* *5: max (80)*	*Ratio between orientation areas, according to building shape. In jordan, a rectangular shape is usually used.*
H2.2	Share of the site that is permeable	%	*0: min (0)* *5: max (25)*	*According to the Green building Guideline of Jordan, it is considered a green building to allow more than 25% of the total footprint of the land to be permeable or planted.*
H4.2	Share of greywater collected and	%	*0: min (0)*	*According to the Green building Guideline of*

	cleaned for reuse		*5: max (100)*	*Jordan, it is encouraged to use all greywater generated from buildings for irrigation, gaining 9 points for 100% use, 6 points for 75% use, and 3 points for 50% use of grey water for irrigation.*

Residential Buildings

A. Site regeneration and development, urban design and infrastructure				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
A1.2	*Accessibility index to public transportation*	*n*	*0: (1.5)*	*The min value index, indicates that buildings are far away from public transport access or stations by more than 1000m walking distance, However, a maximum value index would indicate that a user would walk for less than 50 m from the entrance of the building to the public transportation station.*
			5: (12)	
A1.4	Average distance from key services	m	*0: (2000)*	*According to the green building guideline in Jordan, buildings distance should be less than 1000m from services, the closer it is, the more green it is. Regular standard buildings can be 2000m away from services, not more, or they will be considered remote.*
			5: (50)	*The best service location is to be very close to the building.*
A2.1	The extent of vegetated landscaped area that is planted with native plants	%	*0: (0)*	*Not all buildings accommodate land for plantation of gardens or green roofs.*
			5: (100)	*If a garden exists, it is best to plant it with native, or adapted plants for the total area, to*

				encourage water saving and lower maintenance efforts.

B. Energy and resources consumption

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
B1.1	*Primary energy consumption per internal useful floor area per year*	*kWh/m²/a*	*0: (155)* *5: (80)*	*Surveys and standards*
B1.2	*Delivered thermal energy consumption per internal useful floor area per year*	*kWh/m²/a*	*0: (30)* *5: (15)*	*Surveys and standards*
B1.3	*Delivered electrical energy consumption per internal useful floor area per year*	*kWh/m²/a*	*0: (120)* *5: (90)*	*Surveys and standards*
B1.4	*Share of renewable energy in final thermal energy consumptions*	*%*	*0: (20)* *5: (100)*	*Surveys and standards*
B1.5	*Share of renewable energy in final electric energy consumption*	*%*	*0: (20)* *5: (100)*	*Surveys and standards*
B1.6	*Embodied primary non-renewable energy*	*MJ/m²*	*0: (432)*	*Surveys and standards*

	per building's useful internal floor area		*5: (400)*	
B2.1	*Average of peak monthly electrical demand for one year*	*W/m2*	*0: (100)*	*If consumption increases above this value, this indicates lower efficient energy equipment, systems or applications, and bad energy related occupant behaviour.*
			5: (20)	*if consumption is lower than this value in full occupancy, without compromising the comfort of the occupant, this indicates higher efficient energy equipment, systems or applications, and very good energy related occupant behaviour.*
B3.4	Weight of recycled materials on total weight of materials	%	*0: (15)*	*Green standards*
			5: (50)	
B3.5	Weight of local materials on total weight of materials	%	*0: (30)*	*it is highly recommended to encourage local material use in building construction for sustainable income and social development, in addition to encouraging lowering GHG emissions resulting from transport of building materials.*
			5: (50)	*if high ratio of materials is local, this would give a higher sustainability value.*

B4.2	Total consumption of water per building occupant	m3/occupant yr	0: (120)	*Surveys and Jordanian Standards*
			5: (50)	*Surveys and Jordanian Standards*
B4.3	Potable water consumption per occupant per year	m^3/{occupant}/a	0: (100)	*Surveys and Jordanian Standards*
			5: (30)	
B4.4	Potable water consumption / standardised potable water consumption	%	0: (80)	*Surveys and Jordanian Standards*
			5: (0)	*Surveys and Jordanian Standards*

C. Environmental loadings

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
C1.1	*Embodied carbon dioxide equivalents per building's useful internal floor area*	*kg{CO2-eq}/m²*	*0: (3.1)*	*Technical Standards*
			5: (2.2)	
C1.2	*CO2 equivalent emissions per useful internal floor area per year*	CO_2 eq./m²/a	*0: (54)*	*Technical Standards*
			5: (28)	
C3.2	*Ratio of the number of collectable solid waste categories within a 100 m distance from the building's entrance to the reference solid*	*%*	*0: (0)*	*The higher the number of collectables, the higher the positive impact on the environment and closer to achieving sustainable goals and GIM strategy in solid waste management. When all collectables are*
			5: (100)	

	waste categories			*within a walking distance of 100m from the entrance of the building, it is given a full score of 5.*

D. Indoor environmental quality

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
D1.2	*TVOC concentration in indoor air*	*µg/ m3*	*0: (0.5)*	*Technical Standards*
			5: (0.1)	
D1.3	*CO2 concentration in indoor air*	*ppm*	*0: (2600)*	*According to the ventilation building code, and the green building guideline, each space use and occupancy type has a maximum allowed CO2 concentration allowed, which can reach 2600 ppm for multi use halls. and concentrations can be as low as the outdoor concentration which can be 400 ppm.*
			5: (400)	
D1.6	Relative humidity in indoor air	%	*0: (60)*	*According to comfort levels of indoor relative humidity, higher than 60% would be too humid*
			5: (30)	*According to comfort levels of indoor relative humidity,lower than 30% would be too dry.*
D1.7	Mechanical Ventilation	l/s/m²	*0: (0.6)*	*Ventilation possibilities and limitations indoors according to standards*
			5: (1.2)	*Ventilation possibilities and limitations indoors according to standards*

D2.3	Predicted Percentage of Disatisfied	%	*0: (20)*	*Thermal comfort standards*
			5: (10)	*Thermal comfort standards*
D3.1	Mean Daylight Factor	%	*0: (2)*	*Standards of efficient illumination range between 100 to 1000 lux, depending on the nature of the task. And it would be a sustainable option to provide the space with the required illumination indoors from daylight, without compromising solar radiation admittance.*
			5: (4)	
D3.2	Level of daylight provision	Level	*0: (1)*	*Jordan responding climate*
			5:(3)	

E. Service quality

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
E1.2	*Total smart readiness of buildings for responding to the needs of occupants, optimizing energy performance, and interacting with energy grids*	*%*	*0: (40)*	*According to market availability and maturity and legislations*
			5:(100)	

F. Social, cultural and perceptual aspects

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
F1.1	*The scope and quality of design measures planned to facilitate access and use of building facilities by persons with disabilities*	*Score*	*0: min (0)* *5: max(5)*	*Special care should be given to accessibility of people with disabilities through buildings. According to the new (Building for the disabled) building code of Jordan, it is mandatory for all public buildings to accommodate people with disabilities, and minimum requirements for residential buildings. score 5 is considered the full adaptation of the code in the building.*
F1.2	Hours of sunlight	Hours	*0: (1)* *5: (12)*	*Access to solar radiation and daylight is very important for well-being, productivity and health, therefore, full time exposure of 12 hours in a moderate day is given a full score.*
F2.1	Quality of view out	*Score*	*0: (25)* *5: (75)*	*if an opening can provide A view that comprises of all the following three distinct layers,It can achieve a full score of 5:* *1. A layer of sky;* *2. A layer of landscape;* *3. A layer of ground.* *If it doesn't open to any layer, the score is 0.*

G. Cost and economic aspects

Criterion	Indicator	Unit of measure	Benchmark	Rationale
G1.4	*Annual energy cost per useful internal floor area*	*€/m2/year*	*0: (20)* *5: (5)*	Questionnaire and Surveys

H. Adaptation to climate change

Criterion	Indicator	Unit of measure	Benchmark	Rationale
H1.2	*Mean Solar Reflectance Index of paved surfaces and roofs in the area*	*{index}*	*0: (50)* *5: (100)*	*Standard and green criteria*
H1.3	*Percent of building envelope with orientation between West and South East that will be covered by vegetation during the warm season (June 12st)*	%	*0: (20)* *5: (80)*	*Ratio between orientation areas, according to building shape. In jordan, a rectangular shape is usually used.*
H2.2	Share of the site that is permeable	%	*0: min (0)* *5: max (25)*	*According to the Green building Guideline of Jordan, it is considered a green building to allow more than 25% of the total footprint of the land to be permeable or planted.*
H4.2	Share of greywater collected and cleaned for reuse	%	*0: min (0)* *5: max (100)*	*According to the Green building Guideline of Jordan, it is encouraged to use all greywater generated from buildings for irrigation, gaining 9 points for 100% use, 6 points for 75% use, and 3 points for 50% use of grey water for irrigation.*

3/ MOUKHTARA:

B. Energy and resources consumption				
Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
B1.1	*Primary energy demand per internal useful floor area per year*	*kWh/m2/yr*	*0: (155)* *5: (50)*	These benchmarks were adopted taking into consideration the electrical and thermal energies benchmarks contextualized for Moukhtara municipality building
B1.2	*Delivered thermal energy demand per internal useful floor area per year*	*kWh/m2/yr*	*0: (30)* *5: (15)*	There are no available meters for the delivered thermal energy at the municipality building. The thermal energy consumption relies on fuel-based boilers. Assumptions for the benchmarks took into consideration the metric tons of fuel consumed on yearly average by the municipality. The average value was close to the benchmarks set for by the SB Tool and therefore they were adopted without any changes.
			0: (5)	These Benchmark were

B1.3	*Delivered electric energy demand per internal useful floor area per year*	*kWh/m2/yr*	*5: (60)*	adopted based on the average areas of the municipality and public school in Moukhtara and taking into consideration a factor related to the power shortage electricity in the country
B1.4	*Share of renewable energy in final thermal energy consumptions*	*%*	*0: (20)* *5: (100)*	These benchmarks were adopted as listed in the SB tool excel sheet since they reflected the case of the municipality and school buildings in Moukhtara and were found acceptable by Moukhtara SMC team
B1.5	*Share of renewable energy in final electric energy consumption*	*5*	*0: (20)* *5: (100)*	These benchmarks were adopted as listed in the SB tool excel sheet since they reflected the case of the municipality and school buildings in Moukhtara and were found acceptable by Moukhtara SMC team
B1.6	*Non-renewable primary energy per useful internal floor area*	*MJ/m2*	*0: (2000)* *5: (2500)*	These benchmarks were set taking into consideration the upper Chouf area as baseline and the Moukhtar ain specific as reference to set the lower and upper limit of the benchmarks accounting for the fuel based consumed by municipality buildings relying on fuel boilers for heating

B3.4	*Weight of recycled materials on total weight of materials*	*%*	*0: (15)* *5: (50)*	There is no specific baseline or data in Lebanon neither in Moukhtara for recycled material used when constructing the municipality building built in 1999 since in the 90's the concept of recycling material was not adopted in Lebanon neither in Moukhtara and therefore the benchmarks indicated at the SB tool excel sheet were adopted
B4.1	*Net fresh water per useful internal floor area*	*m3/m2*	*0: (20)* *5: (5)*	The SMC team agreed based on their experience in different fields to adopt the same benchmarks used in the SB Tool excel sheet
B4.2	*Total consumption of water per building occupant*	*m3/occupant yr*	*0: (120)* *5: (50)*	The initial calculation of the total water consumption of the municipality building fell in the range of the benchmark indicated in the SB Tool excel sheet and since the scenarios in mind will not affect this indicator, the same benchmarks were adopted
B4.3	*Potable water consumption / standardised potable water consumption*	*m3/occupant yr*	*0: (50)* *5: (10)*	There is no meter for potable water consumption at the municipality building. The benchmarks were set based on the average employees and members of the

				Moukhtara municipality and the yearly working hours of the municipality entity.
B4.4	*Potable water consumption / standardised potable water consumption*	%	*0: (50)* *5: (0)*	This indicator is measuring the potable water for irrigation while in Lebanon and in Moukhatar in specific potable water is not used for irrigation, and therefore the benchmarks were set between 0 and 50 %

C. Environmental loadings

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
C1.1	*kg CO2 equivalents per useful internal floor area (product stage)*	*Kg CO2eq/m2*	*0: (500)* *5: (700)*	There is no specific baseline or data in Lebanon neither in Moukhtara for using material with low embodied carbon when constructing the municipality building in 1999 since in the 90's the concept of GHGreduction was not adopted in Lebanon neither in Moukhtara and therefore the benchmarks indicated was based on googling similar type of households built in the 90s around the world with similar material
			0: (54)	Due to power shortage related

C1.2	*kg CO2 equivalents per useful internal floor area per year*	*Kg CO2eq/m2*	*5: (28)*	to electricity the CO2 equivalent of the municipality building is low, however the relying on fuel for heating has CO2 emissions consideration and therefore the Moukhtara SMC team agreed to adopt the same benchmark in the SB tool excel sheet since the value set were in the range of the benchmark
C1.3	*kg CO2 equivalents per useful internal floor area for a period of 50 years*	*Kg CO2eq/m2*	*0: (10)* *5: (3)*	Due to power shortage related to electricity the CO2 equivalent of the municipality building is low, however the relying on fuel for heating has CO2 emissions consideration and therefore the Moukhtara SMC team agreed to adopt the same benchmark in the SB tool excel sheet since the value set were in the range of the benchmark

D. Indoor environmental quality

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
D1.2	*TVOC concentration in indoor air*	*µg/ m3*	*0: (0.5)* *5: (0.1)*	No baseline or specific standard was adopted when building the municipality building and therefore it was agreed by the municipality engineering members to adopt the same benchmark

				indicated in the SB tool excel sheet
D1.7	*Ventilation rate per useful internal floor area*	*L/s/m2*	*0: (0.6)* *5: (1.2)*	No baseline or specific standard was adopted when building the municipality building and therefore it was agreed by the municipality engineering members to adopt the same benchmark indicated in the SB tool excel sheet
D2.1	*Percentage of the time out of the range of defined interior maximum and minimum temperatures*	*%*	*0: (10)* *5: (8)*	Researchwas conducted relying on available history and record for minimum and maximum temperatures in Moukhtara and it was found that the benchmarks listed can be adopted mainly due to the location of Moukhtara and its landscaping.
D2.2	*Percentage of the time out of the range of defined interior maximum and minimum temperatures*	*%*	*0: (10)* *5: (8)*	Research was conducted relying on available history and record for minimum and maximum temperatures in Moukhtara and it was found that the benchmarks listed can be adopted mainly due to the location of Moukhtara and its landscaping
			0: (20)	There is no specific baseline for

D2.3	*Predicted Percentage of Dissatisfied*	%	*5: (10)*	this factor in Lebanon and therefore the same benchmarks were adopted, assuming that the context of Moukhtara will not affect the limits of the benchmark
D3.1	*Mean Daylight Factor*	%	*0: (2)* *5: (4)*	There is no specific baseline for this factor in Lebanon and therefore the same benchmarks were adopted and assuming that the context of Moukhatara will not affect the limits of the benchmarks

E. Service quality

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
E1.1	*Percentage of control functions within class A*	*$*	*0: (50)* *5: (100)*	These benchmarks were adopted as found reasonable by Moukhtara SMC team for public buildings appliances.
E1.2	*Rate the total smart readiness of buildings in terms of three key functionalities, i.e. responding tothe needs of occupants, optimizing*	%	*0: (40)* *5: (100)*	These benchmarks were adopted as found reasonable by Moukhtara SMC team for public buildings appliances.
			0: (0)	These benchmarks were

E2.1	*The availability of a comprehensive and long-term plan at the end of Design phase, and evidence of its implementation during Operations phase*	*Score*	*5: (5)*	adopted since the indicator was divided into 5 points: availability of the plan, is it comprehensive, is it for long terms, is there evidence for implementation and does it cover all the aspects of the building
E2.2	*The provision of energy sub-metering systems and water consumption monitoring systems, according to design documentation*	*Score*	*0: (0)* *5: (5)*	These benchmarks were adopted since the indicator was divided into 5 points: availability of meters, availability of submeters, availability of monitoring system, is the submeter operational, is the monitoring system operational, are the systems according to design documentation
E2.3	*The scope and quality of design documentation retained for use by building operators, according to design documentation.*	*Score*	*0: (0)* *5: (5)*	These benchmarks were adopted to cover the 5 points: Availability of design documentation, scope of the documentation, quality of the documentation, are the design documentation being used by the operators, are they found useful.

F. Social, cultural and perceptual aspects

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
F1.1	*The scope and quality of design measures planned to facilitate access and use of building facilities by persons with disabilities.*	*Score*	*0: (0)* *5: (5)*	These benchmarks were adopted as per the SB tool excel sheet as agreed within the SMC Moukhatara team members since even though in Lebanon many NGO are working toward pushing on the government to adopt laws for PWD accessibility in public spaces this is so far not fully applied.
F2.1	*Quality of view out.*	*Score*	*0: (25)* *5: (75)*	These benchmarks were adopted as per the SB Tool excel sheet since no baseline reference were found to set a specific benchmark for Moukhtara

G. Cost and economic aspects

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
G1.4	*Energy annual cost per useful internal floor area*	*€/m2/yr*	*0: (20)* *5: (5)*	These benchmarks were evaluated taking into consideration the cost of electricity paid to the public grid in addition to the cost of electricity paid for the backup generator and found logical in the current power sector condition in Lebanon and Moukhtara.

G1.5	*Water annual cost per useful internal floor area*	*€/m2/yr*	*0: (5)* *5: (1)*	The municipality of Moukhtara has an agreement with the water establishment and doesn't pay for the water annual consumption and therefore these benchmarks were adopted

H. Adaptation to climate change

Criterion	*Indicator*	*Unit of measure*	*Benchmark*	*Rationale*
H1.2	*Mean Solar Reflectance Index of paved surfaces and roofs in the area*	*SRI*	*0: (20)* *5: (100)*	There is no baseline found for this indicator specific to Moukhtara area or public building or building built in the 90's and therefore the same benchmarks were adopted
H4.2	*Share of greywater collected and cleaned for reuse.*	*%*	*0: (80)* *5: (100)*	These benchmarks were adopted taking into consideration the availability of of an operational wastewater treatment plant in Moukhtara and the connection of the municipality greywater to the wastewater networks

2.8: SBTool Weights Assessment

1/ SOUSSE :

.1 Assignment of Priority values to issues and Weights calculation		
Topics	*Priority Factor (1-5)*	***JUSTIFICATION***
A. Site regeneration and development	5	Integrating a building with its environment has huge benefits, such as maintaining ecological balance, reducing environmental damage, and promoting sustainability. It is essential to design facilities that seamlessly integrate with existing infrastructure in the vicinity. A perfect integration to the site is **fundamental** to creating harmonious enclaves where nature and humans live together
B. Energy and resource consumption	5	Energy and resource consumption in buildings is **crucial** for several major reasons, including environmental impact, sustainability, energy efficiency, occupant health, and long-term costs.
C. Environmental charges	5	Reducing the environmental burden on buildings is **crucial** to mitigating environmental impacts, reducing long-term costs, improving the quality of life of occupants, and addressing growing sustainability concerns. It contributes to the transition to a more environmentally friendly built environment and to tackling current environmental challenges, such as climate change and biodiversity loss.
D. Quality of the indoor environment	4	The internal quality of a building plays a **fundamental** role in the health, well-being and satisfaction of its occupants, as well as in the long-term sustainability and value of the construction. Creating spaces where people can live, work and thrive comfortably, in a healthy and productive way is essential.
E. Quality of service	3	Quality of service and intelligent systems are of **considerable** interest for building sustainability and safety. Today home automation offers a wide variety of uses, such as improving energy efficiency, security, accessibility and remote management of different energy equipment. It also allows occupants to benefit from a smarter, more convenient and more personalized environment.

F. Social, cultural and perceptual aspects	**4**	Social aspects play a **fundamental** role in creating functional, aesthetic and comfortable indoor spaces. Architects seek to manipulate these socio-cultural aspects to create environments that meet the needs and preferences of occupants, while creating positive perceptual experiences.
G. Costs and economic aspects	**5**	Closely monitoring and managing costs throughout the building life cycle is **crucial** to avoid budget overruns. Mismanagement of individual costs can lead to unexpected expenses and financial problems.
H. Adaptation to climate change	**5**	Adapting buildings to climate change is **critical** to ensuring sustainability, while reducing long-term risks and increasing resilience to climate threats. It is a crucial theme in addressing the current environmental and climate challenges.

4.2 Assigning priority values to categories as weights calculation

A	Site regeneration and development	*Priority Factor (1-5)*	*JUSTIFICATION*
A1	Site Selection	**5**	The urban proximity and the grouping of buildings, saves space. This is **crucial** for reducing pressure on road infrastructure and improving mobility.
A2	Site Development	**3**	Treatment in this category can help preserve green spaces.
B	Energy and resource consumption	*Priority Factor (1-5)*	*JUSTIFICATION*
B3	*Materials*	**3**	Sustainable urban planning is increasingly important to address the challenges of rapid urbanization and climate change, and the circulation and adaptability of buildings are important considerations for building resilient and future-oriented cities.

B4	*Use of drinking water, stormwater and greywater*	**5**	The "building water footprint", or "grey water footprint", is an important aspect of sustainability in the construction field. This is a **crucial** topic for sustainable urban planning in Tunisia
C	**Environmental charges**	*Priority Factor (1-5)*	*JUSTIFICATION*
C3	*Solid Waste*	**4**	To mitigate the negative impact of solid waste in construction, it is essential to establish effective waste management practices, recycle as much as possible, use sustainable materials and raise awareness among stakeholders of **the importance** of reducing waste on construction sites.
D	**Quality of the indoor environment**	*Priority Factor (1-5)*	*JUSTIFICATION*
D3	*Daylight and Illumination*	**4**	The use of natural light reduces reliance on artificial lighting, resulting in significant energy savings. the sunny climate of Sousse, is an **important** factor that can help reduce electricity consumption for lighting
D4	*Noise and Acoustics*	**3**	sound quality and comfort in an administrative building is **desirable** for productivity, occupant well-being, confidentiality and professional image.
D5	*Electromagnetic pollution*	**3**	Administration buildings are increasingly equipped with wireless technologies, which can increase the level of electromagnetic pollution inside. Effective management of these technologies can help reduce occupant exposure.
E	**Quality of service**	*Priority Factor (1-5)*	*JUSTIFICATION*
E2	*Optimize and maintain operational performance*	**4**	Continuous monitoring and verification of building performance is **essential** to ensure energy efficiency, durability and regulatory compliance. This helps create more sustainable and efficient buildings
F	Social, cultural and perceptual	*Priority Factor (1-5)*	*JUSTIFICATION*

	aspects		
F1	*Social Aspects*	**3**	Physical accessibility of an administrative building must comply with Tunisian regulations in force. The design shall take into account the installation of ramps, elevators, wide doors and corridors to allow persons with mobility difficulties to move freely within the building.
G	Costs and economics	*Priority Factor (1-5)*	*JUSTIFICATION*
G1	*Costs and economics*	**4**	Rigourous cost management, accurate expenditure estimates and consideration of budgetary considerations are key elements for the success of any construction project, especially a public building.
H	Climate change adaptation	*Priority Factor (1-5)*	*JUSTIFICATION*
H1	*Climate action: temperature rise*	**4**	Shading is a **powerful** tool for improving the quality of the microclimate inside a building. It can help maintain comfortable temperatures, reduce energy costs, improve visual comfort and create a pleasant indoor environment.
H2	*Climate Action: Storm Flood*	**4**	Soil permeability is an **important** criterion in sustainable design. It influences the layout, buildings and green spaces to maximize stormwater infiltration.
H3	*Climate action: river and coastal flooding*	**4**	Reducing the vulnerability of occupants and buildings to flooding is a **major concern** of local authorities, particularly in Sousse, which is prone to flood risks.
H4	*Climate Action: Drought*	**4**	There are now regulations and incentives to encourage the use of rainwater for non-potable uses. Calculating collection and storage capacity is **essential** to meet these requirements.
H5	*Climate Action: Exposure to Fire*	**3**	It is important to comply with the standards in place when designing and building a building to ensure the fire safety of its occupants.

H6	*Climate action: wind action*	**2**	The design of a wind-resistant building **is not a top priority** to ensure the structural safety and durability of the building, especially in Sousse which is not exposed to strong winds or very extreme weather conditions.

4.3 Assignment of priority values to criteria and weights calculation

A. Site regeneration and development

A1. Site Selection

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
A1.2.	12	2	3	2	
A1.3.	8	2	2	2	
A1.4.	12	2	3	2	

Total: 100

A2 Site Development

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
A2.2.	4	1	2	2	
A2.3.	8	2	2	2	

Total: 100

B. Energy and resource consumption					
B3 *Materials*					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
B3.2	*24*	2	4	3	
B3.5	*24*	2	4	3	
B3.6	*32*	2	4	4	
B3.7	*32*	2	4	4	
Total: 100					

B4 Use of drinking water, storm water and greywater					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
B4.1	*24*	2	4	3	
B4.2	*24*	2	4	3	
B4.4	*24*	2	4	3	
Total: 100					

C. Environmental charges					
C3 *Solid Waste*					
Criteri	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*

on					
C3.1	24	2	4	3	

Total: 100

D. Quality of the indoor environment

D3 *Daylight and Illumination*

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
D3.2	8	2	2	2	

Total: 100

D4 Noise and Acoustics

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
D4.1	4	2	1	2	

Total: 100

D5 Electromagnetic pollution

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
D5.1	6	3	1	2	

Total: 100

E. Quality of service

E2 *Optimize and maintain operational performance*

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
E2.1	*8*	2	2	2	
E2.2	*24*	2	4	3	

Total: 100

F. Social, cultural and perceptual aspects

F1 *Costs and economics*

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
F1.1	6	3	1	2	

Total: 100

G. Costs and economic aspects

G1 *Costs and economics*

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G1.5	*24*	2	4	3	

Total: 100

H. Adaptation to climate change

H1 *Climate action: temperature rise*

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H1.3	*12*	2	3	2	
H1.4	*12*	2	3	2	

Total: 100

H2 Climate Action: Storm Flood

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H2.1	*18*	3	3	2	
H2.2	*18*	3	3	2	

Total: 100

H3 Climate action: river and coastal flooding

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H3.1	*18*	3	3	2	

Total: 100

H4 Climate Action: Drought

Criteri	*Impact (PK)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*

on	*(I x E x D x A)*				
H4.1	*18*	3	3	2	
Total: 100					
H5 Climate action: exposure to fire					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H5.1	*18*	3	3	2	
Total: 100					
H6 Climate action: wind action					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H6.1	12	3	2	2	
Total: 100					

2/ IRBID :

4.1 Assignment of priority values to issues and weights calculation		
ISSUE	*PRIORITY FACTOR (1-5)*	*JUSTIFICATION*
A. Site regeneration and development, urban design, and infrastructure	*(4)*	A. Site regeneration and development is considered to be a holistic approach and integration of all site components for a better sustainable result. B. Energy and resources consumption is an indicator of nation's economic growth and the economic growth prioritise the long term development of existing resources and thief use does not pollute environment- (C and D) important to the health and wellbeing of the residents but the indoor environmental quality is a major impact on residents health F. Social, cultural and Perceptual aspects are considered to play a vital role in social development , quality of life and human behaviour. G. Costs and economic aspects, it affects the financial aspects of production. H. Adaptation to climate change, climatic risks are important but sufficient to deal with building assessment.
B. Energy and resources consumption	*(5)*	
C. Environmental loadings	*(3)*	
D. Indoor environmental quality	*(4)*	
F. Social, cultural and perceptual aspects	*(4)*	
G. Costs and economic aspects	*(4)*	
H. Adaptation to climate change	*(3)*	

4.2 Assignment of priority values to categories and weights calculation			
A	Site regeneration and development, urban design, and infrastructure	*Priority factor (1-5)*	*JUSTIFICATION*
A1	Site selection	*5*	*Very High importance, related to the importance of promoting walkability, and transportation efficiency and reducing vehicle distance travelled, and encouraging daily physical activity for improved public health by activity, and reducing greenhouse gas emissions, air pollution, and other environmental and public health harms associated with motor vehicle use.*

A2	Site development	*4*	*High importance, related to the importance of avoiding development in environmentally sensitive lands and reducing the environmental impact from the location of a building on a site, and conserving existing natural areas, provide ecological habitat and promote biodiversity.*
B	Energy and resources consumption	*Priority factor (1-5)*	*JUSTIFICATION*
B1	Energy	*5*	*Very High importance, related to National Agendas and sustainable strategies. To achieve increasing levels of energy performance beyond the minimum requirements of standards and building codes, and to to reduce environmental and economic harms associated with elevated energy use, and GHG*
B2	Electrical peak demand	*5*	*Very High importance, related to National Agendas and sustainable strategies. To reduce the environmental and economic harms resulting from high energy use, and the importance of lowering maintenance and services demands related to energy efficiency in buildings and their systems. In addition to identifying opportunities for additional energy savings by monitoring and logging building-level energy use.*
B3	Materials	*4*	*High Importance, where local policies are encouraging the use of local materials with low embodied energy in construction, To have environmentally, economically, and socially preferable l impacts*
B4	Use of potable water, stormwater and greywater	*5*	*Very high importance, Local agendas and national sustainable strategies demand support of water management and identify opportunities for additional water savings by monitoring water consumption, and better maintenance.*
C	Environmental loadings	*Priority factor (1-5)*	*JUSTIFICATION*
C1	Greenhouse Gas Emissions	*3*	*Moderate importance, where building can contribute to more than 25% of the GHG gasses compared with transportation. Environmental impacts of building footprint for compliance with the Montreal Protocol while minimising direct contributions to climate change.*
C3	Solid wastes	*3*	*Moderate importance, waste generated by building is moderate if compared with food, commercial and industrial industries.* *Reducing waste generated by building occupants will reduce the size of landfills and the GHG resulting from their transportation.* *The importance of recovering, reusing, and recycling materials.*

D	Indoor environmental quality	*Priority factor (1-5)*	*JUSTIFICATION*
D1	Indoor air quality and ventilation	*5*	*Very High importance, To contribute to the comfort and well-being of building occupants, maximising productivity, By minimising exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental impacts.*
D2	Air temperature and relative humidity	*5*	*Very High importance, To contribute to the comfort and well-being of building occupants, maximising productivity, By minimising exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental impacts.*
D3	Daylighting and illumination	*5*	*Very High importance, To contribute to the comfort and well-being of building occupants, maximising productivity, By minimising exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental impacts.*
E	Service quality	*Priority factor (1-5)*	*JUSTIFICATION*
E1	Controllability	*3*	*Moderate importance, Limited applications indoors. However, controllability Increases well-being of building occupants and enhances productivity.*
F	Social, cultural and perceptual aspects	*Priority factor (1-5)*	*JUSTIFICATION*
F1	Social aspects	*4*	*High importance, allowing people with disabilities to access all buildings without preference or prejudice, reaching social sustainability through inclusion. in addition to the importance of maximising solar exposure for the majority of building spaces, guarantees well-being and social sustainability.*
F2	Perceptual	*4*	*High importance, promotes well being of users and occupants reaching social sustainability goals.*
G	Costs and economic aspects	*Priority factor (1-5)*	*JUSTIFICATION*
G1	Costs and economics	*4*	*High importance, contributes to Sustainable economy related pillars, important for development, but limited for research.*
H	Adaptation to climate change	*Priority factor (1-5)*	*JUSTIFICATION*
H1	Climatic action: increase of temperature	*4*	*High importance, contributes to lowering UHI effects and global temperatures.*

H2	Climatic action: pluvial flood	*3*	*Moderate importance, the effect of building surfaces and site surfaces on stormwater runoffs and their impact on the infrastructure. Occasional but important and effective.*
H4	Climatic action: drought	*4*	*High importance, encouraging minimising potable water consumption use, to lower the effects of drought in Jordan, and reach National agenda goals in sustainable development for water resources, supply and demand.*

4.3 Assignment of priority values to criteria and weights calculation

A. Site regeneration and development, urban design, and infrastructure

A1. Site Selection

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
A1.2	*12*	*2*	*3*	*2*	*1*
A1.4	*12*	*2*	*3*	*2*	*1*
A2. Site Development					
A2.1	*36*	*3*	*4*	*3*	*1*
Total:	*100*				

B. Energy and resources consumption

B1. Energy

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
B1.1	*60*	*3*	*4*	*5*	*1*

B1.2	*60*	*3*	*4*	*5*	*1*
B1.3	*60*	*3*	*4*	*5*	*1*
B1.4	*60*	*3*	*4*	*5*	*1*
B1.5	*60*	*3*	*4*	*5*	*1*
B1.6	*60*	*3*	*4*	*5*	*1*
B2. Electrical Peak Demand					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
B2.1	*18*	*3*	*3*	*2*	*1*
B3. Materials					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
B3.4	*24*	*2*	*4*	*3*	*1*
B3.5	*24*	*2*	*4*	*3*	*1*
B4. Use of Potable Water, Stormwater, and Greywater					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
B4.2	*24*	*2*	*4*	*3*	*1*
B4.3	*24*	*2*	*4*	*3*	*1*
B4.4	*24*	*2*	*4*	*3*	*1*
Total:		*100*			

C. Environmental loadings					
C1. Greenhouse Gas Emissions					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
C1.1	*75*	*3*	*5*	*5*	*1*
C1.2	*75*	*3*	*5*	*5*	*1*
C3. Solid Wastes					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
C3.2	*24*	*2*	*4*	*3*	*1*
Total:		*100*			

D. Indoor environmental quality					
D1. Indoor Air Quality and Ventilation					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
D1.2	*6*	*3*	*1*	*2*	*1*
D1.3	*6*	*3*	*1*	*2*	*1*
D1.6	*6*	*3*	*1*	*2*	*1*
D1.7	*6*	*3*	*1*	*2*	*1*
D2. Air Temperature and Relative Humidity					

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
D2.3	*4*	*2*	*1*	*2*	*1*

D3. Lighting and Illumination

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
D3.1	*8*	*2*	*2*	*2*	*1*
D3.2	*8*	*2*	*2*	*2*	*1*
Total:		*100*			

E. Service quality

E1. Controllability

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
E1.2	*16*	*2*	*4*	*2*	*1*
Total:		*100*			

F. Social, cultural and perceptual aspects

F1. Social Aspects

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*

F1.1	2	3	1	2	1
F1.2	2	1	1	2	1
F2. Perceptual					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
F2.1	*4*	*2*	*1*	*2*	*1*
Total:		*100*			
G. Costs and economic aspects					
G1. Cost and Economics					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G1.4	*24*	*2*	*4*	*3*	*1*
Total:		*100*			
H. Adaptation to climate change					
H1. Climatic Action: Increase of Temperature					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H1.2	*18*	*3*	*3*	*2*	*1*
H1.3	*12*	*2*	*3*	*2*	*1*
H2. Climatic Action: Pluvial Flood					

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H2.2	*18*	*3*	*3*	*2*	*1*
H4. Drought					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H4.2	*18*	*3*	*3*	*2*	*1*
Total:		*100*			

3/MOUKHTARA :

4.1 Assignment of priority values to issues and weights calculation		
ISSUE	*PRIORITY FACTOR (1-5)*	*JUSTIFICATION*
B. Energy and resources consumption	*(4)*	*Main issue of interest for Moukhtara*
C. Environmental loadings	*(3)*	*Second issue of interests for selected buildings*
D. Indoor environmental quality	*(2)*	*Low priority for Moukhtara*

E. Service quality	*(2)*	*Low priority for Moukhtara*
F. Social, cultural and perceptual aspects	*(2)*	*Low priority for Moukhtara*
G. Costs and economic aspects	*(3)*	*High priority due to the impact of economy on public buildings*
H. Adaptation to climate change	*(1)*	*Low priority since basic services are more of interest.*

4.2 Assignment of priority values to categories and weightscalculation

B	Energy and resources consumption	*Priority factor (1-5)*	*JUSTIFICATION*
B1	Energy	3	*Energy and water as basic needs are high priority*
B2	Electrical peak demand	*0*	*Peak demand is not relative since we have long shortage of public electricity*
B3	Materials	2	*Energy and water as basic needs are high priority*
B4	Use of potable water, stormwater and greywater	*4*	*Energy and water as basic needs are high priority*
C	Environmental loadings	*Priority factor (1-5)*	*JUSTIFICATION*

C1	Greenhouse Gas Emissions	*1*	*Directly related to energy consumption and types of energy*
C2	Other Atmospheric Emissions	*0*	
C3	Solid wastes	*0*	
D	Indoor environmental quality	*Priority factor (1-5)*	*JUSTIFICATION*
D1	Indoor air quality and ventilation	*1*	*Low priority depending on the selected solutions.*
D2	Air temperature and relative humidity	*1*	*Low priority depending on the selected solutions*
D3	Daylighting and illumination	*1*	*Low priority depending on the selected solutions*
D4	Noise and acoustics	*0*	
D5	Electromagnetic pollution	*0*	
E	Service quality	*Priority factor (1-5)*	*JUSTIFICATION*
E1	Controllability	*2*	*Medium priority to increase energy efficiency practices*
E2	Optimization and maintenance of operating performance	*3*	*Medium priority to increase energy efficiency practices*
F	F. Social, cultural and perceptual aspects	*Priority factor (1-5)*	*JUSTIFICATION*
F1	Social aspects	*2*	*Accessibility of public services is of high priority for Moukhtara to highlight the role of public utility*

F2	**Perceptual**	*3*	*Relative to Moukhtara landscaping*
G	Costs and economic aspects	*Priority factor (1-5)*	*JUSTIFICATION*
G1	Costs and economics	*1*	*Selected as relative to energy and water*
H	Adaptation to climate change	*Priority factor (1-5)*	*JUSTIFICATION*
H1	Climatic action: increase of temperature	*3*	*Higher priority than drought as it is more applicable to Moukhtara concept*
H2	Climatic action: pluvial flood	*0*	
H3	Climatic action: fluvial and coastal flood	*0*	
H4	Climatic action: drought	*2*	*Lower priority than temperature increase*
H5	Climatic action: fire exposure	*0*	
H6	Climatic action: wind action	*0*	

4.3 Assignment of priority values to criteria and weights calculation

B. Energy and resources consumption

B1 *Energy*

Criterion	*Impact (PK)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*

	(I x E x D x A)				
B1.1	*60*	*3*	*4*	*5*	*1*
B1.2	*60*	*3*	*4*	*5*	*1*
B1.3	*60*	*3*	*4*	*5*	*1*
B1.4	*60*	*3*	*4*	*5*	*1*
B1.5	*60*	*3*	*4*	*5*	*1*
B1.6	*60*	*3*	*4*	*5*	*1*
B3 *Material*					
B3.4	*24*	*2*	*4*	*3*	*1*
B4 Use *of potable water, stormwater and greywater*					
B4.1	*24*	*2*	*4*	*3*	2
B4.2	*24*	*2*	*4*	*3*	2
B4.3	*24*	*2*	*4*	*3*	2
B4.4	*24*	*2*	*4*	*3*	2
Total:		*100*			

C. Environmental loadings

C1 *Greenhouse Gas Emissions*

Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*

C1.1	*75*	*3*	*5*	*5*	*1*
C1.2	*75*	*3*	*5*	*5*	*1*
C1.3	*75*	*3*	*5*	*5*	*1*
Total:		*100*			
D. Indoor environmental quality					
D1 Indoor *Air Quality and Ventilation*					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
D1.2	6	3	*1*	2	*1*
D1.7	6	3	*1*	2	*1*
D2 Air Temperature and Relative Humidity					
D2.1	*4*	*2*	*1*	*2*	*1*
D2.2	4	2	1	2	1
D2.3	4	2	1	2	1
D3 Air Temperature and Relative Humidity					
D3.1	*8*	*2*	*2*	*2*	*1*
Total:		*100*			
E. Service quality					
E1 Service *Quality*					

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
E1.1	16	2	4	2	1
E1.2	16	2	4	2	1
E 2 Optimization and Maintenance of Operating Performance					
E2.1	8	2	4	2	1
E2.2	24	2	4	3	1
E2.3	12	2	2	3	1
Total:		*100*			

F. Social, cultural and perceptual aspects

F1 *Social Aspects*

Criterion	Impact (PK) (I x E x D x A)	I Intensity	E Extent	D Duration	A Adjustment
F1.1	6	3	1	2	1
F2 *Perceptual*					
F2.1	4	2	1	2	1
Total:		*100*			

G. Costs and economic aspects

G1 Cost *and Economics*					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
G1.4	*24*	*2*	*4*	*3*	*1*
G1.5	24	2	4	3	1
Total:		*100*			

H. Adaptation to climate change					
H1*Climatic action: increase of temperature*					
Criterion	*Impact (PK) (I x E x D x A)*	*I Intensity*	*E Extent*	*D Duration*	*A Adjustment*
H1.2	*18*	*3*	*3*	*2*	*1*
H4 Climatic action: drought					
H4.2	*18*	*3*	*3*	*2*	*1*
Total:		*100*			

Phase 3: Diagnosis

3.1: Assessment of the current state of the urban area

			SOUSSE			IRBID			MOUKHTARA		
A. Use of land and biodiversity											
A1 (Use of land)			**SOUSSE**			**IRBID**			**MOUKHTARA**		
Code	**Creterion**	**Indicator**	**Value**	**Unit of measure**	**Score**	**Value**	**Unit of measure**	**Score**	**Value**	**Unit of measure**	**Score**
A1.1	Human Density	Population density in agglomerations (less green and blueneighborhood)	95	Inhabitants per Hectare	1.3	21016.55	Inhabitants per km2	0.67			
A1.2	*Urban compactness*	*Relation between the usable space of the buildings (volume) and the urbanspace (area)*				4.12	m3 / m²	5			
A2 (Green urban areas)											
A2.1	Availability of green areas	Proportion of all vegetation areas withinneighborhoodboundaries to total area	5.66	%	-1	9.28	%	-1	79.40 Percentage 5	79.40 Percentage 5	79.40 Percentage 5
A2.2	Green spaces in relation to the population of the district	Total area of greenery in the city divided by the total	7.42	m2/inhabitant	0.3	0.2	m²/Inhabitant	-1	1,022	m2/inhabitant	5

		population of the neighborhood									
A2.3	Green Area Accessibility	Number of inhabitants living with 300m of a publicly accessible green space of at least 0.5ha divided by the total number of neighborhoodinhabitants				14.54	%	-1	0	Percentage	-1
A2.4	Density of green areas	Density of green spaces in the area	7.45	%	**-1**	0.58	%	-1			
B. Energy											
B1 (Energy infrastructure)											
B1.1	Access to electrical service	Percentage of householdswithauthorizedaccess to electricity	100	%	***5***	100	%	5	100	Percentage	*5*
B2 (Energy consumption)											
B2.1	Total final thermal energyconsumption for construction operations	Aggregated total annual final thermal consumption per aggregatedinlanduseful area	19,419	kWh/m2/year	***5***	*31.2*	*kWh/m2/year*	4.91	197	kWh/m2/year	*-1*
B2.4	Total final consumption of electricalenergy for building operations	Aggregated total annual final electricityconsumption per aggregatedinlanduseful area	13,868	kWh/m2/year	**2.8**	*32.84*	*kWh/m2/year*	*-1*	20.64	kWh/m2/year	1.09

B2.5	*Total final electricalenergyc onsumption for residential building operations*	*Aggregatedannu al final electricalenergyc onsumption of residential buildings per aggregated indoor usefulfloor area*				*27.46*	*kWh/m2/year*	*-1*			
B2.6	Total final electricenergycon sumption for public office/ educational building operations	*Aggregatedannu al final electricenergyco nsumption of public office and educational buildings per aggregatedintern alusefulfloor area*							28.20	kWh/m2/year	-1
B2.7	Total demand for primaryenergy for the operation of buildings	Aggregated total annualprimaryene rgyconsumption per aggregatedinlan duseful area	53,243	kWh/m2/year	**-1**	*85*	*kWh/m2/year*	*-1*	217.64	kWh/m2/year	-1
B2.10	Power consumption of streetlighting	Total Power Consumption of Street LightingDivided by the Total Distance from Streets Lit	11423.92	kWh/Km per year	**2.6**	*7,625.2*	*kWh/Km year*	*5*	12,392	kWh/Km year	-1
B3(Renewable energy)											
B3.1	Share of on-site renewableenergy in relation to final total thermal energyconsumptio n for construction operations	Total consumption of final thermal energyproducedfr omrenewable sources on site divided by total final thermal energyconsumpti on	4.3	%	**-1**	*0*	%	*-1*	29	Percentage	-1

B3.4	Share of local renewables in final electricityconsumption	Total consumption of final electricityproducedfromrenewable sources on site divided by total final consumption of electricity	6.9	%	-1	*8*	%	*-1*	36	Percentage	0.43
B3.5	Share of renewableenergy on-site, relative to total final electricenergyconsumption for residential building operations	*Total consumption of final electricenergygeneratedfromrenewable sources on-site divided by total final electricenergyconsumption of residential buildings*							29	Percentage	-1
B3.6	Share of renewableenergy on-site, on final electricenergyconsumptions for public office/educational building operations	*Total consumption of final electricenergygeneratedfromrenewable sources on-site divided by total final electricenergyconsumption of public offices/educational buildings*							79	Percentage	3.5
B3.7	Share of on-site renewableenergyin relation to total primaryenergycon	Total consumption of on-site renewableprimary energydivided by	0,000	%	-1	*3*	%	*-1*	1.11	Percentage	-1

	sumption for construction operations	total primaryenergyco nsumption									
B3.8	Share of renewableenergy on-site, relative to total primaryenergycon sumption for residential building operations	*Total consumption of primaryenergyge neratedfromrene wable sources on-site divided by total primaryenergyco nsumption of residential buildings*							1.11	Percentage	-1
B3.9	Share of renewableenergy on-site, on total primaryenergycon sumptions for public office/ educational building operations	*Total consumption of primaryenergyge neratedfromrene wable sources on-site divided by total primaryenergyco nsumptionof public offices/education al buildings*							79	Percentage	3.5

C. Water											
C1 Water Infrastructure											
C1.1	*Availability of a public municipal water supply*	Percentage of the buildings within the neighborhoodthat are served by a municipal water supply				100%	%	5	100	Percentage	5
C1.2	Availability of wastewater treatment systems	Percentage of neighborhood buildings served by wastewater collection	100	%	5	100%	%	5	100	Percentage	5
C2 Water consumption											
C2.1	Total water consumption	Total amount of the area's water consumption in liters per daydivided by the total area population				*57.4*	Liters/day/person	5	400	Liters/day/person	2.5
C2.3	Drinking water consumption in residential buildings	Annualdrinking water consumption per occupant	169.84	Liters/day//person	2.1	*70*	*Liters/day/person*	*4.74*	180	Liters/day/person	2.33
C2.4	*Consumption of potable water in public offices (offices)*	*Annual potable water consumption per occupant*				*22.4*	*Liters/day/person*	*0.4*	50	Liters/day/person	0
C2.5	*Consumption of potable water in educational buildings*	*Annual potable water consumption per occupant*				*47*	Liters/day/person	*5*	164	Liters/day/person	1.8
C2.6	*Re-use of rainwater in residential buildings*	*Share of rainwatercollectedfrom roofs of residential buildings for reuse*				*0*	%	*0*			
C2.7	*Consumption of potable water in public green spaces*	*Potable water used for irrigation purposes in public green spaces*				*1.22*	m3/m2	*3.78*	0	m^3/m^2	5

C3 (Effluents management)											
C3.1	Water treatment	Total volume of wastewatercollected for at least secondarytreatment in centralizedwastewatertreatmentfacilities divided by the total volume of wastewaterproduced in the area				90	*%*	*5*	*100*	*Percentage*	*5*
C3.2	Public wastewater (fromoutdoor areas) thatisdisposed or treated	Percent of public wastewaterthatisdisposed or treated				80	*%*	*5*			
C3.3	Householdsanitation	Percentage of householdswithaccess to basic sanitationfacilities				100	*%*	*5*	*100*	*Percentage*	*5*
D. Solid Waste											
D1 (Solid waste collection infrastructure)											
D1.1	*Availability of solidwaste collection*	Percentage of buildings withregularsolidwaste collection on				*40*	*%*	*-1*	*99*	*Percentage*	*5*
D2 Solid waste management											
D2.1	Access to solidwaste and recycling collection points	Proximity of the resident population to the solidwaste and recycling collection point				*0*	*%*	0	*78*	*Percentage*	0.75
D2.2	Access to solidwaste and recyclingcollection points	Percentage of inhabitantswithaccess to solidwaste and recyclingcollection points within 400 meterswalking distance	0	%	**-1**				*22*	*Percentage*	*-1*

E. Environmental quality											
E1Air quality											
E1.1	*Fine particulatematter (PM2.5) concentration*	*Number of dayswithin a yearthat PM2.5 concentration exceeds the dailylimit*				0	*days/year*	5			
E1.2	Particle concentration (PM10)	Sum of daily concentrations for the wholeyeardivided by 365 days	42	days/year	**-1**	0	*days/year*	*5*	*1*	*days / y*	5
E1.3	*NitrogenDioxide concentration (NO2)*	*Number of dayswithin a yearthat NO2 concentration exceeds the dailylimit*				0	*days/year*	*5*			
E3 (EMF exposure)											
E3.1	*Exposure to high-frequenceyelectromagnetic fields*	*Percentage of mobile network antenna sites in compliance with EMF exposure guidelines*				*100*	*%*	5			
E3.2	*Percentage of buildings exposed to ELF magneticfields*	*Percentage of buildings in the area located not respecting the safety distance from high voltage lines*				0	*%*	*5*			
F. Transport and Mobility											
F1 Performance of Mobility Service											
F1.1	Performance of the public transport system	Percentage of residentswithin 500 meters of at least one transit stop on foot	80	%	***5***	93.3	*%*	5	*0*	*Percentage*	-1

F2Green mobility											
F2.2	*Electric-vehicle infrastructure (charging stations)*	*Electric vehiclecharging stations per inhabitant*				0	*n/Inhabitant*	-1			
F2.3	Bicycle network	Aggregatelength of bike paths in the city per capita	0.0215	m/inhabitant	**-1**				*1*	*m/inhabitant*	-1
F3 Safety in mobility											
F3.1	Pedestrian infrastructure	Percentage of towndesignated as pedestrian/car-free	2.9	%	**-1**	0	*%*	*0*			
F3.2	SidewalkAvailability	Percentage of the length of roadsthat have reservedsidewalks	100	%	***5***	89	*%*	*3.9*			
F3.4	*Traffic fatalities*	*Traffic fatalities per 1,000 inhabitants.*				*0.06*	*n/1000 inhabitants*	*4.9*			
F4 Urban morphology and transportation											
F4.1	*Cyclomaticcomplexity of the street network*	*Cyclomaticnumber*				36	*Number*	*0.43*			
F4.2	Road Network Connectivity	The number of intersections bound to the global surface	206	number/km2	***5***	100	*Number/km²*	*2.3*			

G. Social Aspects											
G1 Accessibility (withdisabledpersons)											
G1.1	Public buildings accessible to physicallydisabledpersons	Percentage of key public buildings accessible to personswithphysical disabilities	66	%	2	*1.02*	*%*	-1			
G1.2	Sidewalks and other pedestrian pathways accessible to physicallydisabledpersons	Percentage of sidewalks and other pedestrian pathways accessible to personswithdisabilities	0	%	**-1**	*0*	*%*	*-1*			
G1.3	*Barrier-free accessibility in local outdoor public areas*	*Adequacy of barrier-free accessible public outdoor areas compared to the total public area*				*0*	*%*	*-1*			
G2Housing											
G2.1	Affordability of housingproperty	Housingproperties in the local area that are financially accessible to the lowest quintile of area population				*4.90%*	*%*	-1			
G2.2	Affordability of housingrental	Percentage of the averagesalary of the lowest quintile of the population used for rentalpayments				*50.00*	*%*	*0*			
G2.3	*Percent of residentialunits in the local area that are vacant*	*Percentage of vacant residentialunits*				*18.4 https://documents1.worldbank.org/curated/en/855101555960778525/pdf/Jordan-Housing-Sector-Assessment-Housing-Sector-Review.pdf*	*%*	*4.3*			

G2.4	Informal settlements	Percentage of inhabitants living in slums, informalsettlements or inadequatehousing	0	%	5	0	%	5				
G3 Availability of public and private facilities and services												
G3.1	Availability and proximity of key services	Percentage of inhabitantswithin 800 meters of at least 3 essential services on foot	25	%	-1	100	%	5	80	Percentage	3
G3.2	*Availability and proximity of a public primaryschool*	*Percentage of population near a public primaryschool*				*39.31*	*%*	*-1*			
G3.3	*Availability and proximity of a public secondaryschool*	*Percentage of population near a public secondaryschool*				*51.69*	*%*	*3.67*			
G3.4	*Availability and proximity of childrens' playfacilities*	*Percentage of population near a childrens' playfacilities*				*14.54*	*%*	*-1*			
G3.5	*Outdoor public spaces*	*Availability of outdoor public spaces*				*0.58*	*%*	*-1*			
G4 (Education)											
G4.1	*Primaryenrollment rate*	*Net primaryenrollment rate*				*91.4*	*%*	*4.31*			
G4.3	*Secondaryschoolenrollment*	*Lowersecondarycompletion rate*				*71.96*	*%*	*0.59*			
G5 (Social Inclusion)											
G5.1	*Energy poverty of households*	*Percentage of householdsunable to afford the most basic levels of*				*21.46*	*%*	*-1*			

		energy (more than 10% of the incomespent on energy bills)									
G5.2	*Population at risk of poverty or exclusion*	*Share of personswith an equivaliseddisposableincomebelow 60 % of the national medianincome*				*24.66*	*%*	*0.14*			
G6 (Safety)											
G6.1	*Police service*	*Number of police officers per 1,000 inhabitants.*				*1.24*	n/1000 inhabitants	*-1*			
G6.2	*Fire service*	*Number of firefighters per 1,000 inhabitants*				*0*	n/1000 inhabitants	*-1*			
G10 (Perceptual)											
G10.1	*Perceivedsafety of public areas for pedestrians*	*Perceivedsafety of public places and pedestrian routes, as determined by a sample of pedestrians*				*-1*	Score	*-1*			
H. Economy											
H1 (Economic performance)											
H1.1	Averageannual per-capita income of residents	Average per-capita income of residents in the local area relative to that of the urbanregion as a whole				*94.08*	*%*	5			
H4 (ICT infrastructure)											
H4.2	Wireless Broadband Coverage	Percentage of the neighbourhoodserved by wirelessbroadband (3G, 4G, 5G)				*99.1*	*%*	5			
H4.4	Mobile phone subscriptions	Total number of mobile phone subscriptions in				*610*	*number / 1000 inhabitants*	*5*			

		the area divided by one 1000th of the area's total population									
I. CLIMATE CHANGE: Mitigation and Adaptation											
I1Climate change mitigation											
I1.1	Greenhouseg asemissions	Total amount of greenhousegases in tons (carbondioxideeq uivalent) produced in a calendaryeardivid ed by the current population of the neighborhood	1,061	Tons CO2 equivalent per capita	**-1**	*2.8*	*Tons CO2 eq. /inhabitant/ year*	*3.67*	*2.49*	*Tons CO2 eq. / inhabitant*	-1
I1.2	Greenhouseg asemissionsfro m residential buildings	Total amount of greenhousegases inKg (units of carbondioxideeq uivalent) generated over a calendaryear per aggregatedinlan d useful area	8,070	Kg CO2 eq/m2	**-1**				*197*	*Kg CO2 eq / m2*	*-1*
I2Adaptation to climate action: heat waves and temperature rise											
I2.1	*Albedo*	*Mean Solar Reflectance Index of paved surfaces and roofs in the area*				*23*	*SRI*	3.36			
I2.2	Use of vegetation to provide ambient outdoorcoolin g	Leaf area index: ratio of total vegetation area (on soil and on roofs, includingtrees) divided by total site area	9.06	Index	**-1**	*0*	*%*	*0*			

I3 Adaptation to climate action: storm surge											
I3.3	Soilpermeabili ty	Share of urban area permeable to water	7.86	%	-1	*37.4*	*%*	*1.09*	*63*	*Percentage*	2.69
I4 Adaptation to climate action: river and coastal flooding											
I4.1	Flood risk	Share of buildings in flood-prone areas	8.08	%	1.9						
I5 Adaptation to the climatic action: drought											
I5.1	*" Rainwater collection and storage from buildings for non-potable uses"*	*Share of buildings in the area with a rainwater collection system*				*0*	*%*	*0*			
I5.2	*Rainwater collection storagefromo utdoor areas*	*Share of rainwatercollecte dfrompaved (not permeable) surfaces in the area (excluding buildings' roofs and plots)*				*0*	*%*	*0*			
I5.3	*Greywater collection in buidings for non-potable uses*	*Share of building in the are with a greywater collection system*				*0*	*%*	*0*			
J.Governance											
J1 Urban Planning											
J1.1	Community participation in urban planning activities	Percentage of residents active in public urban planning	1	Level	1						

J3 Operation of public buildings												
J3.1	Sustainability of public buildings	Percentage of public buildings withrecognizedsustainability certifications ongoingoperations	0	%	-1	0	%	-1			
J3.2	Operating energycosts for public buildings	Aggregatedannual operating energycost per aggregated indoor usefulfloor area				0.16	€/m²/year	5			
J3.3	Energy consumption of public buildings	Total final energyconsumption in public buildings of a city divided by the total indoor useful area of those buildings	102.34	kWh/m2	-1						

3.2: Identification of weaknesses and critical themes of the urban area

	SOUSSE		IRBID	MOUKHTARA
Code	Critère	Score		
A1.1	Human Density	1.3		
A2.1	*Availability of green urban areas*	-1	-1.00	5
A2.2	*Green areas in relation to the neighborhood population*	0.3	-1.00	5
A2.3	*Green Area Accessibility*		-1.00	-1
A2.4	*Green zones density*	-1	-1.00	
B1.1	*Access to electrical service*	5		5
B2.1	*Total final thermal energyconsumption for building operations*	5		-1
B2.4	*Total final electricalenergyconsumption for building operations*	2.8	-1.00	1.09
B2.5	*Total final electricalenergyconsumption for residential building operations*		-1.00	
B2.6	*Total final electricenergyconsumption for public office/ educational building operations*			-1
B2.7	*Total primaryenergydemand for building operations*	-1	-1.00	-1
B2.10	*Energy consumption of public lighting*	2.6		-1
B3.1	*Share of renewableenergy on-site, relative to total final thermal energyconsumption for building*	-1	-1.00	-1

	operations			
B3.4	*Share of renewableenergy on-site, relative to final electricenergyconsumption*	***-1***	*-1.00*	***0.43***
B3.5	*Share of renewableenergy on-site, relative to total final electricenergyconsumption for residential building operations*			***-1***
B3.6	*Share of renewableenergy on-site, on final electricenergyconsumptions for public office/educational building operations*			***3.5***
B3.7	*Share of renewableenergy on-site, relative to total primaryenergyconsumption for building operations*	***-1***	*-1.00*	***-1***
B3.8	*Share of renewableenergy on-site, relative to total primaryenergyconsumption for residential building operations*			***-1***
B3.9	*Share of renewableenergy on-site, on total primaryenergyconsumptions for public office/ educational building operations*			***3.5***
C1.1	*Availability of a public municipal water supply*			***5***
C1.2	*Availability of wastewatertreatmentsystems*	***5***		***5***
C2.1	*Total water consumption*	***5***		***2.5***
C2.3	*Consumption of potable water in residential buildings*	***2.1***		***2.33***
C2.4	*Consumption of potable water in public offices*		*0.00*	***0***
C2.5	*Consumption of potable water in educational buildings*			***1.8***
C2.6	*Re-use of rainwater in residential buildings*		*0.00*	
C2.7	*Consumption of potable water in public green spaces*			***5***

C3.1	*Water Treatment*			**5**
C3.3	*Householdsanitation*			**5**
D1.1	*Availability of solidwaste collection*			**5**
D2.1	*Access to solidwaste and recyclingcollection points*		0.00	**0.75**
D2.2	*"Access to solidwaste and recycling*		0.00	**-1**
E1.2	*Particle concentration (PM10)*	**-1**		**5**
F1.1	*Performance of the public transport system*	**5**		**-1**
F2.2	*Electric vehicle infrastructure (charging stations)*		-1.00	
F2.3	*Bicycle network*	**-1**	-1.00	**-1**
F3.1	*Pedestrian infrastructure*	**-1**	0.00	
F3.2	*SidewalkAvailability*	**5**		
F4.1	*Cyclomaticcomplexity of the street network*			
F4.2	Road Network Connectivity	**5**		
G1.1	*Public buildings that are accessible for use by physicallydisabledpersons*	**2**	-1.00	
G1.2	*Sidewalks and other pedestrian pathsthat are accessible for use by physicallydisabledpersons*	**-1**	-1.00	
G1.3	*Barrier-free accessibility in local outdoorpublic areas*		-1.00	
G2.1	*Affordabilityofhousingproperty*		-1.00	
G2.2	*Affordability of housingrental*		0.00	
G2.4	Informal settlements	**5**		

G3.1	Availability and proximity of key services	-1		3
G3.2	*Availability and proximity of a public primaryschool*		-1.00	
G3.4	*Availabilityand proximity of children'splayfacilities*		-1.00	
G3.5	*Outdoorpublic spaces*		-1.00	
G4.3	*Secondaryschoolenrollment*			
G5.1	*Energy poverty ofhouseholds*		-1.00	
G5.2	*Population at risk of poverty or exclusion*		0.00	
G6.1	*Police service*		-1.00	
G6.2	*Fire service*		-1.00	
G10.1	*Perceivedsafety of public areas for pedestrians*		-1.00	
I1.1	Greenhousegasemissions	-1		-1
I1.2	Greenhousegasemissionsfrom residential buildings	-1		-1
I2.1	*Albedo*		-1.00	
I2.2	Use of vegetation to provide ambient outdoorcooling	-1		
I2.3	*Green roofs*		0.00	
I3.3	Soilpermeability	-1		2.69
I5.1	*" Rainwater collection and storagefrom buildings for non-potable uses"*		0.00	
I5.2	*Rainwater collection and storagefromoutdoor areas*		0.00	

I5.3	*Greywater collection in buildings for non-potable uses*		*0.00*	
J3.1	*Sustainability of public buildings*	***-1***	*-1.00*	
J3.3	Energy consumption of public buildings	***-1***		
J1.1	Community participation in urban planning activities	***1***		
I4.1	Flood risk	***1.9***		

3.3: Evaluation of the energy infrastructure's current state

SOUSSE	IRBID	MOUKHTARA
"Describe the current state of energy infrastructure in the urban area. Identifyweaknesses and highlight criticalones." B1: Energy infrastructure All public and private buildings in Sahloul 3 are 100% connected to the national electricity and naturalgas distribution network operated by the TunisianElectricity and Gas Corporation (STEG). The distribution iscarried out by cablesroutedthrough underground pipes. Electrical power issupplied by MT/BT delivery stations owned by STEG. All subscriptions in the neighborhood are low voltage. The same buildings in the district are also 100% suppliedwithdrinking water thanks to the distribution network set up by SONEDE (Société Nationale d'Exploitation et de Distribution des Eaux), whichpreserves the monopoly of thisactivity. Sinceitisrelatively new, the SONEDE network has a lowleakage rate.	**B1, B2 Energy Infrastructure and Consumption** In terms of access to electrical services, the evaluation of energy infrastructure in the neighborhoodranked a score of 5, an excellent and ideal performance indicator of quality of life, resilience, and economicproductivity. As the analysis shows, 100% of the buildings in the selectedneighborhood have authorized and stable access to electricity. The analysis of urban thermal energy for building operationsalsoscored 4.9, corresponding to a value representing the best practice level. However, the neighborhooddoes not have a distinguished thermal energy network. On the contrary, each building manages its thermal state individuallydepending on daily and seasonalweather variations, usingelectricity and oilderivatives. Results of the questionnaire surveyindicatethatusersprimarilyrely on electricity for domestic hot water and cooling. As shown in Figure 1-1, a high rate, accounting for 72.2% of the neighborhoodbuildings, utilizeelectricheaterscompared to 21%	Lebanon isfacing an economiccrisis due to the devaluation of the Lira since 2019. The economiccrisisaffectedmostly the electricitysector in the country since 90% of the operational power plant rely on heavy fuel oilimportedfromoutside the country and priced in US dollars. The electricityshortage in Lebanon led to a total black out in the country many times in 2020, 2021 and 2022 with a power supplyequal to zeromost of the time. Currently, the power generationincreased to reach 2 to 4 hours per day, while the citizensneed to rely on privategenerators or solar system at householdlevel.

B2: Energy consumption

The structure of consumption in the district isalmostsimilar to the national statistics, withpetroleumproducts in first place at 43% and mainlyrepresented by the fuel used for passenger cars powered by diesel and petrol. Followed by electricity at 35%, electricityisconsumed by the followingutilities:

- Air conditioning
- The lighting
- Appliances
- Other

Next, 18% naturalgasisusedmainly for domestic hot water (CHW) production, cooking and spaceheating.

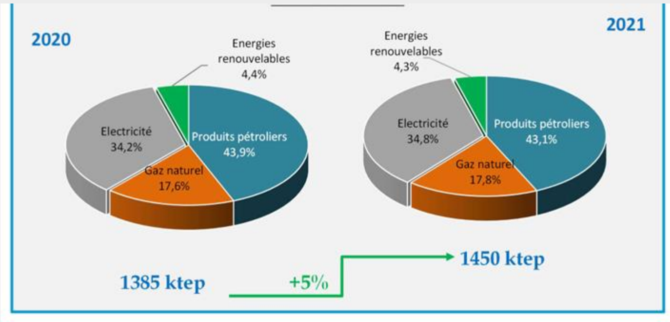


Figure 15 : Structure de la consommation finale du secteur résidentiel par forme d'énergie

The primaryenergyconsumptionconsidered high in the Sahloul 3 neighborhoodis due to a number of factors:

usingsolar water heaters for domestic hot water. Furthermore, more thanhalf of the usersrely on air conditioning and electric fans for cooling, with a rate of 96.2%, (56%, and 40.2%) respectively.

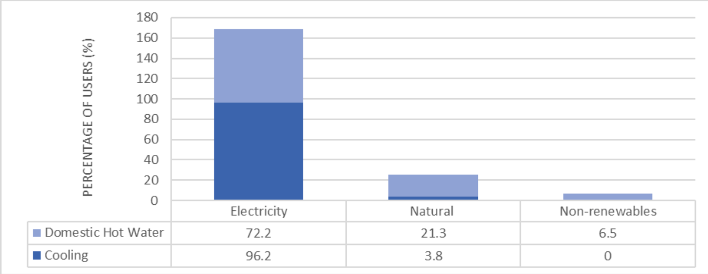


Figure 1-1, Thermal Energy Sources for Cooling and Domestic Hot Water in Al NuzhaNeighborhood

In Contrast, usersprimarilyrely on non-renewables as a source for heating; the rate of usersdependent on gas tanks accounts for 53.9%, followed by 19.3% for central heatingusing diesel.

The total final electricenergyconsumption for building operations for residential/ non-residential buildings ranked a score of -1, corresponding to a value of the indicatorsbelow the minimum acceptable performance. Although the questionnaire revealed a tendency for the users to reducetheirconsumptionthroughenergy-efficient lights and usingapplianceseficiently, the

Moukhtaraenergy infrastructure current state issimilar to the country power situation, benefitingfrom 2 to 4 hoursdailyfrom public energy services and relying on generators run by the municipality to cover the public power shortage. The provision of diesel oil for the generatorsisburdening the municipality due to the high cost of diesel comparing to the cost of electricitygenerated by the public electricity utility.

Only 37% of houses in Moukhtarainstalled PV solar system to generateelectricity, keeping more than 60% of Moukhtararesidentsrelying on the standby generators and thermal power plants.

The municipality building alsorelymainly on the stand bygeneratorswith no solar system installed for the municipality building.

1- Energy inefficiency of buildings: Buildings with poor insulation or inefficient heating, ventilation and air conditioning systems and excessive use of energy for heating and air conditioning. 2- Use of energy-intensive equipment: Inefficient or outdated household appliances, electronics, and lighting systems can consume more energy than is necessary. 3- Population growth: An increase in the population of a neighborhood leads to an increase in the demand for energy for heating, air conditioning, lighting and other daily needs. 4- Trade: The presence of large buildings and trade in a neighborhood contributes significantly to energy consumption, especially if these activities use energy-intensive machinery or processes. 5- Transport: The transport infrastructure in Sahloul 3 is not developed, the inhabitants use a large number of vehicles and generate an increased demand for energy for fuels. 6- Extreme Weather: Extreme weather conditions, mainly heat waves, result in increased energy consumption for air conditioning. 7- Lifestyles: overuse of air conditioning in summer or excessive heating in winter contribute to excessive energy consumption.	electricityconsumptionremainedhigh, higherthan the maximum acceptable benchmark value. This resultcouldbeattributed to the following aspects : 1- The reliance on electricity for indoor temperatureregulation and the lack of passive measures in the area lowers the energy performance of buildings. 2- Excess electricityconsumption can resultfrompoor insulation and non-compliance with local thermal insulation codes, which cause higherheating and coolingloads due to energylossthrough the building envelope (roofs, walls, doors, and windows). 3- The energy performance of the devices, in addition to theirlifecycle, are also major contributors to increasedenergyconsumption in the long run. 4- Number of building occupants and types of activitiesperformed in the area. 5- Lack of natural and artificialshadingelementsthatreduceheat gain into building envelopes.	

8- Lack of awareness of energy efficiency: Lack of awareness of energy efficiency and eco-responsible practices leads to energy waste.

Reducing excessive energyconsumption in a neighborhoodoftenrequirespolicies and measures to improve the energyefficiency of buildings, promote more sustainable lifestyles, invest in modern energy infrastructure and raiseawareness of the importance of energy conservation.

B3:Renewableenergy

Twoforms of renewableenergy are present in the energyconsumption mix in the residentialsector:

1- Photovoltaics to produce electricity. There are currently 91 self-generating rooftop installations with a total capacity of 350 KWc.
2- Solar thermal energy: The housing includes about 200 installations, mostly 300-liter systems producing 500 Mcal/year.

Finally, renewableenergies in the cartier are estimated at 4.3% This rate remainsverylowcompared to the national targets of 30% in 2030.

The total primaryenergydemand for building operations has alsoscored -1 on the neighborhoodscale, corresponding to a value of the indicatorbelow the minimum acceptable performance. As a residentialneighborhood, the analysisrevealed a high demand for primaryenergy, includingnaturalgas and other fuels for heating, in addition to electricity for cooling, lighting, and hot water production. This couldbeattributed to :

High energydemand for indoor thermal regulation (heating/ cooling).

Low application of energyefficiencymeasures (i.e., appliances, advancedmaterials, and policies).

Lack of on-site renewableenergymeasureswithin the neighborhoodcontext.

B3. Renewable Energy

Renewableenergyweighed 33.33% and a total score of -0.3. The score corresponds to a value of the indicatorunder the minimum acceptable performance. The regiongenerallylacksrenewableenergysystems, especiallysolarthermal energysystems. There are

	somephotovoltaiccellsystems in the area. Still, theirnumberisverylimited, due to the factthatnieghborhood buildings are mostly multi-storey buildings and dosnt have sufficient roof area to supply PV panels for all of the apartments. Furthermore, the cost of thesesystemsisconsiderably high, according to the questionnaire survey, 57.5% of the neighborhoodresidentsbelievethat the obstacle is the cost of the system, while 10.5% believethat the difficulty of installation is the obstacle. 1.8% believethatthesesystems are useless. On the other hand, 30.1% saidthatthere are no obstacles. As for solar thermal energysystems, the regionlackssuchsystemsdespite the urgent need for them to meet the demand for water heating, heating, or and electricalenergysupply. All thermal energyconsumed in the regioncomesfrom non-renewable sources. Also, more than 90% of the electricalenergyconsumed in the regioncomesfrom non-renewable sources. However, the area ischaracterized by good solar radiation rangingfrom 600-799 W/m2, whichmakesinstallingsolarenergysystems, either PV or solar thermal systemseconomicallyfeasible. The electricitydemand has increased in recentyears due to risingtemperaturesresultingfromclimate change, leading to increasedelectricityconsumption for air conditioningspecifically. Thesereasonsled to the negative score regardingrenewableenergy,	

	despite the site’sadvantagesrelated to good solar radiation. Regardingwindenergy, the area is flat and does not have anyhills as itislocatedwithin the city and does not have the high wind speeds necessary to makewindenergysystemseconomically viable.	

3.4: Evaluation of Water Infrastructure's current state

Almost all buildings in the district are connected to the public drinking water supply network through SONEDE (Société Nationale d'Exploitation et de Distribution des Eaux) , as well as to the public sanitation network through ONAS (Office National de l'Assainement). The length of the SONEDE network is 14.96 km, with a density of 0.25 km/Hectare. It isdividedinto 4 categories of diameters: - 60 to 90 mm, 100 to 160 mm and 200 to 315 mm HDPE (High Density Polyethylene) - On the edge of the neighborhood, there is a watermain of more than	Describe the current state of the water infrastructure in the urban area. Identify the weaknesses and highlight the mostcriticalones. Jordan ranks as the world's second most water-scarce nation, withitsannualrenewable water resources per personfalling short at lessthan 100 m3, whichismarkedlylowerthan the severe water scarcity benchmark of 500 m3 annually. Therefore, Al-Nuzhadistrict'surban area faces significant challenges withitscurrent state of water infrastructure. Weaknesseswithin the water supply system, distribution network, treatmentfacilities, and storage infrastructure compromise the reliability, quality, and availability of water for residents. Urgent investments and upgrades are required to addressthesecriticalweaknessesadequately. As well, as to promote the utilization of rainwater and encourage its adoption among the populace, whilesimultaneouslyestablishingmeasures to reduce water consumption, including the effective utilization of treatedwastewater. By doingso, a sustainable and efficient provision of safe water can meet the growingdemands of Al-Nuzha district effectively. In terms of improved water sources, more than 98% of the total population iscovered. However, only 93% of them have access to a safelymanagedsupply, and 86% can avail of piped networks. Urban regionsreceive water supplies weekly, while rural areas getthemlessthantwoweeks, withfurtherreduction in frequencyduring the summerseason. The percentage of sanitationsystems meeting safetynormsamounts to only 77.3% and schoolsthat have basic sanitation cover only a third of the total figures. According to the SN tool, sustainableassessment. The Water criteriondividedintothree issues C1, C2 and C3	Moukhtararely on spring water (surface source) to serve the householdswithinitsterritory. The water ispumpedfrom the springs to the households once every 2 days to be able to serve all the neighborhoodsalternatively. The strict schedule of pumping water once every 2 daysismainly due to the high cost of diesel oilsince the water pumps are fed by electricitygeneratedfrom the diesel generators due to the public power shortage. The water networks in Moukhtara are considered in good conditions since distribution pipelines wererehabilitatedsevenyearsago, howeverthereis no water

400 mm

The length of the ONAS network is 13.4 km, with a density of 0.22 km/Hectare.

- About 80% has a diameter of 250 mm, PVC or Cement Asbestos
- The remaining 20% have a diameter of between 300 and 500 mm in reinforced concrete

The urban change index is 731% between 1998 and 2020, indicatingthat the neighborhoodisrecent, itis a neighborhoodthatwasdesigned by AFH (Housing Land Agency, a public enterprisewithfinancialautonomy). It istherefore plausible that the water infrastructure (ASP and Sanitation) is in a suitable statecurrently.

Code	Category	Weight	Weighted score
C1	Water Infrastructure	31%	1.54
C2	Water consumption	38%	0.84
C3	Effluents Management	31%	1.54

The Category Water resulted to have 3.92 as total score and 0.41 as weighted score, thisresultsrepresent an improvementtowards the best practice level and total weight percentage is 11 %

Water Infrastructure normalized scores for C1.1 — Availability of a public municipal water supply and C1.2 — Availability of wastewatertreatmentsystemsgot an excellent ideal performance with 5 as normalized score.

The categories**C1" Water infrastructure**" and C3 **"effluents management**" got a weight of 31% and total score withcomparison to the 10 categoriesselected of all SN toolassessment of 1.54 wasassigned to;

C1" Water infrastructurewas for the selection of C1.1 Availability of a public municipal water supply and for C1.2 Availability of wastewatertreatmentsystems. The total score for both issues of C1 and C3 have represented a minimum increase of performance with regard to the minimum acceptable performance.

customermetersinstalled at householdlevels, instead water gauges are installedwhich are hard to control leading to excess in water consumption.

All the houses in Moukhtara are connected to water and wastewater networks.

As for the storm water collection and drainage system, itisessentiallysuperficial, with the presence of a few scuppers at low points. The existence of a few flood-prone areas in the neighborhoodrequires maintenance, cleaning and cleaning of the grates and scuppers, in order to allow the flow of rainwaterthat has becomeincreasinglyconcentrated in recentyears.	However, C2 water consumptiongot a weighted score of 1.58 whichrepresents a minimum increase of performance with regards to the minimum acceptable performance. Normalized scores of water mostcritical issues wereassigned to C2 (Water Consumption), for instance, 0 score for **C2.6**. Re-use of rainwater in residential buildings, which corresponds to minimum acceptable performance (minimum standard regulation or current practice). For criterionregarding the Adaptation to the climaticaction:drought all selectedcriteriongotnormalized score thatrepresents a, minimum accepted performance 0, and need to beimproved for (H.I.B) for the criterionselectedeg : I5.1" Rainwater collection and storagefrom buildings for non-potable uses ., I5.2 Rainwater collection and storagefromoutdoor areas , and I5.3 Grey Water collection in buildings for non-potable uses . Accordingly, t the following are the mostcritical issues that have been identified in the water infrastructure of Al-Nuzha district: •Aging and Inefficient Distribution System:Deteriorating pipelines and insufficient maintenance contribute to frequentleaks, bursts, and lossesthatimpede efficient water supply, erodereliability, and increasewastage. •Outdated Water TreatmentFacilities:Withoutdatedfacilitieslackingsufficientcapacity, compromised water qualitypresentspotentialhealthhazards for residentswithin Al-Nuzha district. • Insufficient Water Storage Infrastructure:Inadequatecapacityalongsideinadequate maintenance leave Al-Nuzha district susceptible to water shortagesduringpeakperiods and vulnerableduring emergencies or disruptions to regularsupply.	

3.5: SWOT analysis

IRBID

W: Scores ≤ 0.00 T: bigger than 0 & score ≤ 2.5 O: 2.6 – 4 S: bigger than 4

	Negative	Positive	
S / Internal	A1.2 Urban compactness - B2.1 Total final thermal energyconsumption for building operations - B2.10 Energy consumption of public lighting - C2.5 Consumption of potable water in residential buildings - C2.7 Consumption of potable water in public green spaces - C3 (Effluents management) - E1 (Air quality) - G2.3 Percent of residentialunits in the local - G2.4 Informal settlements- G3.1Availability and proximity of key service According to the diagnosis phase, a deepenvironmentalanalysis has been conducted on the neighborhood and the main internalassessment (i.e., strengths and weaknesses) and	A2 Green urban areas, B3 Renewableenergy - C2.1 Total water consumption - C2.4 Consumption of potable water in public officies - C2.6 Re-use of rainwater in residential buildings - D. Solid waste - F. Transportation and mobility, I2 Adaptation to the climatic action: heatwaves and increase of temperature - I5 Adaptation to the climatic action: drought - J3.1 Public buildings sustainability - G1 Accessibility (disabledpersons) - G2.1 Affordability	W
O / External	B1.1 Access to electrical service - C1 (Water Infrastructure) - F3.2 Availability of sidewalks - F3.4 Traffic fatalities - G3.3 Availability and proximity of a public secondaryschool. Takingintoconsideration the external positive aspects, an important list of enhancementopportunitiescouldbesummarized as follows:energy infrastructure related to access to electrical service. water Infrastructure. safetv in	A1.1 Population density - A2.4 Green zones density - F4.1 Cyclomaticcomplexity of the street network - F4.2 Connectivity of the street network - G5.2 Population at risk of poverty or exclusion - I.3.3 Permeability of land - G3.2 Availability and proximity of a public primaryschool - G3.4 Availability and proximity of childrens'playfacilities/ - G3.5 Outdoor public spaces - G6 Safety - F3.1 Pedestrian infrastructure. Regarding the negativeexternal aspects, the following issues and categories are considered	T

SOUSSE

S

- Low density built-up frame (layout and template)
- Concentration of retail and service businesses
- Total population growth
- The sector of high social and material support.
- A serviced neighborhood well connected to the rest of the city.
- Neighborhood well protected from flooding.
- Significant supply of major public facilities and services for health, education etc.
- Satisfactory thermal, electrical and water consumption.

W

- Public domain facilities are minimal, which is detrimental to active transportation and public ownership
- Lack of parking management on the street and/or in car parks
- High energy consumption of buildings
- Lack of tree planting or vegetation
- The presence of heat islands in some places
- Low involvement of residents in neighborhood planning and

O

- The integrated approach to developing the City's new Urban Planning and Mobility Plan.
- The proximity of many dynamic job centers (Novation City).
- The existence of national and international programs directly related to sustainability issues.

T

- The persistence of culture and dependence on cars (growing need for parking spaces).
- Climate change and its effects on weather events.
- Unsustainable development and construction practices.
- Air pollution and high GHG emissions.
- Low funding resource.

Positive

Negative

MOUKHTARA

External

Positive:

- Availability of green spaces
- Availability of spaces (roofs) to install PV solar systems at households' level
- Solar system is installed at school level.
- All the houses in Moukhtara are connected to water and waste water networks.
- Waste water is treated in a treatment plant and used for irrigation

Negative:

- Houses are relying on fuel oil for heating due unavailability of other heating resources
- There is no regulation to generate and sell renewable energy in Lebanon
- Shortage of financial resources to solve the electricity crisis
- High cost of solar system with

Internal

Positive:

- Availability of spaces (roofs) to install PV solar systems at households' level and municipality level
- 63% of houses don't have solar system installed at household levels and can be considered as an opportunity to reduce

Negative:

- Security
- Shortage of trained human resources
- Governmental and environmental regulations
- Fluctuation in the prices of raw material and solar system products

Positive

Negative

3.6: Assessment of the current state of the building

2.1 Public building

A. Site regeneration and development, urban design, and infrastructure											
A1 (Site Selection)			SOUSSE			IRBID			MOUKHTARA		
Code	Criterion	Indicator	Value	Unit of measure	Score	Value	Unit of measure	Score	Value	Unit of measure	Score
A1.2	*Proximity of site to public transportation*	*Accessibility index to public transportation*				*7*	*Index*	2.62			
A1.4	*Proximity to key services*	*Average distance from key services*				*560*	*m*	*3.69*			
A2 (Site Development)											
Code	Criterion	Indicator				Value	Unit of measure	Score			
A2.1	*Use of native plantings*	*The extent of vegetated landscaped area that is planted with native plants*				*0*	*%*	0			
A2.2	*Development of outdoorrecreation areas*	*Number of recreational services offeredoutside the building*	*4*	*n*	*2.5*						
A2.3	*Support for the use of the bicycle*	*Number of bicycle parking places/number of occupants*	*0*	*%*	*-1*						

B. Energy and resources consumption											
B1 (Energy)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
B1.1	*Primary energy consumption*	*Primary energy demand per internal useful floor area per year*	*226.23*	*Kwh/m^2/year*	*3.83*	*289*	*kWh/m^2/yr*	*-1*	*52.97*	*Kwh/m^2/year*	*4.86*
B1.2	*Delivered thermal energy consumption*	*Delivered thermal energy demand per internal useful floor area per year*	*30.50*	*Kwh/m^2/year*	*-1*	*70*	*kWh/m^2/yr*	*-1*	*36.17*	*Kwh/m^2/year*	*-1*
B1.3	*Delivered electrical energy consumption*	*Delivered electric energy demand per internal useful floor area per year*	*80.25*	*Kwh/m^2/year*	*2.82*	*201*	*kWh/m^2/yr*	*-1*	*16.80*	*Kwh/m^2/year*	*3.93*
B1.4	*Energy from renewable sources in total thermal energy consumption*	*Share of renewable energy in final thermal energy consumption*	*0.00*	*%*	*-1*	*12*	*%*	*-1*	*0*	*%*	*-1*
B1.5	*Energy from renewable sources in total electrical energy consumption*	*Share of renewable energy in final electric energy consumption*	*0.00*	*%*	*-1*	*27*	*%*	*0.44*	*0*	*%*	*-1*
B1.6	*Embodied non-renewable primary energy*	*Non-renewable primary energy per useful internal floor area*	*814.43*	*MJ/m^2*	*-1*	*903*	*MJ/m^2*	*-1*	*3.000*	*MJ/m^2*	*-1*
B2 (Electrical peak demand)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
B2.1	*Electrical peak demand for building operations.*	*Average of peak monthly electrical demand for one-year*					*W/m^2*	-1			

B3 (Materials)											
Code	Criterion	Indicator	Value	Unit of measure	Score	Value	Unit of measure	Score	Value	Unit of measure	Score
B3.4	*Recycled materials*	*Weight of recycled materials on total weight of materials*	8	%	-1	0	%	-1			
B3.5	*Local materials*	*Weight of local materials on total weight of materials*	100	%	-1	80	%	5			
B4 (Use of potable water, stormwater, and greywater)											
Code	Criterion	Indicator	Value	Unit of measure	Score	Value	Unit of measure	Score	Value	Unit of measure	Score
B4.1	*Embodied water*	*Embodied water*							1.40	M3/m²	5
B4.2	*Total water consumption*	*Total consumption of water per building occupant*				2	m³/occupant/yr	5	61	M3/occupant/a	4.21
B4.3	*Potable water consumption for indoor uses.*	*Potable water consumption / standardized potable water consumption*	175	%	-1	2	m³/occupant/yr	5	0.05	M3/occupant/a	5
B4.4	*Potable water consumption for irrigation*	*Potable water consumption / standardized potable water consumption*	60	%	-1	100	%	-1	0	%	5

C. Environmental loadings											
C1 (Greenhouse Gas Emissions)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
C1.1	*Embodied carbon*	*kg CO2 equivalents per useful internal floor area (product stage)*	*2.61*	*$KgCo_2eq/m^2$*	*2.72*	*3*	*Kg $CO2eq/m^2$*	0.56	*495*	*Kg $CO2eq/m^2$*	*-1*
C1.2	*GHG gas emissions during operation*	*kg CO2 equivalents per useful internal floor area per year*	*35.62*	*$KgCo_2eq/m^2$*	*3.53*	*74*	*Kg $CO2eq/m^2$*	*-1*	*37*	*Kg $CO2eq/m^2$*	*3.27*
C1.3	*Life cycle global warming potential*	*CO2 equivalent emissions per useful internal floor area for a period of 50 years*							*7.4*	*Kg $CO2eq/m^2$*	*1.86*
C3 (Solid Wastes)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
C3.1	*constructionwaste*	*Weight of waste and materialsproduced per m² of floor area*	*0.0125*	*Kg/m^2*	*5*						
C3.2	*Solid waste from building operations*	*Ratio of the number of collectible solid waste categories within a 100 m distance from the building's entrance to the reference solid waste categories*				*0*	*%*	0			

D. Indoor environmental quality											
D1 (Indoor Air Quality and Ventilation)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
D1.2	*TVOC concentration*	*TVOC concentration in indoor air*	*0.60*	*µg/m3*	*-1*	*0.3*	*µg/ m³*	2.5	*0.3*	*N/A*	*2.5*
D1.3	*CO2 concentrations*	*CO2 concentration in indoor air*				*1000*	*ppm*	*3.64*			
D1.6	*Relative humidity*	*Relative humidity in indoor air*				*40*	*%*	*3.33*			
D1.7	*Ventilation*	*Ventilation rate per useful internal floor area*	*0.75*	*L/S/m²*	*1.25*	*0.7*	*L/s/m²*	*0.83*	*0.8*	*I/s/m²*	*1.67*
D2 (Air Temperature and Relative Humidity)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
D2.1	*Time outside of the thermal comfort range (heating season)*	*Percentage of the time out of the range of defined interior maximum and minimum temperatures during the heating season*							*8.3*	*%*	*4.25*
D2.2	*Time outside of the thermal comfort range (cooling season)*	*Percentage of the time out of the range of defined interior maximum and minimum temperatures during the cooling season*							*8.3*	*%*	*4.25*
D2.3	*Thermal comfort index*	*Predicted Percentage of Dissatisfied*	*35*	*%*	*-1*	*17*	*%*	1.5	*16.6*	*%*	*1.7*

D3 (Daylighting and Illumination)											
Code	Criterion	Indicator	Value	Unit of measure	Score	Value	Unit of measure	Score	Value	Unit of measure	Score
D3.1	*Daylight*	*Mean Daylight Factor*	*4.70*	*%*	*5*	*3*	*%*	*2.5*	*3*	*%*	*2.5*
D3.2	*Daylight Provision*	*Level of daylight provision*	*1*	*Level*	*0*	*2*	*Level*	*2.5*			
D4Noise and acoustics											
D4.1	*Protection againstnoise: insulation of facades*	*D2m,nT,w - Weightednormalizedleveldifference for traffic noise (sound insulation)*	*54*	*db*	*5*						
E. Service quality											
E1 (Name of the category)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
E1.1	*Effectiveness of facility management control system*	*Percentage of control functions within class A*							33	%	-1
E1.2	*Smart readiness indicator*	*Rate the total smart readiness of buildings in terms of three key functionalities, i.e. responding to the needs of occupants, optimizing energy performance,*	*23.06*	*%*	*-1*	*60%*	*%*	1.67	60	%	1.67

		interacting with energy grids									
E2 Optimize and maintainoperational performance											
E2.1	*Existence and implementation of a maintenance management plan.*	*Availability of a comprehensive, long-term plan at the end of the design phase and proof of implementationduring the operational phase*	*0*	*S*	*0*				*0*	*Score*	*0*
E2.2	*Continuous performance monitoring and verification.*	*The provision of energysubmeteringsystems and water monitoring systems, in accordance with the design documentation*	*0*	*S*	*0*				*2.5*	*Score*	*2.5*
E2.3	*Retention of as-built documentation*	*The scope and quality of design documentation retained for use by building operators, according to design documentation*							*5*	*Score*	*5*
F. Social, cultural and perceptual											
F1 (Social Aspects)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
F1.1	*Universal access on-site and within the building.*	*The scope and quality of design measures planned to facilitate access and use of building facilities by*	*3*	*Score*	*3*	*0*	*Score*	0	*1*	*Score*	*1*

		persons with disabilities									
F1.2	*Exposure to sunlight*	*Hours of sunlight*				*6*	*Hours*	*3.75*			
F2 (Perceptual)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
F2.1	*View out*	*Quality of view out*				*50*	*Score*	2.5	*50*	*Score*	*2.5*

G. Cost and economic aspects											
GX (Name of the category)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
G1.4	*Energy cost*	*Energy annual cost per useful internal floor area*	*25.97*	*Dt/m^2/year*	*4.4*	*16*	*€/m^2/yr*	1.33	*7.30*	*Score*	*4.23*
G1.5	*Cost of water*	*Annualcost of water per floor area*	*1.29*	*Dt/m^2/year*	*5*				*0*	*Score*	*0*
H. Adaptation to climate change											
H1 (Climatic action: increase of temperature)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
H1.2	*Heat island effect*	*Mean Solar Reflectance Index of paved surfaces and roofs in the area*	*27.80*	*ISR*	*-1*	*35*	*SRI*	-1	*27*	*(Index)*	*0.44*

H1.3	*Shading of building envelope by vegetation*	*Percent of building envelope with orienteation between West and South East that will be covered by vegetation during the warm season (June 12st)*	*5*	*%*	*-1*	*12*	*%*	*-1*			
H1.4	*Use of vegetation to improve the microclimate and coolingduringsummer*	*Leaf area index: ratio of total vegetation area (on soil and on roofs, includingtrees) divided by total site area*	*8*	*%*	*-1*						
H2 (Climatic action: pluvial flood)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
H2.1	*StormwaterRetentionCapacity on Site*	*Share of on-site stormwaterretentioncapacity versus optimal retentioncapacity*	*15.38*	*%*	*-1*						
H2.2	*Permeability of land*	*Share of the site that is permeable*	*8*	*%*	*-1*	*0*	*%*	0			
H4 (Climatic action: drought)											
Code	*Criterion*	*Indicator*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*	*Value*	*Unit of measure*	*Score*
H4.1	*Rainwater harvesting and storagecapacity for non-potable uses*	*Share of rainwatercollected and stored for reuse in roofs and paved area of plot*	*0*	*%*	*-1*						
H4.2	*Capacity of greywater collection and storage for non-potable uses*	*Share of greywater collected and cleaned for reuse*				*0*	*%*	*0*	*100*	*%*	*5*

3.7: Identification of the weaknesses and critical issues in the building

		IRBID	*SOUSSE*	*MOUKHTARA*
Code	***Criterion***	***Score***	***Score***	***Score***
A2.2	*Development of outdoor recreation areas*		2.5	
A2.3	*Support of the use bicycle*		-1	
B1.1	*Primary energy consumption*	-1.00	-1	4.86
B1.2	*Delivered thermal energy consumption*	-1.00	-1	-1
B1.3	*Delivered electrical energy consumption*	-1.00	5	3.93
B1.4	*Energy from renewable sources in total thermal energy consumption*	-1.00	-1	-1
B1.5	*Energy from renewable sources in total electrical energy consumption*		-1	-1
B1.6	*Embodied non-renewable primary energy*	-1.00	-1	-1
B2.1	*Electrical peak demand for building operations.*	-1.00		
B3.4	*Recycled materials*	-1.00	-1	-1
B3.5	*Local materials*		-1	
B4.1	*Embodied water*			5

B4.2	*Total water consumption*			4.21
B4.3	*Potable water consumption for indoor uses*		-1	5
B4.4	*Potable water consumption for irrigation*	-1.00	-1	5
H1.2	*Heat island effect*	-1.00		
H1.3	*Shading of building envelope by vegetation*	-1.00	-1	
H1.4	*Use of vegetation to improve thr microclimate and cooling during summer*		-1	
C1.1	*Embodied carbon*		2.7	-1
C1.2	*GHG gas emissions during operation*	-1.00	3.5	3.27
C1.3	*Life cycle global warming potential*			1.86
C1.5	*Cost of water*		4.6	
A2.1	*Use of native plantings*	0.00		
B3.5	*Local materials*	0.00		
C3.1	*Construction waste*		5	
C3.2	*Solid waste from building operations*	0.00		
F1.1	*Universal access on-site and within the building.*	0.00	3	
H2.1	*Stormwater retention capacity on site*		-1	
H2.2	*Permeability of land*	0.00	-1	
H4.1	*Envelope fire resistance*		-1	
H4.2	*Capacity of greywater collection and storage for non-potable uses*	0.00		
B1.5	*Energy from renewable sources in total electrical energy consumption*	0.44		

C1.1	*Embodied carbon*	0.56		
D1.2	*TVOC concentration*		-1	2.5
D1.7	*Ventilation*	0.83	1.25	1.67
D2.1	*Time outside of the thermal comfort range (heating season)*			4.25
D2.2	*Time outside of the thermal comfort range (cooling season)*			4.25
D2.3	*Thermal comfort index*		-1	1.7
D3.1	*Daylight*		5	2.5
D3.2	*Dylight supply*		0	
D4.1	*Protection against noise : insulation of facades*		5	
E1.1	*Effectiveness of facility management control system*			-1
E1.2	*Smart Readiness Indicator*		-1	1.67
E2.1	*Existence and implementation of a maintenance management plan*		0	0
E2.2	*On-going monitoring and verification of performance*		0	2.5
E2.3	*Retention of as-built documentation*			5
F1.1	*Universal access on site and within the building*			1
F2.1	*View out*			2.5
G1.4	*Energy cost*		-1	4.23
G1.5	*Water cost*			5
H1.2	*Heat island effect*		-1	0.44
H4.2	*Capacity of greywater collection and storage for non-potable uses*			5

3.8: Diagnosis Summary Report

1/ SOUSSE : Summary Report

At the Neighborhood Scale (SNTool):

Criteria with poor performance: (Score -1 to -0.1)

Code	*Criterion*	*Score Ranking*	*Description of the results*
A1.1	Human Density	-1	Low population density in relation to sustainability standards (predominance of individual housing typology)
A2.1	Availability of green areas	-1	Lack of green spaces, which are considered to be well endowed compared to other parts of the city.
A2.4	Density of green areas	-1	Lack of green spaces in the neighborhood.
B2.7	Total demand for primary energy for the operation of buildings	-1	Excessive consumption for poor insulation, low equipment performance etc.
B3.1	Share of on-site renewable energy in relation to final total thermal energy consumption for construction operations	-1	Almost no solar heating, despite the great potential.
B3.4	Share of local renewables in final electricity consumption	-1	Almost no photovoltaics, despite the great potential.
B3.7	Share of on-site renewable energy in relation to total primary energy consumption for construction operations	-1	No photovoltaics, despite the great potential.
D2.2	Access to solid waste and recycling: collection points	-1	No recycling policy for household waste

E1.2	Particle concentration (PM10)	-1	High level of air pollution.
F2.3	Bicycle network	-1	Near lack of infrastructure for soft mobility
F3.1	Pedestrian infrastructure	-1	Almost no pedestrian area in the area (predominance of private car)
G1.2	Sidewalks and other pedestrian pathways accessible to physically disabled persons	-1	Lack of adequate accommodation for people with physical disabilities
G3.1	Availability and proximity of key services	-1	Only 1 in 4 people have at least 3 basic amenities nearby (still far from the city vision of the quarter-hour)
I1.1	Greenhouse gas emissions	-1	A great deal of effort still needs to be made in this area
I1.2	Greenhouse gas emissions from residential buildings	-1	A great deal of effort still needs to be made in this area
I2.2	Use of vegetation to provide ambient outdoor cooling	-1	Little use of vegetation
I3.3	Soil permeability	-1	In urban areas, there is a tendency to water-proof all available surfaces.
D3.1	Sustainability of public buildings	-1	Governments are not leading by example
D3.3	Energy consumption of public buildings	-1	Governments are not leading by example

Criteria with minimum acceptable performance: (Score from 0 to 1)

Code	Criterion	Score Ranking	Description of the results
A2.2	Green spaces in relation to the population of the district	**0.3**	Minimum acceptable for this neighborhood
D1.1	Community participation in urban planning activities	**1**	This culture is beginning to take shape in the mores of the inhabitants

Criteria with acceptable performance: (Score 1.1 to 5)

Code	Criterion	Score Ranking	Description of the results
I4.1	Flood risk	**1.9**	Satisfactory
G1.1	Public buildings accessible to physically disabled persons	**2**	The efforts of the public authorities are satisfactory in this particular respect
C2.3	Drinking water consumption in residential buildings	**2.1**	Satisfactory, but still needs to evolve due to the critical situation of freshwater resources in the country as a whole
B2.4	Total final consumption of electrical energy for building operations	**2.8**	Satisfactory
B1.1	Access to electrical service	**5**	Satisfactory
B2.1	Total final thermal energy consumption for construction operations	**5**	Satisfactory
B2.10	Power consumption of street lighting	**5**	Satisfactory
C1.2	Availability of wastewater treatment systems	**5**	Satisfactory

F1.1	Performance of the public transport system	**5**	Satisfactory
F3.2	Sidewalk Availability	**5**	Satisfactory
F4.2	Road Network Connectivity	**5**	Satisfactory
G2.4	Informal settlements	**5**	Satisfactory

SWOT analysis:

S

- Cadre bâti peu dense (implantation et gabarit)
- La concentration de commerces de détails et de services
- Croissance de la population totale
- Le secteur de favorisation sociale et matérielle élevée.
- Quartier viabilisé bien connecté au reste de la ville.
- Quartier bien protégé des inondations.
- Offre importante des principaux équipements et services publics de santé, d'éducation etc.
- Consommation d'énergie thermique, électrique et de l'eau satisfaisante.

W

- Les aménagements du domaine public sont minimaux, ce qui nuit aux transports actifs et à son appropriation par les citoyens
- L'absence de gestion du stationnement sur rue et ou dans les parkings
- Consommation énergitique élevée des bâtiments
- Manque de plantation d'arbres ou de végétation
- La présence d'îlots de chaleurs à certains endroits
- Faible implication des résidents dans la planification et la gestion du quartier.
- Le quartier ne dispose pas d'un système de gestion des déchets efficaces, tels que le recyclage et la réutilisation, pour réduire la production de déchets et minimiser leur impact environnemental.
- Peu d'espace vacant pour d'éventuels développements

O

- La démarche intégrée d'élaboration du nouveau Plan d'urbanisme et de mobilité de la Ville.
- La proximité de nombreux pôles d'emplois dynamiques (Novation City).
- L'existence de programmes nationaux et internationaux en relation directe avec les thématiques de durabilité.

T

- La persistance de la culture et de la dépendance à l'automobile (Besoin grandissant en espaces de stationnement).
- Les changements climatiques et leurs effets sur les événements météorologiques.
- Les pratiques d'aménagement et de construction non durables.
- Pollution atmosphérique et fortes émissions de GES.
- Faible ressource de financement.
- Faible coordination des parties prenantes.
- Faiblesse de la structure de gouvernance.

Positifs

Négatifs

Key findings of the evaluation:

* The properly serviced area is served by the main usual public networks (Electricity, Drinking Water Supply, Sanitation, Connectivity etc...)
* Neighborhood gets a low sustainability score
* There is almost no use of renewable energy (despite the high potential)
* There is no selective sorting and therefore no recycling of waste
* No facilities adapted to gentle mobility (cyclist and pedestrian)

It is a classic urban planning model of the 1970s and 1980s that gives priority to individual housing, to private cars (without, however, providing adequate parking), that does not take into consideration the issues of sustainability, and that remains insensitive to new technologies and renewable energies.

Critical issues identified:

- Lack of green spaces
- Excessive energy consumption
- Lack of use of renewable energy
- Air pollution and significant GHG emissions
- Lack of selective sorting and recycling policy
- Lack of infrastructure suitable for soft mobility (pedestrians and cyclists)
- Urban planning not adapted to the 15-minute city

Recommendations to address critical issues identified:

- Encouraging the use of renewable energies through a proactive policy
- Encouraging energy consumption optimization through incentives (better thermal insulation of buildings, adapted equipment, home automation, etc.)
- Incentives to reduce commuting causing pollution and GHGs
- Implement a selective sorting policy at neighborhood level, as a first step towards recycling
- Create pedestrian areas, bike paths or BHNS for public transport
- Bringing basic public facilities closer to the people

1. Building Scale (SB Tool):

Criteria with poor performance: (Score -1 to -0.1)

Code	Criterion	Score Ranking	Description of the results
A2.3	Support for the use of the bicycle	-1	No media
B1.1	Primary energy consumption	-1	Excessive for poor envelope insulation and poor equipment performance
B1.2	Consumption of thermal energy supplied	-1	Poor sealing and insulation of the envelope/non-performing heating equipment
B1.4	Energy from renewable sources in total thermal energy consumption	-1	No solar heating
B1.5	Energy from renewable sources in total electricity consumption	-1	No PV Installation
B1.6	Incorporated non-renewable primary energy	-1	100% non-renewable primary energy.
B3.4	Recycled materials	-1	No recycling
B3.5	Local materials	-1	100% local materials
B4.3	Drinking water consumption inside.	-1	Excessive consumption for inappropriate use / no recovery
B4.4	Drinking water consumption for irrigation	-1	60% of the water consumed is used for watering the outdoor garden
D1.2	VOC concentration	-1	No filtration / proximity to a lane with high road traffic
D2.3	Thermal comfort index	-1	Poor insulation / no regulation / inappropriate equipment.
E1.2	Smart readiness indicator	-1	No SMART devices

H1.2	Thermal island effect	-1	Dark paint on the roof (bitumen)
H1.3	Shading of the building envelope by vegetation	-1	No vegetation constituting a screen to the sun.
H1.4	Use of vegetation to improve the microclimate and cooling during summer	-1	No use of vegetation
H2.1	Stormwater Retention Capacity on Site	-1	No recovery planned
H2.2	Soil permeability	-1	Waterproof coating
H4.1	Envelope fire resistance	-1	Low fire resistance walls
G1.4	Cost of energy	-1	Energy is relatively expensive.

Criteria with minimum acceptable performance: (Score from 0 to 1)

Code	*Criterion*	*Score Ranking*	*Description of the results*
E2.1	Existence and implementation of a maintenance management plan.	*0*	Corrective Maintenance Only
E2.2	Continuous performance monitoring and verification.	*0*	Insufficient monitoring
D3.2	Daylight Supply	*0*	Satisfactory

Criteria with acceptable performance: (Score 1.1 to 5)

Code	Criterion	Score Ranking	Description of the results
D1.7	Ventilation	**1.25**	Satisfactory
A2.2	Development of outdoor recreation areas	**2.5**	Satisfactory
C1.1	Embedded carbon	**2.7**	Satisfactory
F1.1	Universal access on site and in the building.	**3**	Satisfactory
C1.2	Greenhouse gas emissions during operation	**3.5**	Satisfactory
G1.5	Cost of water	**4.6**	Satisfactory
B1.3	Power Consumption Provided	**5**	Satisfactory
C3.1	construction waste	**5**	Satisfactory
D3.1	Daylight	**5**	Satisfactory
D4.1	Protection against noise: insulation of facades	**5**	Satisfactory

Key findings of the evaluation:

The building gets a fairly low durability score
The design of the building has certain defects in relation to durability.
The facilities are not up to par
Lack of regulation and management of energy-intensive equipment
Lack of energy monitoring system
No use of renewable energy, whether thermal or electric

Critical issues identified:

Certain durability problems are permanent and difficult to correct (air conditioning and heating equipment, envelope, exterior coatings, etc.)
The building is newly constructed, which makes it difficult to justify investments
Lack of staff for monitoring and maintenance

Recommendations for addressing critical issues identified:

- Roof insulation and painting
- Improvement of waterproofing
- Implementation of regulation
- Stormwater recovery for non-sanitary uses
- Installation of bicycle parking
- Implementation of a performance monitoring system
- Improvement of building intelligence.
- Maintenance of energy-intensive equipment

2/ IRBID : Summary Report

At the neighborhood scale (SNTool):

Criteria with low performance: (Score from -1 to -0.1)

Code	*Criterion*	*Score ranking*	*Description of the results*
A2.1	*Availability of green urban areas*	*-1.00*	*green urban areas are almost non-existence per neighborhood, due to high cost of private land, not available for public green spaces*
A2.2	*Green areas in relation to the neighborhood population*	*-1.00*	*green areas are almost non-existence per neighborhood, due to high cost of private land, not available for public green spaces, and relatively high-density population*
A2.3	*Green Area Accessibility*	*-1.00*	*green spaces are almost not available, hence no accessibility was found*
A2.4	*Green zones density*	*-1.00*	*green zones were not available in the land use, due to high cost of land*
B2.4	*Total final electrical energy consumption for building operations*	*-1.00*	*total dependence on electricity from the public grid without any other sources of wheeling or thermal energy.*
B2.5	*Total final electrical energy consumption for residential building operations*	*-1.00*	*Total final electrical energy consumption for residential building operations depends on equipment efficiency in the residential sector and needs to be market-developed.*
B2.7	*Total primary energy demand for building operations*	*-1.00*	*total dependence on imported energy and electricity from the public grid with minimum thermal energy*

B3.1	*Share of renewable energy on-site, relative to total final thermal energy consumption for building operations*	-1.00	*low dependence on on-site renewables due to a strict number of allowed systems per neighborhood, from the by-laws of government.*
B3.4	*Share of renewable energy on-site, relative to final electric energy consumption*	-1.00	*low dependence on on-site renewables due to a strict number of allowed systems per neighborhood from the by-laws of government.*
B3.7	*Share of renewable energy on-site, relative to total primary energy consumption for building operations*	-1.00	*low dependence on on-site renewables due to a strict number of allowed systems per neighborhood from the by-laws of government.*
F2.2	*Electric-vehicle infrastructure (charging stations)*	-1.00	*Low cultural and social awareness of new electrical systems for vehicles. And the high cost of new EV infrastructure.*
F2.3	*Bicycle network*	-1.00	*There is low cultural acceptance of bicycle use at the neighborhood level, in addition to a lack of related urban planning legislation and codes.*
J3.1	*Public buildings sustainability*	-1.00	*Lack of implementation and monitoring body and recruiting.*
G1.1	*Public buildings that are accessible for use by physically disabled persons*	-1.00	*Lack of infrastructure for inclusion. However, it is being developed in new buildings due to enforcement*
G1.2	*Sidewalks and other pedestrian paths that are accessible for use by physically disabled persons*	-1.00	*Lack of infrastructure for inclusion due to high cost and legislation challenges of re-developing accessibility*
G1.3	*Barrier-free accessibility in local outdoor public areas*	-1.00	*Lack of infrastructure for inclusion, due to high cost and legislation challenges of re-developing accessibility*
G2.1	*Affordability of housing property*	-1.00	*A high majority of housing types are single and Multi-family housing units. making it not always affordable for neighborhood residents.*

G3.4	*Availability and proximity of childrens' play facilities*	-1.00	*lack of playgrounds and infrastructure, high land cost*
G3.2	*Availability and proximity of a public primary school*	-1.00	*Not all age groups are covered within the available primary school inside the neighborhood through a walkable distance.*
G3.5	*Outdoor public spaces*	-1.00	*There is a very low existence of public spaces per neighborhood, making it difficult to approach through walkable distance.*
G5.1	*Energy poverty of households*	-1.00	*More than 10% of the income is spent on total energy bills, including electricity & thermal energy.*
G6.1	*Police service*	-1.00	*The share of police service is less than 1 per 1000 inhabitants.*
G6.2	*Fire service*	-1.00	*The share of fire service/ fire security prevention in the neighborhood is less than 1 per 1000 inhabitants.*
G10.1	*Perceived safety of public areas for pedestrians*	-1.00	*Lack of safe pedestrian routes, existence of obstacles, lack of maintenance, lack of enforced legislation, lack of application awareness and follow-up.*

Code	Criterion	Score ranking	Description of the results
C2.6	*Re-use of rainwater in residential buildings*	*0.00*	*Lack of laws and enforcement legislations on the majority of the existing building and infrastructure*
D2.1	*Access to solid waste and recycling collection points*	*0.00*	*No access of residential households and non-residential users to nearby collection points for solid waste and recycling. Not available at the neighborhood level.*
D2.2	*"Access to solid waste and recycling*	*0.00*	*No access of residential households and non-residential users to nearby collection points for solid waste and recycling. Not available at the neighborhood level. Most of the waste goes to landfills and incineration.*
F3.1	*Pedestrian infrastructure*	*0.00*	*None existent car-free zones within the neighborhood area due to cultural restrictions.*
G2.2	*Affordability of housing rental*	*0.00*	*None available affordable housing units and no existence of rent control policies within the context.*
I2.3	*Green roofs*	*0.00*	*none available, no construction infrastructure for green roofs.*
I5.1	*" Rainwater collection and storage from buildings for non-potable uses"*	*0.00*	*no available infrastructure for rainwater harvesting used in non-potable uses in the neighborhood.*
I5.2	*Rainwater collection and storage from outdoor areas*	*0.00*	*no available infrastructure to collect from surfaces for non-potable water use.*
I5.3	*Greywater collection in buildings for non-potable uses*	*0.00*	*Greywater systems are not available in the Jordanian context and are not enforced by law or legislation.*
G5.2	*Population at risk of poverty or exclusion*	*0.14*	*Share of people in the neighborhood with below 60% of the national median income.*
C2.4	*Consumption of potable water in public offices*	*0.40*	*Non-potable water sources are not available in the public sector, and water-saving fixtures are not available in public buildings*
F4.1	*Cyclomatic complexity of the street network*	*0.43*	*lack of road accessibility due to high-bottom approach application*

G4.3	*Secondary school enrollment*	*0.59*	*Secondary level in Jordan is for grades 11, 12. This level is not compulsory, and a considerable rate of students drop off due to cultural norms or economic situation*
A1.1	*Population density*	*0.67*	*population density (inhabitants per km2) is low, due to the enforced limited number of floors per housing unit, according to housing regulations and standards.*

Criteria with minimum acceptable performance: (Score from 1.1 to 5)

Code	*Criterion*	*Score ranking*	*Description of the results*
I3.3	*Permeability of land*	*1.09*	*A share of vacant land within the neighborhood that allows water infiltration underground and reduces the stormwater runoff*
F4.2	*Connectivity of the street network*	*2.3*	*The neighborhood has 100 street intersections per Km2, a good indicator of the connectivity of the neighborhood.*
I1.1	*Greenhouse gas emissions*	*3.67*	*Greenhouse Gas Emissions from building operations are low and represent a best practice and low contribution to climate change*
G3.3	*Availability and proximity of a public secondary school*	*3.67*	*51.7% of the neighborhood population are living within a 500m distance to a public secondary school*
C2.7	*Consumption of potable water in public green spaces*	*3.78*	*Very good consumption of potable water used for irrigation purposes in public green areas*
F3.2	*Availability of sidewalks*	*3.9*	*89% of the roads in the neighborhood has dedicated sidewalks.*
G4.1	*Primary enrollment rate*	*4.31*	*The primary Level in Jordan is called (basic education, grades 1 to 10). It is compulsory for children aged 6 to 15*
G2.3	*Vacant residential units in the neighborhood*	*4.33*	*Low percentage of vacant residential units, which shows sufficient supply and demand of housing dwellings in the neighborhood*

C2.3	*Consumption of potable water in residential buildings*	*4.74*	*Low consumption of potable water in residential buildings, which shows efficient use of water resources.*
B2.1	*Total final thermal energy consumption for building operations*	*4.91*	*Low final thermal energy consumption for building operations as people mainly depend on electricity for main uses as domestic hot water and cooling*
F3.4	*Traffic fatalities*	*4.97*	*Very low number of traffic fatalities in the neighborhood which is a indicator of pedestrian safety.*
J3.2	*Operating energy costs for public buildings*	*5*	*Excellent rate of energy cost for public buildings*
H4.2	*Wireless Broadband Coverage*	*5*	*An increased access to internet and wireless connection spots at affordable rates.*
H4.4	*Mobile phone subscriptions*	*5*	*An increased level of use of communication technology in the neighborhood.*
H1.1	*Average annual per-capita income of residents*	*5*	*High average annual income of the neighborhood residents compared to per capita income in Irbid Governorate.*
G3.1	*Availability and proximity of key services*	*5*	*100% of the neighborhood population are located within 800 meters of walking distance from at least three key services*
G2.4	*Informal settlements*	*5*	*There are no informal settlements or slums within the neighborhood's urban context*
E3.2	*Exposure to ELF magnetic fields*	*5*	*The neighborhood buildings are not situated within high-voltage risk distance*

E3.1	*Exposure to high-frequency electromagnetic fields*	*5*	*All of the mobile network antenna's are located on the buildings roof which is safe to the neighborhood residents*
E1.3	*Nitrogen Dioxide concentration (NO2)*	*5*	*Excellent air quality where number of days in a years exceeding the limit are lower than maximum number of days specified by Jordanian standard for ambient air quality*
E1.2	*Particulate matter (PM10) concentration*	*5*	*Excellent air quality where number of days in a years exceeding the limit are lower than maximum number of days specified by Jordanian standard for ambient air quality*
E1.1	*Fine particulate matter (PM2.5) concentration*	*5*	*Excellent air quality where number of days in a years exceeding the limit are lower than maximum number of days specified by Jordanian standard for ambient air quality*
D1.1	*Availability of solid waste collection*	*5*	*An excellent indicator of neighbourhood's cleanliness and quality of life, as all of neighborhoods buildings are served by solid waste collection*
C2.1	*Total water consumption*	*5.00*	*An excellent indicator of the total water consumption of the neighborhood. An indicator of efficient use of water.*
C3.1	*Water treatment*	*5*	*A considerable percentage of disposed wastewater from the neighborhood is treated which reduces reduce the incidence of water-borne diseases*
C3.2	*Public wastewater (from outdoor areas) that is disposed or treated*	*5*	*A considerable percentage of disposed wastewater from outdoor areas is treated, which reduces the incidence of water-borne diseases*

C3.3	*Household sanitation*	5	*100% of the neighborhood population have access to basic sanitation services in their buildings, an indicator of high levels of hygiene*
C2.5	*Consumption of potable water in educational buildings*	5	*An efficient use of water resources through low consumption of potable water in educational buildings.*
C1.2	*Availability of wastewater treatment systems*	5	*100% of the neighborhood population has access to a wastewater treatment network—an indicator of the users' health, cleanliness, and quality of life.*
C1.1	*Availability of a public municipal water supply*	5	*100 % of the neighborhood population has access to the municipal water network, an indicator of well-being and quality of life.*
B2.10	*Energy consumption of public lighting*	5	*Efficiency in use for public lighting in the neighborhood through cost-effective measures and energy-efficient lighting systems.*
B1.1	*Access to electrical service*	5	*100% of the population has access to the electricity network, an indicator of sustainability, resilience, and economic productivity.*
A1.2	*Urban compactness*	5	*The Ratio of urban usable space of the building to the urban space is high. An indicator of efficient utilization of urban structure, lands, and buildings.*
F1.1	*Performance of the public transport system*	5	*The neighborhood is surrounded by four major roads that public modes of transportation pass by on a daily basis with a minimum of 20 trip per day*

Swot analysis:

S A1.2 Urban compactness B2.1 Total final thermal energy consumption for building operations B2.10 Energy consumption of public lighting C2.1 Total water consumption C2.5 Consumption of potable water in residential C2.7 Consumption of potable water in public green spaces C3 (Effluents management) E1 (Air quality) G2.3 Percent of residential units in the local G2.4 Informal settlements, G3.1Availability and proximity of key service	**W** A2 Green urban areas B3 Renewable energy C2.6 Re-use of rainwater in residential buildings D. Solid waste F. Transportation and mobility I2 Adaptation to the climatic action: heatwaves and increase of temperature I5 Adaptation to the climatic action: drought J3.1 Public buildings sustainability G1 Accessibility (disabled persons) G2.1 Affordability of housing property & G2.2 and rental G10.1 Perceived safety of public areas for pedestrians C2.4 Consumption of potable water in public officies
O B1.1 Access to electrical service C1 (Water Infrastructure) F3.2 Availability of sidewalks F3.4 Traffic fatalities G3.3 Availability and proximity of a public secondary school	**T** A1.1 Population density A2.4 Green zones density F4.1 Cyclomatic complexity of the street network F4.2 Connectivity of the street network G5.2 Population at risk of poverty or exclusion I.3.3 Permeability of land G3.2 Availability and proximity of a public primary school G3.4 Availability and proximity of childrens' play facilities/ G3.5 Outdoor public spaces G6 Safety F3.1 Pedestrian infrastructure

Main findings of the assessment:

In regard to the use of land, Urban compactness scored an excellent performance, as the Ratio of urban usable space of the building to the urban space is high, which is an indicator of efficient utilization of urban structure, lands, and buildings. Population density, on the other hand, is defined as a critical issue and is explained in the critical issue's summary.

Green urban areas availability, accessibility, ratio to the neighborhood population, and Green zone density are defined as critical issues and explained in the critical issue's summary.

For the Energy network, 100% of the population has access to the municipal electricity network, which is an indicator of sustainability, resilience, and economic productivity. The analysis also revealed efficiency in public lighting in the neighborhood through cost-effective measures and energy-efficient lighting systems. There is Low final thermal energy consumption for building operations as people mainly depend on electricity for main uses such as domestic hot water and cooling.

The total final electrical energy consumption for residential/non-residential building operations and the total primary energy demand for building operations, in addition to the renewable energy category, are defined as critical issues and explained in the critical issue's summary.

Al-Nuzha district is a residential area currently undergoing rapid urbanization and population growth. As a result, its water infrastructure is under immense pressure. This claims that the lack of maintenance to the water sector in Irbid , has led to many problems, such as water loss problems and weak pumping due to lack of pipelines. The proposed improvements for AlNuzha, must include improving the pipeline network, and reservoir capacity, in addition to system restructuring. With regard to the consumption of potable water in public green spaces, the resulting score represents a best practice which demonstrates a very good consumption of potable water used for irrigation purposes in public green areas.

In addition , the resulting scores of access to the municipal water network and wastewater treatment emphasizes that 100 % of the neighborhood population has access to the municipal water network, wastewater treatment ,and to basic sanitation services in their buildings; this indicator represents excellence and ideal performance. In terms of the Consumption of potable water in educational buildings, there is an efficient use of water resources through low consumption of potable water in educational buildings. Also, *Water treatment and Public wastewater (from outdoor areas) that is disposed of or treated scored an excellent performance. Therefore , a considerable percentage of disposed wastewater from outdoor areas is treated, which reduces the incidence of water-borne diseases.*

In terms of the neighborhood's solid waste management activities, a large percentage of buildings in the area is served by solid waste collection, which is a strong indicator of a neighborhood's cleanliness and overall quality of life. Furthermore, all of the buildings in the area are covered by solid waste collection services. This demonstrates a significant dedication to waste management practices. With regards to the proximity of the resident population to the solid waste and recycling collection point, the situation becomes less favorable as the municipal water network is detailed in the critical issues section.

The environmental quality of the neighborhood ranked an excellent performance in terms of the selected pollutants (pm10, pm2.5, and NO2), as according to Ministry of Environment ambient air quality reports, the number of days in a year exceeding the limit is lower than the maximum number of days specified by Jordanian standard for ambient air quality.
The neighborhood's exposure to EMF and ELF also ranked as an excellent performance. The neighborhood buildings are not situated within high-voltage risk distance. Furthermore, all of the mobile network antennas are located on the building's roofs, which is considered safe for the neighborhood residents.

The neighborhood is surrounded by four major roads that public modes of transportation pass by on a daily basis, with a minimum of 20 trips per day. The connectivity of the neighborhood scored a good performance with a substantial number of intersections per km2. 89% of the roads in the neighborhood have dedicated sidewalks. There is a significantly low number of traffic fatalities in the neighborhood, which is an indicator of pedestrian safety.

Indicators related to the Bicycle Network, Electric-vehicle infrastructure (charging stations), Pedestrian infrastructure, and Cyclomatic complexity of the street network are defined as critical issues and explained in the critical issue's summary

This neighborhood exhibits positive social indicators. It has a low vacancy rate, indicating a healthy balance between supply and demand for housing. Notably, there are no informal settlements or slums in the urban context, indicating that living conditions are equitable. Additionally, 100 percent of the population has access to at least three essential services within 800 meters, promoting convenience and accessibility. Additionally, 51.7% of the population lives within 500 meters of a public secondary school, facilitating access to education. In Jordan, children ages 6 to 15 are required to receive primary education, ensuring educational opportunities for all children.

However, other social aspects considered critical issues such as Accessibility for people with disabilities, affordability of housing rental and property, availability and proximity of a public primary school and public facilities and outdoor public places and Perceived safety of public areas for pedestrians. more details are available in the critical issues section . The selected economic indicators in the neighborhood ranked an excellent performance. The average annual per capita income of the neighborhood residents is considered high compared to per capita income in Irbid Governorate. There is a sufficient level of use of communication technology in the neighborhood, in addition to efficient access to internet and wireless connection spots at affordable rates.

The impact of climate change and extreme weather conditions, such as flash floods, droughts, and high temperatures, have further driven people into urban areas. Jordan suffers from increasing temperatures, erratic rainfall, declining available water, and increasing heat waves, flash floods, droughts, and landslides. At the national level, transport and industrial energy activities are responsible for 74% of GHG emissions, while the waste management sector emitted approximately 13% and industry 8%, posing an environmental challenge. According to Climate Change: mitigation and adaptation, it can be found that the resulting score (1.06), corresponds to a value that represents a minimum increase of performance with to the minimum acceptable performance. A very low weighted score for the adaptation to the climatic action: heatwaves and increase of temperature and Adaptation to the climatic action: drought.

With regards to the Greenhouse gas emissions, it can be found that the greenhouse gas emissions from building operations are low and represent a best practice and low contribution to climate change. Also , the results showed that there are Climatic Threats such as the permeability of the land , in which the score represents a minimum increase of performance with to the minimum acceptable performance, this score as result of the percentage of vacant land within the neighborhood that allows water infiltration underground and reduces the stormwater runoff .

In terms of Governance and Public Buildings Operation sustainability, there are some notable positive findings. The aggregated annual operating energy cost per indoor useful floor area is excellent, indicating efficient energy management in public buildings. However, there is room for improvement in terms of recognized sustainability certifications for ongoing operations, as detailed in the critical issues section.

Critical issues identified:

The population density in the neighborhood is low due to the enforced limited number of floors per housing unit, which may prohibit more people from living in the area. The existing context shows a clear weakness in planning and utilizing nature in the neighborhood. There is a lack of green urban areas in relation to the neighborhood's total area. Furthermore, the ratio of green areas in relation to the neighborhood population is very low. There is only one park in the neighborhood, which is not accessible by all inhabitants. At the same time, the density of vegetation and green zones is also lower than the minimum required by national and international standards.

The total final electrical energy consumption for building operations (Residential/ Non-Residential is high due to low energy efficiency measures used in the neighborhood and excess use of electricity for different operational uses, including lighting, electrical devices, cooling, domestic hot water, and heating. Energy losses exacerbate this consumption through building envelopes.

The neighborhood lacks renewable measures, and most of the energy consumed in the neighborhood is from non-renewable measures. This result is attributed to the fact that there is a strict number of allowed systems per neighborhood from the by-laws of the government. Furthermore, systems such as photovoltaic cell systems are high in cost, and their application process is complicated, in addition to a lack of public awareness.

The C1 category of Water Infrastructure, the weighted score is 1.54, indicating moderate inadequacy. This suggests that there are deficiencies in the water infrastructure system in the area. The C3 category of Effluents Management also has a weighted score of 1.54, indicating considerable challenges in managing wastewater. This implies that there may be insufficient practices in place for treating and disposing of wastewater, leading to potential environmental and health risks.

In regard to water consumption, the data from the questionnaire analysis reveals that the majority of respondents (76.9%) consume bottled water, suggesting that tap water may not be safe or perceived to be safe. Moreover, the effluents management criterion has a weighted score of 1.54 out of 5, suggesting a low rating despite its 31% weight. This indicates that the current wastewater treatment and disposal practices are inadequate, posing potential environmental and health risks. Furthermore, the provided data shows that the average total water consumption per month in the Al-Nuzha district is 47.6 m3/3 months, which is not significantly high. However, the monthly water bill per quarter is

35.7 JD, indicating potential inefficiencies in the water pricing or billing system.

Overall, the analysis highlights the weaknesses in the water infrastructure of the Al-Nuzha district, particularly in water consumption and effluent management. These findings call for immediate attention and improvements in the water infrastructure to ensure the provision of safe and efficient water services in the area while mitigating environmental and health risks.re:

The primary management of Al-Nuzha district's water supply system lies with the Jordan Water Authority. The district receives water from both surface and groundwater sources, supplemented by imports from neighboring districts. However, various weaknesses inhibit the current infrastructure from meeting increasing demands. Also, the distribution network within Al-Nuzha district faces numerous challenges including aging pipelines, inadequate maintenance, and insufficient investment in infrastructure upgrades. These issues contribute to frequent leaks, bursts, and water losses that affect efficient water supply and lead to wastage. Consequently, they impact reliability and hinder substantial quantities of water reaching consumers.

Water treatment facilities are vital for ensuring top-quality drinking water within Al-Nuzha district; however, existing plants are outdated and lack capacity to effectively treat larger volumes of water required by an ever-growing population. As a consequence, compromised water quality poses significant health risks for residents.

Current storage infrastructure such as reservoirs and tanks proves inadequate in meeting rising demands within Al-Nuzha district; limited capacity paired with subpar maintenance exacerbates the problem further still leading to shortages during peak demand periods or emergencies disrupting regular supply.

*After testing SN tool for water category, normalized score of below minimum standard performance was resulted to criterion **C2.1** Total water consumption), and for criterion C2.4 Consumption of potable water in public offices and C2.6 Re-use of rainwater in residential buildings , their scores corresponds to minimum acceptable performance (minimum standard regulation or current practice).*

The following critical issues have been identified in the water infrastructure of Al-Nuzha district:

•Aging and Inefficient Distribution System:Deteriorating pipelines and insufficient maintenance contribute to frequent leaks, bursts, and losses that impede efficient water supply, erode reliability, and increase wastage.

•Outdated Water Treatment Facilities:With outdated facilities lacking sufficient capacity, compromised water quality presents potential health hazards for residents within Al-Nuzha district.

• Insufficient Water Storage Infrastructure:Inadequate capacity alongside inadequate maintenance leave Al-Nuzha district susceptible to water shortages during peak periods and vulnerable during emergencies or disruptions to regular supply.

The neighborhood faces challenges in effectively managing waste disposal and recycling. There are no convenient locations for residents and businesses to dispose of solid waste and recyclables, nor are there any in the neighborhood. As a result, a substantial amount of waste ends up in landfills or is burned, which is not good for the environment or for human health. The neighborhood needs a more efficient system for waste and recycling collection.

Although 9% of the neighborhood population uses electric vehicles, there is a lack of public electric charging stations in the neighborhood. The existing stations are only for fuel vehicles. While electric chargers are installed individually for users in their buildings.

The current neighborhood road planning, composition, and context don't allow for a distinguished bicycle network. Existing road widths can hardly absorb the high number of vehicles and traffic congestion. Furthermore, cultural and societal norms are a major restriction in this manner, especially for female users.

Although 89% of the roads in the neighborhood has dedicated sidewalk, the pedestrian network remains weak. sidewalks are fragmented, cracked, and have a lot of barriers that prohibit users from using them properly. There is no distinguished pedestrian or car-free zone due to cultural and societal norms. The cyclomatic complexity of the street network is within its minimum acceptable performance for road connectivity and spatial accessibility.

Most existing buildings lack proper accessibility for People With Disabilities (PWD), primarily due to the high costs and legislative challenges associated with retrofitting for inclusion. However, the construction of new buildings is increasingly incorporating inclusive infrastructure due to enforcement measures.

The most housing options available in the neighborhood are single and multi-family units, often resulting in affordability challenges for local residents. Furthermore, the absence of affordable housing units and the lack of rent control policies exacerbate the affordability issue within this context.

The public and private facilities and services in the neighborhood have some deficiencies. A significant issue is that the nearby primary school does not serve all age groups, requiring some students to take transportation to school because it is not within walking distance of their houses. Additionally, playgrounds and other infrastructure are difficult to find. These issues indicate that the neighborhood lacks amenities that are essential for social cohesion and quality of life.

At the secondary education level in Jordan (grades 11 and 12), there are notable weaknesses. As the attendance is not mandatory, leading to a significant dropout rate among students. This issue is worsened by cultural norms and economic constraints, making it difficult for many students to complete their secondary education.

From a social inclusion perspective, the neighborhood has two significant problems. First, many households spend more than 10% of their income on energy bills, which includes electricity and heating. This burdens these households financially and makes it difficult for them to afford other necessities.

Second, a small portion of the neighborhood's population is at risk of poverty or exclusion because they earn less than 60% of the national median income. This means some people in the neighborhood are struggling financially, which can lead to social exclusion and limit their access to opportunities. These issues highlight the neighborhood's challenges in ensuring everyone is included and has a fair chance at a good quality of life.

Regarding safety, the neighborhood faces two significant problems. First, there aren't enough police officers, with less than 1 for every 1000 residents. This could make it harder to respond quickly to safety issues.

Second, there's also a shortage of fire fighting services, as there is no fire station in the neighborhood. This lack of resources raises concerns about the neighborhood's ability to deal with fires and keep everyone safe. These issues highlight the neighborhood's safety and security challenges and the need to adopt better safety measures.

From a perceptual perspective, the neighborhood faces multiple weaknesses that affect how residents perceive their surroundings. One critical issue is the absence of safe pedestrian routes, which can make walking and commuting hazardous. Additionally, the presence of obstacles, such as obstructions or poorly maintained ways, further hinders safe and convenient movement within the neighborhood. The lack of maintenance in public spaces contributes to an overall sense of discomfort. Moreover, the limited awareness and follow-up regarding safety measures worsen these problems. Collectively, these factors create a perception of insecurity and inconvenience among residents *(especially People With Disabilities), impacting their overall quality of life and comfort in the neighborhood.*

For criterion regarding the Adaptation to the climatic action: drought all selected criterion got normalized score that represents a, minimum accepted performance of zero, and need to be improved for higher is better for the criterion , an infrastructure needed for both rainwater harvesting used in non-potable uses in the neighborhood and to collect from surfaces for non-potable water use. In addition, the construction infrastructure for green roofs need to be addressed , because there is no availability of green roofs in the Al Nuzha neighborhood.

Moreover, under minimum acceptable performance was resulted in the albedo with score value of (-1) , this is as result of the majority of dark surfaces existing in Al Nuzha neighborhood streets that are made usually out of asphalt and high areas of solar absorptive construction surfaces.

In terms of the public buildings sustainability, there is a notable weakness concerning sustainability practices. A significant portion of public buildings lacks recognized sustainability certifications for their ongoing operations. What compounds this issue is the absence of a dedicated implementation and monitoring body, along with recruitment challenges. Without a structured approach to sustainability and a designated authority to oversee and enforce it, the neighborhood faces difficulties in achieving environmental operations within its public buildings.

Recommendations to tackle the critical issues identified

In order to manage the existing urban context efficiently, planning decisions and policies may focus on increasing population density by promoting medium-rise development while limiting urban sprawl. Allowing users to add extra floors to their buildings is a sustainable measure that can enhance environmental, economic, and social sustainability through concentrating population and economic services in the urban area and lowering their ecological footprint. This measure is also important for green urban spaces and vegetation. Limiting sprawl can allow municipal authorities to develop a more inclusive and sustainable green network by utilizing the existing vacant lands, which will increase the availability and density of vegetation and green public spaces and improve the health and well-being of residents.

Ensuring efficient energy consumption is a key measure of sustainability. This could be achieved through various actions that lower consumption and limit energy losses. Public awareness is a significant factor in this regard; building envelope retrofits (i.e., cool roofs, internal and external insulation, enhancing glazing surfaces, and adding vegetation elements) should be encouraged and implemented at a building scale for the existing buildings. Users who accept those measures and implement them at their homes and workplaces can collectively reach this goal on a neighborhood scale.

It is also important to enforce laws or policies that can:

Govern the building process and inspect insulations properly for new building stock.

Manage and encourage the utilization of nature-based solutions, including green roofs, facades, and trees, to limit heat gain, especially during the hot season.

Encourage the utilization of non-renewable measures and remove the existing barriers: cost, complicated insulation, and public awareness.

Clean Water and regular sanitation needed. Although the connection to the water network is available and accessible in most areas, piped water is undrinkable. Thus, AlNuzha residents tend to buy filtered water. Also, the pipes are old and need maintenance. Additionally, in summer, Irbid residents suffer from water shortage. Moreover, ongoing projects with allocated budgets are needed in order to improve the existing water network and connect residential areas. A drainage network is needed while some urban areas in Irbid suffer from flooding due to the lack of which negatively impacts the residents. below are the highly recommended issues that has to be developed in order to tackle the main critical issues in the existing situation of water infrastructure , such as :

-The water network need maintenance and to upgraded

- The sewerage network to be upgraded

- Improve water supply

-Sanitation network need regular maintenance.

-efficient Distribution System:

-Water Treatment Facilities

-Sufficient Water Storage Infrastructure

Water Weaknesses in Al Nuzha are mainly within the water supply system, distribution network, treatment facilities, and storage infrastructure which compromise the reliability, quality, and availability of water for residents. Urgent investments and upgrades are required to address these critical weaknesses adequately. As well, to promote the utilization of rainwater and encourage its adoption among the populace, while simultaneously establishing measures to reduce water consumption, including the effective utilization of treated wastewater. By doing so, a sustainable and efficient provision of safe water can meet the growing demands of Al-Nuzha district effectively. In terms of improved water sources, more than 98% of the total population is covered. However, only 93% of them have access to a safely-managed supply, and 86% can avail piped networks. Urban regions receive water supplies weekly, while rural areas get them less than two weeks, with further reduction in frequency during the summer season. The percentage of sanitation systems meeting safety norms amounts to only 77.3% and schools that have basic sanitation cover only a third of the total figures.

In regards to solid waste operations category, it is recommended to develop infrastructure to hold intermediate solid waste collection points in neighborhoods in between public buildings, in order to lower walking distance between public buildings and solid waste collection points to 100 meters and below, and reach minimum standard performance requirements.in addition, increasing inhabitants awareness on solid waste separation and recycling is highly recommended

F - Transportation and mobility

While there is a tendency for the world to increase the number of electric vehicles to combat climate change, the authorities need to integrate electric charging stations near the *neighborhood and within the existing fuel stations to enhance their accessibility.*

Road networks should be re-designed to facilitate pedestrian-bicycle movement without interfering with vehicles on the road. The development of enhanced public transportation modes and reducing the number of cars in the street can greatly influence this manner. Furthermore, policies should encourage car-free zones and public spaces and enhance pedestrian movement and social interaction to enhance the health and well-being of residents.

Regarding the social and cultural category, it is advised that minimum inclusion construction regulations and disability-related codes be applied strictly to newly constructed public buildings, and that infrastructure development plans for already-existing public buildings be gradually implemented to comply with the minimum requirements for inclusion and accessibility for people with disabilities.

To enhance housing affordability in the neighborhood, it's essential to focus on several actions. First, to promote the construction of affordable housing units through collaborations with nonprofits, offering incentives for inclusion in projects. In addition, advocate for rent control policies and enforce tenant protections to ensure stable and fair renting conditions. Furthermore, support prospective homeowners with down payment assistance and tax incentives.

It is highly recommended that one or more primary schools be established in close proximity to all residents in order to address the deficiencies in public and private facilities and services within the neighborhood. These deficiencies include the lack of a comprehensive primary school and easily accessible recreational areas. In order to guarantee accessibility for all children, it is also advisable to make sure that these schools are close to necessary amenities like public parks.

Enrollment and dropout rates in secondary schools are important issues that need to be addressed so everyone can get high-quality education. iIt is recommended to collect and analyze a lot of data at the local or regional level. By finding schools or areas with a lot of dropouts and looking into things like poverty, location, gender inequality, the underlying causes and trends should be identified in order to find more actionable solutions.

To address the challenges related to energy poverty of households and population at risk of poverty in the neighborhood, recommendations include implementing energy efficiency programs and providing subsidies for households spending over 10% of their income on energy bills. These measures aim to ease the financial burden imposed by high energy costs. Additionally, local economic development initiatives and job training programs should be promoted to elevate income levels for individuals at risk of poverty or exclusion, thereby fostering social inclusion and improving access to opportunities.

To address the safety concerns in the neighborhood, it is crucial to allocate additional resources. It is recommended to increase the number of police officers to a level that ensures a better officer-to-resident ratio, as this would enhance the ability to respond promptly to safety issues. Additionally, establishing a fire station within the neighborhood or implementing a rapid response plan in collaboration with nearby stations is essential to mitigate fire-related risks effectively.

To enhance the neighborhood's perceptual quality and safety, it is recommended to give a special attention to the pedestrian infrastructure improvements. Creating well-marked, safe pedestrian routes with proper lighting and accessibility features will not only encourage walking but also contribute to a positive perception of the area and enhance its safety.

H - Economy (non critical)

I - Climate Change:mitigation and adaptation

Climate change perspectives should also be integrated in solid waste and wastewater policies, strategies and action plans.Also, Access to national and international financing for low carbon energy and environmental technology should be enhanced, as well as promote technology transfer of mitigation in Jordan. For instanceGreywater systems should be enforced by jordanian laws and legislations.

In order to address the challenges that are faced by the Adaptation to the climatic action ,it is highly recommended to improve the rainwater collection and storage from buildings for non-potable uses , rainwater collection and storage from outdoor areas , and grey Water collection in buildings for non-potable uses,these indicators should be improved for higher is better. Climatic and environmental interventions needed like improvement of road infrastructure and installation of a connection to the storm-water drainage system needed to be addressed for Nuzha district. In addition to the adoption of green roofs in order to reduce air pollution and greenhouse gas emissions.

To address the sustainability gaps in public buildings, it is recommended to establish a dedicated sustainability implementation and monitoring body to manage the certification process. This body can work to identify eligible buildings, facilitate the certification process, and ensure ongoing compliance with sustainability standards

1. At the building scale (SBTool)

Public Buildings

Criteria with low performance: (Score from -1 to -0.1)

Code	Criterion	Score ranking	Description of the results
B1.1	*Primary energy consumption*	-1.00	*Excessive use of electrical appliance or inefficient/ outdated electrical devices in the public buildings*
B1.2	*Delivered thermal energy consumption*	-1.00	*High thermal energy consumption per internal useful area per year compared to the minimum acceptable performance.*
B1.3	*Delivered electrical energy consumption*	-1.00	*no energy efficiency measures applied on building envelopes windows or doors*
B1.4	*Energy from renewable sources in total thermal energy consumption*	-1.00	*Lack of renewable energy resources on-site and high dependency of nonrenewable energy resources for thermal energy*
B1.6	*Embodied non-renewable primary energy*	-1.00	*High embodied energy in construction materials due to the extraction of raw materials and the production of new materials.*
B2.1	*Electrical peak demand for building operations.*	-1.00	*Excess use of electrical energy due to lack of energy efficiency measures*
B3.4	*Recycled materials*	-1.00	*lack of utilization of recycled materials in the building and renovation processes*
B4.4	*Potable water consumption for irrigation*	-1.00	*Only potable water is used for irrigation if available.*
H1.2	*Heat island effect*	-1.00	*Lack of reflective surfaces and increased use of solar absorbent that increases the risk of urban heat island effect*
H1.3	*Shading of building envelope by vegetation*	-1.00	*Lack of use of vegetation elements on West and South-East facades that leads to increased energy consumption, especially during hot seasons.*
C1.2	*GHG gas emissions during operation*	-1.00	*High total GHG emissions from building operations, indicator's performance ranks below the minimum acceptable performance*

Criteria with minimum acceptable performance: (Score from 0 to 1)

Code	*Criterion*	*Score ranking*	*Description of the results*
A2.1	*Use of native plantings*	*0.00*	*Lack of native vegetation elements surrounding the building*
C3.2	*Solid waste from building operations*	0.00	*The building is not located within 100 meters walking distance from solid waste collection point*
F1.1	*Universal access on-site and within the building.*	0.00	*Lack of accessibility measures for persons with disabilities in the building*
H2.2	*Permeability of land*	0.00	*High use of impermeable surfaces around the building which lowers infiltration rates and increases the stormwater runoff*
H4.2	*Capacity of greywater collection and storage for non-potable uses*	0.00	*No utilization of greywater collection and treatment measures in the selected buildings*
B1.5	*Energy from renewable sources in total electrical energy consumption*	0.44	*Very low utilization of renewable resources to generate electrical energy and higher dependency on non-renewable resources*
C1.1	*Embodied carbon*	0.56	*Use of construction materials with high embodied carbon*
D1.7	*Ventilation*	0.83	*Ventilation rates in relation to the indoor thermal comfort corresponds slightly higher than the minimum acceptable performance*

Criteria with minimum acceptable performance: (Score from 1.1 to 5)

Code	*Criterion*	*Score ranking*	*Description of the results*
G1.4	*Energy cost*	1.33	*relatively high energy cost per useful internal floor area, due to high consumption in relatively small public services areas.*
D2.3	*Thermal comfort index*	*1.5*	*an indicator of slight increase over minimum acceptable performance due to lack of proper ventilation and insulation*

E1.2	*Smart readiness indicator*	*1.67*	*limited availability of smart readiness of buildings for responding to the needs of occupants, through control devices and systems.*
D1.2	*TVOC concentration*	*2.5*	*substantial increase of performance with minimum acceptable performance for TVOC concentration*
D3.1	*Daylight*	*2.5*	*substantial increase of performance with minimum acceptable performance for daylight admittance inside all primary occupied spaces in public buildings.*
D3.2	*Daylight Provision*	*2.5*	*substantial increase of performance with minimum acceptable performance for daylight level provision inside all primary occupied spaces in public buildings.*
F2.1	*View out*	2.5	*The score represents the best practice performance for a visual connection with surroundings in public buildings.*
A1.2	*Proximity of site to public transportation*	2.62	*Accessibility to transportation (walking index) represents best practice*
D1.6	*Relative humidity*	*3.33*	*Relative humidity value corresponds to an improvement towards the best practice*
D1.3	*CO2 concentrations*	*3.64*	*CO2 concentration corresponds to an improvement towards the best practice*
A1.4	*Proximity to key services*	*3.69*	*Accessibility to key services (average distance from key services and public building) represents best practice.*
F1.2	*Exposure to sunlight*	*3.75*	*correspondence to an improvement towards the best practice levels in which principal daytime living areas of dwelling units in the building have direct sunlight*
B3.5	*Local materials*	5	*an efficient use of local materials in building and renovation processes and lower dependency on imported materials*
B4.2	*Total water consumption*	*5*	*excellence and ideal performance score for total water resources consumption score represents a substantial increase of performance to the minimum acceptable performance for visual connection with surroundings in public buildings in public buildings*
B4.3	*Potable water consumption for indoor uses.*	*5*	*excellence and ideal performance score for potable water consumption inside public buildings per year*

Residential Buildings

Criteria with low performance: (Score from -1 to -0.1)

Code	*Criterion*	*Score ranking*	*Description of the results*
B1.6	*Embodied non-renewable primary energy*	*-1.00*	*High embodied energy in construction materials due to the extraction of raw materials and the production of new materials.*
B2.1	*Electrical peak demand for building operations.*	-1.00	*Excess use of electrical energy due to lack of energy efficiency measures*
B3.4	*Recycled materials*	*-1.00*	*lack of utilization of recycled materials in the building and renovation processes*
B4.2	*Total water consumption*	*-1.00*	*Excess consumption of water resources in the building*
B4.4	*Potable water consumption for irrigation*	*-1.00*	*Only potable water is used for irrigation if available*
H1.2	*Heat island effect*	*-1.00*	*Lack of reflective surfaces and increased use of solar absorbent that increase the risk of Urban Heat Island effect*
H1.3	*Shading of building envelope by vegetation*	*-1.00*	*Lack of use of vegetation elements on West and South-East facades that leads to increased energy consumption, especially during hot seasons.*

Criteria with minimum acceptable performance: (Score from 0 to 1)

Code	*Criterion*	*Score ranking*	*Description of the results*

H2.2	*Permeability of land*	*0.00*	*High use of impermeable surfaces around the building which lowers infiltration rates and increases the stormwater runoff*
H4.2	*Capacity of greywater collection and storage for non-potable uses*	0.00	*No utilization of greywater collection and treatment measures in the selected buildings*
C3.2	*Solid waste from building operations*	0.00	*The building is not located within 100 meters walking distance from solid waste collection point*
F1.1	*Universal access on-site and within the building.*	0.00	*Lack of using accessibility measures for persons with disabilities in the building*
A2.1	*Use of native plantings*	0.00	*Lack of native vegetation elements surrounding the building*
B4.3	*Potable water consumption for indoor uses.*	0.14	*An increased potable water consumption which shows inefficiency in using water resources*
B1.4	*Energy from renewable sources in total thermal energy consumption*	0.31	*No renewable resources existing on building and full dependency on none-renewables for thermal energy consumption*
B1.5	*Energy from renewable sources in total electrical energy consumption*	0.44	*Very low utilization of renewable resources to generate electrical energy and higher dependency on non-renewable resources*
C1.1	*Embodied carbon*	*0.56*	*Use of construction materials with high embodied carbon*
D1.7	*Ventilation*	*0.83*	*Ventilation rates in relation to the indoor thermal comfort corresponds slightly higher than the minimum acceptable performance*

Criteria with minimum acceptable performance: (Score from 1.1 to 5)

Code	*Criterion*	*Score ranking*	*Description of the results*
B1.2	*Delivered thermal energy consumption*	1.33	*Thermal energy consumption per internal useful area per year represents a minimum increase of performance with regards to the minimum acceptable performance.*
D1.6	*Relative humidity*	*1.67*	*Relative humidity value corresponds to an improvement towards the best practice*
D1.2	*TVOC concentration*	*2.5*	*substantial increase of performance with minimum acceptable performance for TVOC concentration*
D3.1	*Daylight*	2.50	*The score represents a substantial increase of performance with minimum acceptable performance for visual connection with surroundings in residential buildings.*
D3.2	*Daylight Provision*	2.50	*substantial increase of performance with minimum acceptable performance for daylight level provision inside all primary occupied spaces in residential buildings.*
A1.2	*Proximity of site to public transportation*	2.62	*accessibility to transportation (walking index) represents best practice*
F1.2	*Exposure to sunlight*	3.18	*correspondence to an improvement towards the best practice levels in which principal daytime living areas of dwelling units in the building have direct sunlight*
E1.2	*Smart readiness indicator*	3.33	*best practice smart readiness of buildings for responding to the needs of occupants, through control devices and systems.*
F2.1	*View out*	3.50	*The score represents the best practice performance for a visual connection with surroundings in residential buildings.*

A1.4	*Proximity to key services*	3.69	*accessibility to key services (average distance from key services and public building) represents best practice.*
D2.3	*Thermal comfort index*	*4*	*Ideal performance of thermal comfort indicator*
D1.3	*CO2 concentrations*	*4.09*	*CO2 concentration corresponds to the best practice*
B1.1	*Primary energy consumption*	5.00	*ideal performance of primary energy consumption per useful internal floor area per year*
G1.4	*Energy cost*	5.00	*ideal performance of energy cost per useful internal floor area*
B3.5	*Local materials*	5.00	*an efficient use of local materials in building and renovation processes and lower dependency on imported materials*
B1.3	*Delivered electrical energy consumption*	5	*Low electrical energy consumption corresponding to the best practice*
C1.2	*GHG gas emissions during operation*	*5*	*Low GHG emissions during operations corresponding to the best practice*

Main findings of the assessment:

Public buildings

In regards to Site regeneration and development, urban design, and infrastructure category, it was found that public buildings achieved best practice walking index and distance for both accessibility to transportation and key services, and appropriate proximity of public building sites to available public transportation routes and key services locations.

On the other hand, the use of native planting was a critical issue, and explained in the critical issue's summary.

In regards to Energy and resources consumption category, it was found that best practice and full score is achieved in an efficient use of local materials in all public buildings and renovation processes with lower dependency on imported materials.

However, the use of recyclable materials in public building construction was found to be critical, and explained in the critical issue's summary.

In addition, Total water consumption and total potable water consumption amounts in public buildings were found to achieve excellence and ideal performance score, and substantial increase of performance to the minimum acceptable performance for total water consumption in public buildings. Nevertheless, the use of potable water in irrigation was a critical issue, and explained in the critical issue's summary.

On the other hand, all Energy related performance indicators of public buildings had critical issues and were explained in the critical issue's summary.

In regards to environmental loadings for public buildings category, operations of solid waste were found to be a critical issue, and explained in the critical issue's summary.

In regards to Indoor environmental quality category, substantial increase of performance with minimum acceptable performance for daylight admittance and daylight level provision was found inside all primary occupied spaces in public buildings.

In regards to service quality category, it was found that smart readiness of buildings for responding to the needs of occupants, through control devices and systems, was limited in public buildings, but available for improvement and reaching near best practice standards.

In regards to Social, cultural and perceptual for public buildings, it was found that best practice performance for visual connection with surroundings, and best practice levels in which principal daytime useful areas having direct sunlight were achieved in public buildings.

On the other hand, Universal access on-site and within public buildings was a critical issue, and explained in the critical issue's summary.

In regards to Cost and economic aspects for public buildings, it was standard energy cost inside public buildings, and achieved relatively high energy cost per useful internal floor area, due to high consumption in relatively small public services areas.

In regards to Adaptation to climate change for public buildings category, heat island effect and land properties were found as critical issue, and explained in the critical issue's summary.

Residential buildings

In regards to Site regeneration and development, urban design, and infrastructure category, it was found that residential buildings achieved best practice walking index and distance for both accessibility to transportation and key services, and appropriate proximity of residential building sites to available public transportation routes and key services locations.

On the other hand, the use of native planting was a critical issue, and explained in the critical issue's summary.

In regards to Energy and resources consumption category, it was found that best practice and full score is achieved in an efficient use of local materials in all residential buildings and renovation processes with lower dependency on imported materials.

However, the use of recyclable materials in residential building construction was found to be critical, and explained in the critical issue's summary.

In addition, Thermal energy consumption per internal useful area per year represents a minimum increase of performance with regards to the minimum acceptable performance in residential buildings. Nonetheless, all other Energy related performance indicators of residential buildings had critical issues and were explained in the critical issue's summary.

On the other hand, Total water consumption and total potable water consumption amounts in residential buildings, and irrigation were found to be critical issues, and were explained in the critical issue's summary.

In regards to environmental loadings for residential buildings category, operations of solid waste were found to be a critical issue, and explained in the critical issue's summary.

In regards to Indoor environmental quality category, substantial increase of performance with minimum acceptable performance for daylight admittance and daylight level provision was found inside all primary occupied spaces in residential buildings.

In regards to service quality category, it was found that residential buildings achieved best practice smart readiness for responding to the needs of occupants, through control devices and systems.

In regards to Social, cultural and perceptual for residential buildings, it was found that best practice performance for visual connection with surroundings, and best practice levels in which principal daytime useful areas having direct sunlight were achieved in residential buildings.

On the other hand, Universal access on-site and within residential buildings was a critical issue, and explained in the critical issue's summary.

In regards to Cost and economic aspects for public buildings, ideal performance and full score of energy cost per useful internal floor area was achieved for residential buildings.

In regards to Adaptation to climate change for residential buildings category, heat island effect and land properties were found as critical issue, and explained in the critical issue's summary.

Critical issues identified:

Public buildings

In regards to Use of Land and biodiversity criteria, one of the critical issues was the Lack of native vegetation elements surrounding public buildings.

In regards to Energy use and consumption in public buildings, some of the critical issues were related to none efficient electrical appliances, or outdated devices used in public buildings, consuming more primary energy in public building operations, in addition to high electrical peak demand.

In addition, both delivered thermal and electrical energy consumption per internal useful floor areas of public buildings were very high when compared to the minimum acceptable performance.

It is also found that delivered electrical energy consumption in public buildings was very high due to lack of building envelope energy efficiency measures *applications, and disregarding the minimum energy efficient building code requirements in the construction of the public building.*

Furthermore, utilization of renewable energy resources in public buildings was very low in generating energy, and most dependence was on non-renewable energy resources from the grid. This also affects the high dependence on thermal energy as a non-renewable energy resource in public buildings.

It was also found that the embodied energy in construction materials is relatively high, depending on extraction of raw materials and new ones, making it a critical issue to tackle.

In regards to recyclable materials category, one of the critical issues were related to lack of utilization of recycled materials in the public building and renovation processes, due to poor related infrastructure on both the construction and neighborhood level.

In regards to the water category, one of the critical issues were related to the consumption of only potable water for irrigation process (if available) in public building, without any use of greywater, rainwater harvesting, or recycled non-potable water for irrigation, which increases the consumption of potable water above minimum related standards.

In regards to solid waste operations category, one of the critical issues was the high distance between public buildings locations in relation to solid waste collection points, were it exceeds 100 meters walking distance, and therefore not adhering with the minimum standard performance requirements.

In regards to social and cultural category, one of the critical issues was related to Lack of using accessibility measures for persons with disabilities in public buildings, and not adhering with minimum inclusion construction regulations and codes related to disability.

In regards to the adaptation to climate change category, some of the critical issues are related to Lack of reflective surfaces and vegetation elements in public building projects and surrounding surfaces, which leads to increased solar absorption, increased energy consumption, and increased risk of urban heat Island effect.

In addition, one of the critical issues is related to High use of impermeable surfaces around public buildings which lowers infiltration rates and increases the *stormwater runoff.*

Another critical issue is related to greywater collection and storage uses, where it is not used at all in public building applications, due to lack of enforcement, or application legislations, and high cost of related infrastructure.

However, for public buildings, the categories of Services quality, and Cost and economics aspects, have NO critical issues.

Residential buildings

In regards to Use of Land and biodiversity criteria, one of the critical issues was the Lack of native vegetation elements surrounding residential buildings.

In regards to Energy use and consumption in residential buildings, some of the critical issues were related to delivered electrical energy consumption in residential buildings which was very high due to lack of building envelope energy efficiency measures applications, and disregarding the minimum energy efficient building code requirements in the construction of the residential building.

In addition, utilization of renewable energy resources in residential buildings was very low in generating energy, and most dependence was on non-renewable energy resources from the grid. This also effects the high dependence on thermal energy as a non-renewable energy resource in residential buildings.

Furthermore, some of the critical issues were related to none efficient electrical appliances, or outdated devices used in residential buildings, resulting of high electrical peak demand.

It was also found that the embodied energy in construction materials is relatively high, depending on extraction of raw materials and new ones, making it a critical issue to tackle.

In regards to recyclable materials category, one of the critical issues were related to lack of utilization of recycled materials in the residential buildings and renovation processes, due to poor related infrastructure on both the construction and neighborhood level.

In regards to the water category, one of the critical issues were related to the total water consumption inside residential buildings where it exceeds the minimum standard performance of total water consumption per occupant.

In addition, an increase in potable water consumption use inside residential building was found due to inefficiency in using water resources

Furthermore, one of the critical issues were related to the consumption of only potable water for irrigation process (if available) in residential buildings, without any use of greywater, rainwater harvesting, or recycled non-potable water for irrigation, which increases the consumption of potable water above minimum related standards.

In regards to solid waste operations category, one of the critical issues was the high distance between residential buildings locations in relation to solid waste collection points, were it exceeds 100 meters walking distance, and therefore not adhering with the minimum standard performance requirements.

In regards to social and cultural category, one of the critical issues was related to Lack of using accessibility measures for persons with disabilities in residential buildings, and not adhering with minimum inclusion construction regulations and codes related to disability.

In regards to the adaptation to climate change category, some of the critical issues are related to Lack of reflective surfaces and vegetation elements in residential building projects and surrounding surfaces, which leads to increased solar absorption, increased energy consumption, and increased risk of urban heat Island effect.

In addition, one of the critical issues is related to High use of impermeable surfaces around residential buildings which lowers infiltration rates and increases the stormwater runoff.

Another critical issue is related to greywater collection and storage uses, where it is not used at all in residential building applications, due to lack of enforcement, or application legislations, and high cost of related infrastructure.

However, for residential buildings, the categories of Services quality, and Cost and economics aspects, have NO critical issues.

Recommendations to tackle the critical issues identified

Public buildings

In regards to Use of Land and biodiversity criteria, it is recommended to increase the vegetation elements surrounding public buildings with native plants in most of the public building surrounding space surfaces and integrating vegetation with the land design around the building.

In regards to Energy use and consumption in public buildings, it is recommended to derive legislations and standards for purchase and use of only appliances and devices with minimum energy performance levels in new public buildings or in any updated systems in existing public buildings, in order to lower primary energy consumption, and minimize electrical peak demand in public building operations.

In addition, it is recommended to find new sources for onsite electrical energy sources or use of renewable thermal energy sources such as solar water heating systems in public buildings, in order to lower delivered thermal and electrical energy consumption per internal useful floor areas. To reach of minimum acceptable performance in public buildings.

In order to lower delivered electrical energy consumption in public buildings, It is highly recommended to adhere to the minimum energy efficient building code requirements in the construction of new public buildings, or update and retrofit windows, doors and thermal insulation accordingly in existing buildings, in relation to cost efficiency and application possibility.

Furthermore, it is recommended to develop legislations, subsidies and incentive programs and schemes to encourage the use of renewable energy sources for public buildings, and increase utilization of renewable thermal and energy resources in generating energy, and lower dependence was on non-renewable energy resources from the grid in public buildings.

It is also recommended to lower the embodied energy in construction materials by using recycled content construction materials such as recycled aggregates, recycled content aluminum and ceramics in order to lower the embodied energy and reach the appropriate standard practice score.

In regards to recyclable materials category, it is highly recommended to develop legislations and incentives schemes related to utilization of recycled materials in the public building and renovation processes.

In regards to the water category, it is highly recommended to develop infrastructure for collecting rainwater and use of non-potable water systems in public buildings, in order to lower the consumption of potable water in irrigation.

In regards to solid waste operations category, it is recommended to develop infrastructure to hold intermediate solid waste collection points in neighborhoods in between public buildings, in order to lower walking distance between public buildings and solid waste collection points to 100 meters and below, and reach minimum standard performance requirements.

In regards to social and cultural category, it is recommended to enforce the application of minimum inclusion construction regulations and codes related to disability in new public buildings, and gradually apply infrastructure development plans for existing public buildings to adhere with minimum requirements for inclusion and disability access.

In regards to the adaptation to climate change category, it is highly recommended to retrofit exposed surfaces to adhere with minimum Solar reflectance Index values, and include vegetated shaded spaces in the surrounding surfaces of public building projects, in order to lower urban heat island effects and lower energy consumption in public buildings.

In addition, it is recommended to increase use of permeable surfaces instead of impermeable surfaces around public buildings in order to increase water infiltration rates and decrease stormwater runoff.

Furthermore, it is recommended to develop enforcement legislations and gradual application instructions to increase the possibility of applying gray water systems in new public building non-potable water uses.

Residential buildings

In regards to Use of Land and biodiversity criteria, it is recommended to increase the vegetation elements surrounding residential buildings with native plants in most of the setbacks and integrating vegetation with the land design around the residential building.

In regards to Energy use and consumption in residential buildings, In order to lower delivered electrical energy consumption in residential buildings, It is highly recommended to adhere to the minimum energy efficient building code requirements in the construction of new residential buildings, or update and retrofit windows, doors and thermal insulation accordingly in existing buildings, in relation to cost efficiency and application possibility.

In addition, it is recommended to develop legislations, subsidies and incentive programs and schemes to encourage the use of renewable energy sources for residential buildings, and increase utilization of renewable thermal and energy resources in generating energy, and lower dependence was on non-renewable energy resources from the grid in residential buildings.

Furthermore, it is recommended to derive legislations and standards for purchase and use of only appliances and devices with minimum energy performance levels in new residential buildings or in any updated systems in existing residential buildings, in order to minimize electrical peak demand in residential building operations.

It is also recommended to lower the embodied energy in construction materials by using recycled content construction materials such as recycled aggregates, recycled content aluminum and ceramics in order to lower the embodied energy and reach the appropriate standard practice score.

In regards to recyclable materials category, it is highly recommended to develop legislations and incentives schemes related to utilization of recycled materials in the residential buildings and renovation processes.

In regards to the water category, it is highly recommended to update water saving fixures and increase awareness for residential building occupants, In order to lower total water consumption per occupant inside residential buildings.

In addition, it is recommended to effectively manage water resources use inside residential buildings to lower dependence on potable water indoors.

Furthermore, it is highly recommended to develop infrastructure for collecting rainwater and use of non-potable water systems in residential buildings, in order to lower the consumption of potable water in irrigation.

In regards to solid waste operations category, it is recommended to develop infrastructure to hold intermediate solid waste collection points in neighborhoods in between residential buildings, in order to lower walking distance between residential buildings and solid waste collection points to 100 meters and below, and reach minimum standard performance requirements.

In regards to social and cultural category, it is recommended to enforce the application of minimum inclusion construction regulations and codes related to disability in new residential buildings, and gradually apply infrastructure development plans for existing residential buildings to adhere with minimum requirements for inclusion and disability access.

In regards to the adaptation to climate change category, it is highly recommended to retrofit exposed surfaces to adhere with minimum Solar reflectance Index values, and include vegetated shaded spaces in the surrounding surfaces of residential building projects, in order to lower urban heat island effects and lower energy consumption in residential buildings.

In addition, it is recommended to increase use of permeable surfaces instead of impermeable surfaces around residential buildings in order to increase water infiltration rates and decrease stormwater runoff.

Furthermore, it is recommended to develop enforcement legislations and gradual application instructions to increase the possibility of applying gray water systems in new residential building non-potable water uses.

3/ MOUKHTARA : Summary Report

1. At the neighbourhood scale (SNTool):

Criteria with low performance: (Score from -1 to -0.1)

Code	Criterion	Score ranking	Description of the results
A2.3	*Green Area Accessibility*	-1	*There is no public garden accessible by the inhabitants of Moukhtara*
B2.1	Total final thermal energy consumption for building operations	-1	*The main thermal energy sources are boiler using diesel oil with high consumption since Moukhtara is 850 meters above sea level.*
B2.6	Total final electric energy consumption for public office/ educational building operations	-1	*The municipality as the only public office in Moukhtara is relying on energy from fossil fuel*
B2.7	Total primary energy demand for building operation	-1	*The primary energy demand is based on the thermal demand which is high and the electricity demand which is high since most of the houses rely on old appliances due to the economic crisis and didn't upgrade their electrical appliances to class A*
B2.10	Energy consumption of public lighting	-1	*The streetlights in Moukhtara are of high consumption type and not LED energy efficient type*
B3.1	Share of renewable energy on-site, relative to total final thermal energy consumption for building operations	-1	*Even though 78% of the houses uses solar water heaters to heat water, the majority of the houses in Moukhtara rely on diesel boiler for thermal energy to heat the houses*
B3.5	Share of renewable energy on-site, relative to total final electric energy consumption for residential building operations	-1	*Only 37% of the houses in Moukhtara are equipped with solar systems while the remaining houses rely on thermal energy generated by the public utility or diesel generators*
B3.7	Share of renewable energy on-site, relative to total primary energy consumption for building operations	-1	All the buildings in Moukhtara are residential buildings there is no industrial or commercial buildings, small

			shops are not equipped with RE system
B3.8	Share of renewable energy on-site, relative to total primary energy consumption for residential building operations	-1	*The houses equipped with RE system to cover both their solar and thermal energy is low.*
D2.2	Access to solid waste and recyclingcollection points	-1	*The recycling facility is beyond the 400 meters set in the indicator*
F1.1	Performance of the public transport system	-1	*Ther is no public transport benefiting specifically Moukhtara*
F2.3	Bicycle network	-1	*Ther is no specific path associated by the public of transportation to cycling purposes in Moukhtara*
I1.1	Greenhouse gas emissions	-1	*The greenhouse gas emissions are calculated based on a coefficient factor related to the electricity energy generated in Lebanon from thermal power plant and based on studies by UNDP and Worl Bank. The electricity consumed per person is acceptable due to shortage of electricity, the benchmark are modified to reflect better the country condition*
I1.2	Greenhouse gas emissions fromresidential buildings	-1	*The houses in Moukhtara are mostly traditional old buildings built before the recycling good practices are being applied.*

Criteria with minimum acceptable performance: (Score from 0 to 1)

Code	Criterion	Score ranking	Description of the results
B3.4	Share of renewable energy on-site, relative to final electric energy consumption	*0.43*	*This is related to B3.5, however since the school is equipped with solar systems it increased the performance of this indicator*
D2.1	Access to solid waste and recycling collection points	*0.75*	*The number of solid waste bins compared to the length of street is found acceptable therefore this indicator is ranged acceptable.*
C2.4	Consumption of potable water in public offices	*0*	*This is calculated based on the consumption of bottled water by the municipality employees.*

Criteria with minimum acceptable performance: (Score from 1.1 to 5)

Code	Criterion	Score ranking	Description of the results
A2.1	*Availability of green urban areas*	*5*	*More than 70% of Moukhtara is agricultural lands*
A2.2	*Green areas in relation to the neighborhood population*	*5*	*More than 70% of Moukhtara is agricultural land*
B1.1	Access to electrical service	*5*	*This indicator is ranked high since all the houses in Moukhtara have access to public electricity services, however the problem in Lebanon is that the public power outage is about 20 out of 24 hours a day.*
B2.4	Total final electrical energy consumption for building operations	*1.09*	*The result is acceptable since this indicator is calculated taking into account the floor areas and old houses are of large square meters comparing to the electricity consumption since no matter what is the area of a house the minimum electricity consumption need to meet the basic needs.*

B3.6	Share of renewable energy on-site, on final electric energy consumptions for public office/educational building operations	*3.5*	*The main parameters of this indicator are the municipality and school building, the school building is equipped with solar system increasing the score of this indicator*
B3.9	Share of renewable energy on-site, on total primary energy consumptions for public office/ educational building operations	*3.5*	*The schools is equipped with solar panels and therefore increasing this indicator*
C1.1	Availability of a public municipal water supply	*5*	*All houses in Moukhtara are connected to public water*
C1.2	Availability of wastewater treatment systems	*5*	*All houses in Moukhtara are connected to public wastewater*
C2.1	Total water consumption	*2.5*	*The consumption is limited by the water distribution schedule*
C2.3	Consumption of potable water in residential buildings	*2.33*	*This was calculated based on the amount of bottled water consumed by a household of 4 persons on average*
C2.5	Consumption of potable water in educational buildings	*1.8*	The tap water in Lebanon is not considered drinkable and therefore there is a cost associated with bottled water for drinking.
C3.1	Water treatment	*5*	*All the houses in Moukhtara are connected to water treatment facility*
C3.3	Household sanitation	*5*	*All houses in Moukhtara are equipped with sanitation facility.*
D1.1	Availability of solid waste collection	*5*	*The municipality is responsible of collecting the solid waste from bins at street level.*
G3.1	Availability and proximity of key services	*3*	*The inhabitant of Moukhtara have equal access to the municipality building*
I3.3	Permeability of land	*2.69*	*This indicator take int consideration the soil properties and agricultural land availability.*

Swot analysis:

External

S

- Availability of green spaces
- Availability of spaces (roofs) to install PV solar systems at households' level
- Solar system is installed at school level.
- All the houses in Moukhtara are connected to water and waste water networks.
- Waste water is treated in a treatment plant and used for irrigation

W

- Houses are relying on fuel oil for heating due unavailability of other heating resources
- There is no regulation to generate and sell renewable energy in Lebanon
- Shortage of financial resources to solve the electricity crisis
- High cost of solar system with batteries

Internal

O

- Availability of spaces (roofs) to install PV solar systems at households' level and municipality level
- 63% of houses don't have solar system installed at household levels and can be considered as an opportunity to reduce diesel consumption if equipped with solar systems
- Strategic partnership with sustainable med cities

- Security
- Shortage of trained human resources
- Governmental and environmental regulations
- Fluctuation in the prices of raw material and solar system products

Positive

Negative

Main findings of the assessment:

The criteria with low performance are mainly under category B Energy and I greenhouse gas emissions; The remaining criteria have minimum acceptable performance such as categories A green areas and category C for water and category D for solid waste. The category B is affecting the score of specific criteria since the operation and maintenance of any category depends on the availability of electricity services. The houses in Moukhtara rely on non-renewable energy for thermal energy such as heating, cooking and water heating with low percentage of houses relying on renewable energy for power generation since to the majority of inhabitants are not financially capable of installing their own solar system. The municipality building is in need to alternative source of electricity such as PV solar system to reduce the electricity cost which is very high compared to the municipality income due to the devaluation of the Lebanese's Lira compared to USD.

Critical issues identified:

The critical issues identified are clearly highlighted with ranking score between -1 and -0.1. These issues fall under the energy consumption, the share of renewable energy in Moukhtara and the use of diesel oil for heating. 1 critical issue is related to the unavailability of public space (such as garden) accessible by the inhabitants, however due to the green landscaping in Moukhtara this is not considered as critical as the energy problem, since the village is walking friendly, and inhabitants can enjoy the landscaping of the whole caza of Chouf from Moukhatara due to its proximity to the Cedars Chouf biodiversity. The public transportation is also ranked as low score however even though no public transportation is available specifically for moukhtara, there is public buses that passes in Moukhtara on the way to the capital city Beirut.

Recommendations to tackle the critical issues identified

To meet the basic and daily need of Moukhtara inhabitants by providing them with access to electricity as per the sustainable development goal (SDG7) which call for “affordable, reliable, sustainable and modern energy for all” by 2030, we recommend to install PV solar systems and solar water heaters at houshehold level in Moukhtara in order to give each house an access to sustainable and clean source of electricity and empower them to manage their consumption while applying energy efficiency good practices .This will not only help the Moukhtara in becoming a more friendly environment but it will also decrease the economic burden on the inhabitants, increase theresilience and reliability of the electric grid and provides environmental, community and health benefits while assuring the inhabitants to live in their hometown and solve the main challenge currently faced by the country and defined as black out.

2. At the building scale (SBTool) - Filled for the municipality building only since the scenario proposed will be for the municipality only

Criteria with low performance: (Score from -1 to -0.1)

Code	Criterion	Score ranking	Description of the results
B1.2	Delivered thermal energy demand	-1	*The municipality rely on diesel oil burning for heating purposes during winter season and propane gas for cooking purposes which both costs are high.*
B1.4	Energy from renewable sources in total thermal energy consumption	-1	*The municipality rely on non-renewable energy sources for thermal usage.*
B1.5	Energy from renewable sources in total electrical energy consumption	-1	*The municipality reply on electrical energy generated by the thermal heavy fuel oil plant in Lebanon and the backup diesel generator*
B1.6	Embodied non-renewable primary energy	-1	*The municipality building is an old building and therefore the material used during construction are nonrenewable*
B3.4	Recycled materials	-1	*The municipality building is an old building and therefore the material used during construction are nonrenewable*
C1.1	Embodied carbon	-1	*The municipality building is an old building and therefore the material used during construction are nonrenewable and the embodied carbon is high*
E1.1	Effectiveness of facility management control system	-1	*The percentage of appliances with class A is less than 50% at the municipality building*

Criteria with minimum acceptable performance: (Score from 0 to 1)

Code	Criterion	Score ranking	Description of the results
E2.1	Existence and implementation of a maintenance management plan	*0*	*There is no management plan for the municipality building*
F1.1	Universal access on site and within the building	*1*	*The first floor of the municipality building is only accessible for persons with disability while other floors are not accessible*
H1.2	Heat island effect	0.44	*The benchmark is adjusted to be better customize for the Moukhtara context*

Criteria with minimum acceptable performance: (Score from 1.1 to 5)

Code	Criterion	Score ranking	Description of the results
B1.1	Primary energy demand	*4.86*	*This indicator is calculated based on the area (in square meters) of the municipality which is considered high and adding the shortage in electricity during the working hours of municipality the result is showing an acceptable performance, which is not reflecting the actual case properly*
B1.3	Delivered electrical energy consumption	*3.93*	*This indicator is calculated based on the area (in square meters) of the municipality which is considered high and adding the shortage in electricity during the working hours of municipality the result is showing an acceptable performance, which is not reflecting the actual case properly*
B4.1	Embodied water	*5*	*The water consumption at the municipality building is within the normal consumption rate for the country*
B4.2	Total water consumption	*4.21*	*The water consumption at the municipality building is within the normal consumption rate for the country*

B4.3	Potable water consumption for indoor uses	*5*	*The water consumption at the municipality building is within the normal consumption rate for the country*
B4.4	Potable water consumption for irrigation	*5*	*No potable water is used for irrigation and related to the municipality building*
C1.2	GHG gas emissions during operation	*3.27*	*Since the power consumption is low due to shortage of power supply, and since the municipality area in square meter is high, the result of this indicator is translated as acceptable*
C1.3	Life cycle global warming potential	*1.86*	*This is the projection of C1.2 for 5o years assuming solar system is installed partially or totally for the municipality building and appliances class A are used.*
D1.2	TVOC concentration	*2.5*	*This indicator is an assumption based on the topology of Moukhtara, the location of the municipality and proximity of factory or any source of chemical volatile*
D1.7	Mechanical Ventilation	*1.67*	*This is calculated based on the availability and rating of mechanical ventilation in the building*
D2.1	Time outside of the thermal comfort range (heating season)	*4.25*	*The climate change is affecting Lebanon in general and Moukhtara in specific, this indicator was calculated based on the heat waves that hit the country in August and the projection in the coming years by the local weather forecast*
D2.2	Time outside of the thermal comfort range (cooling season)	*4.25*	*The climate change is affecting Lebanon in general and Moukhtara in specific, this indicator was calculated based on the heat waves that hit the country in August and the projection in the coming years by the local weather forecast*
D2.3	Thermal comfort index	*1.7*	*This is acceptable based on Moukhtara overall environment and the location of the municipality*
D3.1	Daylight	*2.5*	*This is acceptable due to the architect of the municipality building*
E1.2	Smart Readiness Indicator	*1.67*	*This is based on the failure history of appliances due to grid failure*
E2.2	On-going monitoring and verification of performance	*2.5*	*The municipality is equipped with electricity meter and water gauge*

E2.3	Retention of as-built documentation	*5*	*The as built documentation are available*
F2.1	View out	*2.5*	*This is rated as well/ good view with no obstruction*
G1.4	Energy cost	*4.23*	*The cost of electricity paid by the municipality is acceptable due to the long hours of power outage and doesn't reflect the high cost of KWh paid by the municipality in $ versus the municipality income in LBP*
G1.5	Water cost	*5*	*The municipality don't pay water fees due to collaboration between the municipality and Beirut and Mount Lebanon Water Establishment responsible of production and distribution of public water*
H4.2	Capacity of greywater collection and storage for non-potable uses	*5*	*The municipality is connected to a wastewater treatment facility*

Main findings of the assessment:

The main findings of the assessment can be divided in two categories:

1. The municipality building doesn't meet the renewable energy criteria in terms of thermal and electrical energy, recycling material and implementation of a sustainable management plan.

2. The building is connected to water and wastewater network, is considered accessible to inhabitants, and have access to these services for free.

The aforementioned, is translated in most criteria under category B related to energy are rated with low performance while criteria related to water and wastewater services are rated with acceptable performance.

One item to highlight is that the building is partially accessible to people with disabilities and therefore rated with minimum acceptable criteria between (0 and 1).

Critical issues identified:

The main critical issue is unavailability of reliable and sustainable source of electricity at the municipality building. Even though the building is connected to the public grid, the long hours of power shortage and interrupted supply with no specific schedule for power distribution leave the municipality building most of the time with no electricity. The building is also connected to the backup generator however due to the high cost of diesel the municipality is not able to afford the generator power bills and is enforced to reduce the power consumption by reducing the working hours and consequently not meeting the inhabitants need and support.

Recommendations to tackle the critical issues identified

Installation of solar system for the municipality building which also include a social club benefiting the Moukhtara inhabitants. The solar system will provide power for the municiaplity building allowing the municipality to manage the inhabitants need more flexible since due to power shortage, the municiplaity building was operating partially based on the availiibilty of power.

The solar system will reduce the electricty bills of the municpality paid for the public electricty provided and the private generators, alowing the municipality to better manage her expenses toward implementing greener solutions such as installing solar street lamps or building a recreational area from the savings achieved in lowering the electricity bills.

4. STRATEGIC DEFINITION

4.1 Performance targets for the urban area

1/ SOUSSE

Environmental targets
The environmental targets of the Sahloul 3 neighborhood are as follows: 1- Increased green spaces, permeable areas and vegetation in the neighborhood, for the quality of life of the inhabitants, and for a real contribution to the reduction of air pollution in the neighborhood. 2- The creation of the necessary facilities for gentle modes of travel: pedestrians and cyclists. 3- The control or even reduction of the consumption of thermal and electrical energy as well as water consumption. 4- Renewable energies (mainly solar and photovoltaic) are needed, especially as the potential is real. 5- The implementation of the system for the selective sorting of household waste in the district. 6- The use of regulations that help improve air quality in the neighborhood.

Social targets
The social objectives of Sahloul 3 can be summarized as follows: 1- Accessibility for people with disabilities of all buildings and communal areas, as well as the adequate fitting-out of pedestrian infrastructure (sidewalks and roadways) are important objectives that can be achieved by this very busy neighborhood. 2- The creation of as much essential service equipment as possible in close proximity to the inhabitants must be a priority for the city of Sousse, in order to reduce commuting by motorized vehicles, which are sources of energy waste and air pollution. Moreover, in the context of the revision of its urban development plan, the city of Sousse, which claims to be the "quarter-hour city", has already taken certain measures and provisions in line with this objective.

Economic targets
Regarding the theme (H) relating to the economy and its various aspects, it should be noted that no criteria of this theme have been selected by the partners to carry out the diagnosis and evaluation of sustainability in the Sahloul 3 neighborhood. This can be explained by the high social level of the inhabitants, as well as by the economic dynamics (trade and services) that this neighborhood experiences within the city of Sousse.

The durability target should be set for the underperforming endpoints identified at the diagnostic phase, using the tables below.

A. Use of Land and biodiversity				
A2 Urban Green Spaces				
A2.1	**Availability of green areas**		**Current Value**	**Target Value**
Proportion of all vegetation areas within neighborhood boundaries to total area		%	*5.66*	*6.91*
Score			**-1**	**-1**
A2.2	**Green spaces in relation to the population of the district**		**Current Value**	**Target Value**
Total area of greenery in the city divided by the total population of the neighborhood		m²/inhabitant	*7.42*	*14*
Score			**0.3**	**1**
A2.4	**Density of green areas**		**Current Value**	**Target Value**
Density of green spaces in the area		%	*7.45*	*15*
Score			**-1**	**0**

B. Energy

B2 Energy consumption

B2.7	**Total demand for primary energy for the operation of buildings**		**Current Value**	**Target Value**
Aggregated total annual primary energy consumption per aggregated inland useful area		kWh/m2/year	*53,243*	*24.3*
Score			***-1***	***3.7***

B3 Renewable energy

B3.1	**Share of on-site renewable energy in relation to final total thermal energy consumption for construction operations**		**Current Value**	**Target Value**
Total consumption of final thermal energy produced from renewable sources on site divided by total final thermal energy consumption		%	*4.3*	*40*
Score			***-1***	***0.7***
B3.4	**Share of local renewables in final electricity consumption**		**Current Value**	**Target Value**
Total consumption of final electricity produced from renewable sources on site divided by total final consumption of electricity		%	*6.9*	*100*
Score			***-1***	***5***

B3.7	Share of on-site renewable energy in relation to total primary energy consumption for construction operations		Current Value	Target Value
Total consumption of on-site renewable primary energy divided by total primary energy consumption		%	0	1
Score			-1	-1

C. Water

C2 Water consumption

C2.3	Drinking water consumption in residential buildings		Current Value	Target Value
Annual drinking water consumption per occupant		Liters / day / person	169.84	71.5
Score			2.1	4.7

D. Solid Waste

D2 Solid waste management

D2.2	Access to solid waste and recyclingcollection points		Current Value	Target Value
Percentage of inhabitants with access to solid waste and recycling collection points within 400 meterswalking distance		%	0	92.21
Score			-1	4.3

E. Environmental quality

E1 Air quality

E1.2	Particle concentration (PM10)		Current Value	Target Value
Sum of daily concentrations for the whole year divided by 365 days		days/year	*42*	21
Score			**-1**	**-1**

F. Transportation and Mobility

F2 Green Mobility

F2.3	Bicycle network		Current Value	Target Value
Aggregate length of cycle paths in the neighborhood per capita		m/inhabitant	*0.0215*	1
Score			**-1**	**-1**

F3 Security in mobility

F3.1	Pedestrian infrastructure		Current Value	Target Value
Percentage of town designated as pedestrian/car-free		%	2.9	10
Score			**-1**	**0**

G. Social Aspects				
G1 Accessibility (persons with disabilities)				
G1.1	**Public buildings accessible to physically disabled persons**		**Current Value**	**Target Value**
Percentage of key public buildings accessible to persons with physical disabilities		%	66	86.8
Score			**2**	**4.6**
G1.2	**Sidewalks and other pedestrian pathways accessible to physically disabled persons**		**Current Value**	**Target Value**
Percentage of sidewalks and other pedestrian pathways accessible to persons with disabilities		%	0	51
Score			**-1**	**0.1**
G3 Availability of public and private facilities and services				
G3.1	**Availability and proximity of key services**		**Current Value**	**Target Value**
Percentage of inhabitants within 800 meters of at least 3 essential services on foot		%	25	40
Score			**-1**	**-1**

I. CLIMATE CHANGE: Mitigation and Adaptation

I1 Climate change mitigation

I1.1	Greenhouse gas emissions		Current Value	Target Value
Total amount of greenhouse gases in tons (carbon dioxide equivalent) produced in a calendar year divided by the current population of the neighborhood		Tons CO2 equivalent per capita	*1,061*	*1,061*
Score			**5**	**5**
I1.2	Greenhouse gas emissions from residential buildings		Current Value	Target Value
Total amount of greenhouse gases in Kg (units of carbon dioxide equivalent) generated over a calendar year per aggregated inland useful area		Kg CO2 eq/m2	*8,070*	*8,070*
Score			**5**	**5**

I2Adaptation to climate action: heat waves and temperature rise

I2.2	Use of vegetation to provide ambient outdoor cooling		Current Value	Target Value
Leaf area index: ratio of total vegetation area (on soil and on roofs, including trees) divided by total site area		Index	*9.06*	*18*
Score			**-1**	**-1**

I3 Adaptation to climate action: storm surge				
I3.3	**Soil permeability**		**Current Value**	**Target Value**
Share of urban area permeable to water		%	*7.86*	20
Score			***-1***	***0***

J. Governance				
J1 Urban Planning				
J1.1	**Community participation in urban planning activities**		**Current Value**	**Target Value**
Percentage of residents active in public urban planning		Level	*1*	*3*
Score			***1***	***3***
J3 Operation of public buildings				
J3.1	**Sustainability of public buildings**		**Current Value**	**Target Value**
Percentage of public buildings with recognized sustainability certifications for ongoing operations		%	*0*	*61.6*
Score			***-1***	***2.6***

J3.3	Energy consumption of public buildings		Current Value	Target Value
Total final energy consumption in public buildings of a city divided by the total indoor useful area of those buildings		kWh/m2	102.34	*25*
Score			**-1**	**0**

2/ IRBID

Environmental targets
To achieve environmental sustainability, a set of key targets needs to be achieved in the study area. First, incorporating nature based solutions and vegetation in green urban areas would have multiple environmental benefits, including reducing greenhouse gas emissions, especially in crucial sectors such as transportation and energy. Reducing the Urban Heat Island effect and stormwater runoff, as a result of the vegetation's cooling and infiltration capabilities. Implementing such policies would also promote creating wildlife habitats and protect biodiversity. Enhancing residents' awareness in the environmental issues and engaging local communities can help sustain these solutions and increase their multifunctionality. Increasing the availability of green urban areas is considered to be a high priority to enhance residents' health and well-being and decrease air pollution, and it could be implemented by means of simple change in the short term. *Residents indicated that awareness efforts addressing waste disposal and recycling are significantly required to address the neighborhood's main difficulty with solid waste management. Regarding the urban environment design, the residents emphasized the necessity of making the neighborhood more green overall by including more greenery, in collaboration with the locals. This can involve things like growing trees, introducing urban agriculture on unused land and rooftops, and enhancing the neighborhood's sidewalks and roadway design.* *Furthermore, the total final electrical energy consumption for residential buildings operations should be reduced , which could be achieved by*

relying on a well developed equipment market. The on-site renewables must be increased and enforced by-laws of government as Jordan is blessed to have one of the highest solar irradiance values in the world

Regarding transportation, green mobility has to be promoted in order to increase the reliance on renewable energy. In addition to enhancing pedestrian friendly environment and bicycle networks through the neighborhood towards a cultural change in this regard.

Highlight rainwater harvesting systems and treatments as a water saving technology to overcome water shortages in Jordan. Nuzha Neighbourhood residents highlighted the need to maintain the stormwater drainage network and relocate the drains according to the proper levels.

The potential for climate mitigation is significant, where solar energy can be utilized to produce electricity, reduce fuel consumption, and, accordingly, mitigate climate change impacts and GHG. both transport and industrial energy activities considered to be source of danger for a high percentage GHG emission in the neighborhood

Urban challenges which are faced by the urban area, including water shortages, urban flooding, air pollution
need to explore the applicability of green infrastructure and nature-based solutions in order to address the pressing environmental challenges in the neighborhood.

Social targets

The adoption of inclusive urban spaces that value and accept users of different background, gender, and abilities. Which will increase social interaction, safety and acceptance? Those spaces have positive effects on residents as they reduce stress and improve mental and physical health. Creating safe living environment through efficient and engaging administration, respecting basic human rights, and increase quality of life.

Public buildings must be accessible to physically and disabled people and has to be enforced by laws of government

One of the weaknesses in the Jordanian context is the lack of specific urban planning legislations and specifications, The Physical access in urban legislations should include accessible routes, ramps, parking zones, elevators, signage, entrances, and restrooms. The accessibility of pedestrian routes considering all major disability types should be planned and implemented on ground.

Economic targets
To ensure the sustainability of economic growth and to achieve high levels of economic productivity for the neighborhood, several approaches should be adopted. First, some practices related to recycling and pollution reduction should be implemented, as they not only align with environmental stability but also enhance the value of materials. In addition, we should promote and increase awareness of efficient resource management to encourage inhabitants to minimize waste and optimize other resources utilization. Another important factor that should help economic growth sustainability is enhancing collaboration between public authorities and private entities, as well as fostering synergies and responsibilities. By minimizing the environmental impact of urbanization, we can sustain valuable resources and reduce operational costs such as energy, waste management, telecommunications, and transportation. Additionally, investing in critical infrastructure improvements will not only create job opportunities during implementation but also increase employment opportunities either during implementation or during operation and maintenance; this will improve induced employment and contribute to the neighborhood's long-term economic sustainability.

Sustainability target shall be set for the low performing assessment criteria identified in the diagnosis phase, using the tables below.

A. Use of land and biodiversity				
AX (Name of the category)				
A2.1	*Availability of green urban areas*		*Actual value*	*Target value*
Proportion of all vegetated areas within the neighborhood in relation to the total area		*%*	*9.28*	15
Performance score			*-1*	*0*

A2.2	*Green areas in relation to the neighborhood population*		*Actual value*	*Target value*
Total area of green in the neighborhood divided by neighborhood's total population		*m²/{inhabitant}*	*0.2*	*2.1*
Performance score			*-1*	*0.75*
A2.3	*Green Area Accessibility*		*Actual value*	*Target value*
Percentage of inhabitants with accessibility to green areas		*%*	*14.54*	*48*
Performance score			*-1*	*0*
A2.4	*Green zones density*		*Actual value*	*Target value*
Density of green spaces within the area		*%*	*0.58*	*6.3*
Performance score			*-1*	*-1*

B. Energy			
B2 (Energy consumptions)			
B2.4	*Total final electrical energy consumption for building*	*Actual value*	*Target value*

	operations		
Indicator *Aggregated annual total final electric energy consumption per aggregated internal useful floor area*	*Unit of measure* *kWh/m2/year*	*32.84*	25
Performance score		*-1*	*0*
B2.5	*Total final electrical energy consumption for residential building operations*	*Actual value*	*Target value*
Indicator *Aggragated annual final electrical energy consumption of residential buildings per aggregated ondoor useful floor area*	*Unit of measure* *kWh/m2/year*	*27.46*	15
Performance score		*-1*	*0*
B2.7	*Total primary energy demand for building operations*	*Actual value*	*Target value*
Indicator *Aggregated annual total primary energy consumption per*	*Unit of measure* *kWh/m2/year*	*85*	50
Performance score		*-1*	*0*

B3 (Renewable energy)				
B3.1	Share of renewable energy on-site, relative to total final thermal energy consumption for building operations	Total consumption of final thermal energy generated from renewable sources on-site divided by total final thermal energy consumption	*Actual value*	*Target value*
Indicator : Total consumption of final thermal energy generated from renewable sources on-site divided by total final thermal energy consumption		*Unit of measure* *%*	*0*	10
Performance score			*-1*	*-1*
B3.4	Share of renewable energy on-site, relative to final electric energy consumption	Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption	*Actual value*	*Target value*

<table>
<tr><td colspan="2">Indicator

Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption</td><td>Unit of measure
%</td><td>8</td><td>40</td></tr>
<tr><td colspan="3">Performance score</td><td>-1</td><td>0.63</td></tr>
<tr><td>B3.7</td><td>Share of renewable energy on-site, relative to total primary energy consumption for building operations</td><td>Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption</td><td>Actual value</td><td>Target value</td></tr>
<tr><td colspan="2">Indicator

Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption</td><td>Unit of measure
%</td><td>3</td><td>33</td></tr>
<tr><td colspan="3">Performance score</td><td>-1</td><td>0.21</td></tr>
</table>

C. Water				
C2 (Water Consumption)				
C2.6	*Re-use of rainwater in residential buildings*		*Actual value*	*Target value*
Indicator *Share of rainwater collected from roofs of residential buildings for reuse*		*Unit of measure* *%*	*0*	5
Performance score			*0*	*0.83*
D. Solid waste				
D2 (Solid waste management)				
D2.1	Access to solid waste and recycling collection points		*Actual value*	*Target value*
Indicator Proximity of the resident population to the solid waste and recycling collection point		*Unit of measure* *%*	*0*	*5*
Performance score			*0*	*1.32*
D2.2	*"Access to solid waste and recycling collection points*		*Actual value*	*Target value*

Indicator "Percentage of inhabitants with access to solid waste and recycling collection points within 400 meters walking distance"	*Unit of measure* *%*	*0*	5
Performance score		*0*	*1.32*

D. Solid waste

D1 (solidwaste collection Infrastructure)

D1.1	Availability of solid waste collection	*Actual value*	*Target value*
Percentage of population with regular solid waste collection	*%*	*40*	60
Performance score		*-1*	*0*

F. Transportation and mobility

FX (Name of the category)

F2.2	*Electric-vehicle infrastructure (charging stations)*	*Actual value*	*Target value*

Electric vehicle charging stations per inhabitant	*1/{inhabitant}*	*0*	0.01
Performance score		*-1*	*0*
F2.3	Bicycle network	*Actual value*	*Target value*
Total length of bicycle paths in the neighborhood per inhabitant	m/{inhabitant}	*0*	*5*
Performance score		*-1*	*0*
F3.1	*Pedestrian infrastructure*	*Actual value*	*Target value*
Percentage of the neighbourhood designated as a pedestrian/car free zone	*%*	*0*	*2*
Performance score		*-1*	*1*

G. Social aspects

G1 Accessibility (Disabled Persons)

G1.1	*Public buildings that are accessible for use by physically disabled*	*Actual value*	*Target value*

	persons			
Percent of public buildings that are accessible for use by physically disabled persons		*%*	*1.02*	5
Performance score			*-1*	*0.19*
G1.3	Barrier-free accessibility in local outdoor public areas		*Actual value*	*arget value*
Percentage of accessible public outdoor areas that are barrier-free compared to the total public area		*%*	*0*	*52*
Performance score			*-1*	*0.25*
G2 Housing				

G2.1	Affordability of housing property	*Actual value*	*Target value*
housing properties in the neighbourhood that are financially accessible to the lowest quintile of area population	%	*4.9*	*10*
Performance score		*-1*	*1*
G2.2	Affordability of housing rental	*Actual value*	*Target value*
Percentage of the average salary of the lowest quintile of the population used for rental payments	%	*50*	*45*
Performance score		*0*	*1.25*
G3 Availability Of Public And Private Facilities and Services			

G3.2	Availability and proximity of a public primary school	*Actual value*	*Target value*
Percentage of population near a public primary school	%	*39.31*	*55*
Performance score		*-1*	*0.68*
G3.4	Availability and proximity of children's' play facilities	*Actual value*	*Target value*
Percentage of population near a children's' play facilities	%	*14.54*	*20*
Performance score		*-1*	*1.43*
G3.5	Outdoor public spaces	*Actual value*	*Target value*

Average share of the built-up area of the neighbourhood that is open space for public use	%	*5.8*	*26*
Performance score		*-1*	*0.56*
G5 Social Inclusion			
G5.1 Energy poverty of households		*Actual value*	*Target value*
Percentage of households unable to afford the most basic levels of energy (more than 10% of the income spent on energy bills)	*%*	*24.46*	*9*
Performance score		*-1*	*1.67*

G6.1	Police Service	*Actual value*	*Target value*
Number of police officers per 1.000 inhabitants	1/1000{inhabitant}	*1.24*	*4*
Performance score		*-1*	*2.5*
G6.2	Fire service	*Actual value*	*Target value*
Number of firefighters per 1.000 inhabitant	1/1000{inhabitant}	*0*	*0.8*

s			
Performance score		*-1*	*1.04*
G10 Perceptual			
G10.1	Perceived safety of public areas for pedestrians	*Actual value*	*Target value*
Perceived safety of public places and pedestrian routes, as determined by a sample of pedestrians	Score	-1	2
Performance score		-1	1.25

I.Climate change: Mitigation and Adaptation				
I2 (Adaptation to the climatic action: heatwaves and increase of temperature)				
I5.1	*" Rainwater collection and storage from buildings for non-potable uses"*		*Actual value*	*Target value*
Indicator *share of buildings in the area with a rainwater collection system*		*Unit of measure*	*0*	4
Performance score			*0*	*1.33*
I5.2	*Raiwater collection and storage from outdoor areas*		*Actual value*	*Target value*
Indicator *Share of rainwater collected from paved (not permeable) surfaces in the area (excluding buildings' roofs and plots)*		*Unit of measure* *%*	*0*	*2*

Performance score			*0*	*1.25*
I5.3	*Greygwater collection in buidings for non-potable uses*		*Actual value*	*Target value*
Indicator *Share of building in the are with a greywater collection system*		*Unit of measure* *%*	*0*	10
Performance score			*0*	*0.83*

J. Governance				
J3 Public buildings				
J3.1	*Public buildings sustainability*		*Actual value*	*Target value*
Percentage area of public buildings with recognized sustainability certifications for ongoing operations		*%*	*0*	0.15
Performance score			*-1*	*0.32*

3/ MOUKHTARA

Environmental targets

The Environmentaltargets entail the targets under the category B - Energy and category I – Climate change mitigation and adaptation. The target for the Energy is based on the scenario of installing solar systemso generate electricity at household level for 116 houses, to reduce the cost of electricity demand from the back-up generators and cover the black out of power due to the shortage of electricity from the public utility. In addition, and to reduce the diesel consumption needed for the heating boiler to heat water, installing solar water heaters at household levels for 39 houses in Moukhtara. The aforementioned will increase the target of the electricity generated from Renewable energy for residential buildings in Moukhtara to 90% and will reduce the thermal energy used for household heating and water heating by 15% assuming that in winter and during sunny days, the households will be able to reduce their dependence on diesel and wood used to run the boilers for heating for 2 hours per day and therefore reducing the thermal energy from 197 KWh/m2/year to 167 KWh/m2/year. Replacing the streetlights with solar streetlights will turn the street light electricity consumption to zero since the lights will be off-grid, not connected to any source of electricity except the power stored in their batteries, therefore the target is zero.

By reducing the thermal energy to 167 KWh/m2/year and installing solar water heaters, 184 houses in Moukhtara will be reducing 20KWh/day thermal energy and therefore increasing the target of thermal energy from RE to 43%.

Relying on Renewable energy instead of thermal energy from fuel-based power plant and diesel generators will reduce the tCO2eq emissions in Moukhtara to approximately 2 tCO2eq/occupant/year.

Social targets

The indicator under social aspect in Moukhtara is G3.1: Availability and proximity of key services has a value of 80% under the current condition of public offices in Moukhtara. The scenario forecasted for Moukhtara area and municipality will not affect the value under this indicator and the target will be assumed as the same.

Economic targets
There is no economic target forecasted for Moukhtara urban area.

Sustainability target shall be set for the low performing assessment criteria identified in the diagnosis phase, using the tables below.

A. Use of land and biodiversity				
A2 (Green Urban Areas)				
A2.3	*Green Area Accessibility*		*Actual value*	*Target value*
Percentage of inhabitants with accessibility to green areas		*%*	*0%*	30%
Performance score			*-1*	*0.38*

B. Energy			
B2 (Energy Consumptions)			
B2.6	Total final electric energy consumption for public office/ educational building operations	*Actual value*	*Target value*

B. Energy				
B2 (Energy Consumptions)				
B2.1	Total final thermal energy consumption for building operations		*Actual value*	*Target value*
Total final thermal energy consumption for building operations		kWh/m²/a	*197*	150
Performance score			*-1*	*1.43*

Urban electrical energy consumption of public office/educational buildings	kWh/m²/a	*28.20*	10
Performance score		*-1*	*5*

B. Energy			
B2 (Energy Consumptions)			
B2.10	Energy consumption of public lighting	*Actual value*	*Target value*
Total electricity consumption of public street lighting divided by the total distance of streets where streetlights are present	kWh/km/a	*12,392*	20
Performance score		*-1*	*5*

B. Energy			
B2 (Energy Consumptions)			
B2.7	Total primary energy demand for building operation	*Actual value*	*Target value*
Aggregated annual total primary energy consumption per aggregated indoor useful floor area	kWh/m²/a	*217.64*	150
Performance score		*-1*	*1.43*

B. Energy			
B3 (Renewable Energy)			
B3.1	Share of renewable energy on-site, relative to total final thermal energy consumption for building operations	*Actual value*	*Target value*
Total consumption of final thermal energy generated from renewable sources on-site divided by total final thermal energy consumption	*%*	*29%*	*50%*
Performance score		*-1*	*1.43*

B. Energy			
B3 (Renewable Energy)			
B3.5	Share of renewable energy on-site, relative to total final electric energy consumption for residential building operations	*Actual value*	*Target value*
Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption of residential buildings.	*%*	*29*	*95*
Performance score		*-1*	*4.64*

B. Energy			
B3 (Renewable Energy)			
B3.7	Share of renewable energy on-site, relative to total primary energy consumption for building operations	*Actual value*	*Target value*
Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption	%	*1.11*	30
Performance score		*-1*	*0*

B. Energy			
B3 (Renewable Energy)			
B3.8	Share of renewable energy on-site, relative to total primary energy consumption for residential building operations	*Actual value*	*Target value*
Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption of residential buildings	%	*1.11*	90
Performance score		*-1*	*4.29*

D. Solid waste				
D2 (Solid Waste Management)				
D2.2	Access to solid waste and recyclingcollection points		*Actual value*	*Target value*
Percentage of inhabitants with access to solid waste and recycling collection points within 400 meters walking distance		%	22	30
Performance score			-1	-1
The scenarios adopted for Moukhtara area will not affect this indicator				
F. Transportation and mobility				
F1 (Performance of Mobility service)				
F1.1	Performance of the public transport system		*Actual value*	*Target value*
Percentage of inhabitants that are within 400 meters walking distance of at least one public transportation service stop		%	0	10
Performance score			-1	-1
The scenarios adopted for Moukhtara area will not affect this indicator				

F. Transportation and mobility			
F2 (Green Mobility)			
F2.3	Bicycle network	*Actual value*	*Target value*
Total length of bicycle paths in the neighborhood per inhabitant	m/{inhabitant}	*1*	*5*
Performance score		*-1*	*0*
The scenarios adopted for Moukhtara area will not affect this indicator			

I. Climate change: Mitigation and Adaptation			
I1 (Climate Change Mitigation)			
I1.1	Greenhouse gas emissions	*Actual value*	*Target value*
Total amount of greenhouse gases (equivalent carbon dioxide units) generated from building operations over a calendar year per inhabitant	t/{inhabitant}/a	2.49	1.7
Performance score		*-1*	*1.55*

I. Climate change: Mitigation and Adaptation			
I1 (Climate Change Mitigation)			
I1.2	greenhouse gas emissions from residential buildings	*Actual value*	*Target value*
Aggregated total embodied carbon per aggregated linear area	kg{CO2-eq}/m²	*197*	120
Performance score		*-1*	*0*
The scenarios adopted for Moukhtara area will not affect this indicator			

4.2 Constraints and Restrictions for the Urban Area

1/ SOUSSE

Constraints/Restrictions	
Legal Constraints	• *Rigid urban regulation* • *Urban development plan: In Tunisia, the PAU is a key document. It lays down guidelines and rules for spatial planning. It is important to comply with the provisions of the area in which the Sahloul 3 neighborhood is to be developed and renovated.* • *The process of changing and revising the development plan is very cumbersome and time consuming, a World Bank study found that the time required for a full or partial revision is 4-6 years.* • *The Sahoul 3 neighborhood was planned by the AFH Housing Land Agency. The area's dominant vocation is residential, which limits the scope for diversification of activities.* • *Public consultation: with the new CCL Local Government Code, it is mandatory to involve the local community in the urban planning process. This necessary step can lengthen the process of validating the regulatory document.*
Technical Constraints	• *Land Reserve Almost Nil (Almost entirely urbanized area) index according to the ATLAS des Quartiers is 5%* • *Improving the human-density indicator requires a big increase in housing, which implies a wholesale restructuring of existing infrastructure.* • *The neighborhood's road network is structured in direct relation to the entire area, making it difficult to transform it from vehicular to pedestrian use.* • *Permitted polluting industrial installations near the district (but outside the city of Sousse) limit the reduction in daily exceedances of fine PM10 particles.*
Financial Constraints	• *Public funding: The low availability of public funding is a major factor.* • *Urban renewal projects are often financed by the municipality's funds, which are too limited.* • *Blended funding: Urban renewal projects often require blended funding from a variety of sources, including the public, private and public-private partnerships. The coordination of these sources of funding is too complex, as there is a lack of legal texts that organize the renovation operation* • *Poor financial governance of public authorities, and lack of clear visibility of national and international donor mapping.*

	• *Poor management of decision support tools for cost-effectiveness studies complicates the financial justification of the project.*
Environmental Constraints	• *Management of construction waste: Urban renewal often generates construction waste. It is necessary to put in place waste management plans to dispose of waste responsibly.* • *Water management: Urban renewal must take into account storm water management to avoid flooding.* • *The district is crossed by developed watercourses whose dedicated infrastructure remains undersized compared to the high frequency of precipitation due to climate change.*
Restrictions due to performers	• *No constraints.*
Other relevant constraints	• *Lack of technical staff in the municipality* • *Periodicalization of investments in sustainability.* • *A revision of the urban development plan is under way. (The administrative consultation phase).* • *Resistance to change: Some stakeholders may be reluctant to adopt sustainable urban renewal practices due to lack of awareness, resistance to change or perceived additional costs.* • *Training and skills: Staff and entrepreneurs involved in sustainable urban renewal may require specific training to implement best practices.* • *The current regulations are not aligned with the objectives of sustainable urban renewal, which may require efforts to update or modify them.*

2/ IRBID

Constraints/Restrictions	
Legal constraints	*Government by-laws : a lack of integrated planning at regional level and within governorates* *Inadequate green legislation and enforcement that enables green growth; Specific Urban Planning legislations needed, codes and specifications : legal and specific urban planning standards are missing in the jordanian context, authorities are allowed to enforce rules when people do something illegal.* *Overlap of ministry's responsibilities and lack of coordination between ministries towards common goals* *The absence of a National Urban Policy/green Strategies for Spatial Planning.* *Lack of knowledge transfer and communication between the public and private sector* *Lack of transparency and coordination of green projects and programmes –*
Technical constraints	*Incorporating academics and practitioners in urban development plans, in addition to incorporating gender with urban development plans with the strategic plans, policies and legislation designed and applied for the purpose of uplifting the women status and enhance their economic, social, and political participation, This will bridge the gender gap in various domains, the status of women's participation in and contribution to development is still below the level of ambition;* *Improving technical capabilities for planning and management of Irbid : there is a need to improve the technical capacity of city planning in an elaborate scientific, practical future-oriented manner to solve the environmental challenges and avoid the emergence of problem*

	skilled labor for Green Architecture systems and green buildings applications . *Green economy unit , including external Consultant for green economy unit and technical Expert Advisory Group* *Lack of interest in the use of geographic information systems, development and linkage of the same to planning;The difficulty of systematic and continuous access to information for all and at all levels,* *poor capacity building and exchange of experiences, knowledge and expertise in the field of green urbanism.* *Lack of integrated transportation networks and land use planning resulted in reliance on private automobile, leading to traffic congestion, poor transit coverage and an increase in carbon footprint;* *lack of Biodiversity and ecosystems services* *lack of investment in energy and transport infrastructure in Irbid governorate will lead to economic activity focused on its neighborhood areas where existing infrastructure can support growth.* *Lack of adequate financing mechanisms to incentivize the private sector to instigate green growth* *lack of affordable housing* *Existing road networks may not support adding a share for bicycle lanes due to the current traffic congestion and the large number of private vehicles.* *Poor quality and aesthetics of green space, in addition to the lack of capacity for continuous maintenance, as a result, users lose interest in the green space as it doesn't meet their needs.*

Financial constraints	*The cost of private land may limit the percentage of green urban areas due to a lack of financial resources.* *International and national funds;Lack of funding perceived as key barrier by ministries in the jordan* *Dedicated green finance team* *Lack of capacity, technical skills and data* *required to design and implement green* *growth projects* *the lack of applying participatory planning*
Environmental constraints	*Low annual precipitation rates may affect the growth and durability of vegetation in green urban areas and pose major stress on the water sector.* *lack of fossil fuels and water resources making it unusually well positioned to seize opportunities in the Jordanian governorates.* *•Lack of alternative resources of electrical energy.*

Stakeholder based restrictions	*Lack of inhabitants' interest in participation in the decision-making process.* *Prioritization of Housing and commercial development for the use of land instead of green urban areas to obtain economic benefits.*
Other relevant constraints	*Green strategic initiatives* *lack of access to health care facilities within a 5- and 15-minute walking distance* *lack of public spaces and pedestrian and walkable areas* *Lack of parking lots* *Social constraints regarding the bicycle network and car-free zones may prevent their planning and implementation, cultural norms would not accept using such networks within the composition of the existing road, especially for female users*

3/MOUKHTARA

Constraints/Restrictions	
Legal constraints	*There is no specific legal constraint related to the installation of solar water heaters or solar systems at household levels since it falls under the law 462 and is not in contradiction with any legal regulations. For buildings where more than 1 owner share the roof, a consent need to be agreed upon all building residents to allocate the area for systems installation and give equal systems capacity to all households.*
Technical constraints	*The technical constraints is related to the available space to install the panels on the roofs either for electricity generation or solar water heaters.*
Financial constraints	*Taking into consideration the current fuel cost, KWh cost by the public utility and KWh cost by the backup generator, and the cost of Kwh of solar energy, the return on investment will be achieved after 4.5 years assuming the system installed include 6 solar panels with 4 LED acid batteries.*
Environmental constraints	*Lebanon benefit from 300 days of solar, while the remaining 60 days can vary from full raining days to cloudy days, making Lebanon a good environment for solar energy*
Stakeholder based restrictions	*The citizens of Moukhtara are cooperative and willing to participate in the project*
Other relevant constraints	*Not applicable*

4.3 : Sustainability Targets Summary for the Urban Area

1/SOUSSE

Weak points to address in urban area
Sahloul 3 is a new neighborhood (created at the beginning of the 90s of the last century) that was designed and realized by AFH (Agency Foncière de l'Habitat); a public company, responsible for developing subdivisions and contributing to the creation of the urban environment within cities in Tunisia. The SNTool assessment revealed that the neighborhood has several sustainability weaknesses. These weaknesses can be summarized in the following points: 1- Lack of green spaces, permeable surfaces and vegetation in the neighborhood. 2- High consumption of thermal and electrical energy in buildings and other public facilities in the district. 3- High consumption of drinking water (in a country with high water stress). 4- Lack of a system for the selective sorting of solid waste for future recycling 5- Very low use of renewable energies (despite the high potential available). 6- High air pollution (air quality) causing health problems. 7- Lack of facilities for gentle walking (walking or cycling). 8- Poor accessibility to public (or private) buildings for people with disabilities. 9- Urbanism leading to commuting by motorized vehicles for lack of essential services close to the inhabitants of the neighborhood. 10- Low leaf area and soil permeability indices in the neighborhood 11- Sustainability issues are not yet sufficiently addressed in urban planning, design or construction techniques.

2/IRBID

Weak points to address in the urban area

Summary of the urban areas' weak points to be addressed in the "Retrofitting scenario" phase. (5000 characters)

According to the detailed SWOT analysis, the following issues and categories are considered the main weak points that got less than zero score for the targeted neighborhood and therefore they will be considered as sustainability targets and to be addressed in the (Retrofitting Scenarios):

A. *Use of land and biodiversity*

The availability of green urban areas will be considered as a main initiative aiming to increase the proportion of all vegetated areas within the neighborhood in relation to the total area by 60%.

B. *Energy*

One of the most critical issues and categories in energy consumption is the share of renewable energy on-site relative to final electric energy consumption, therefore; it is highly-important to include this as a main action of increasing the percentage of the total consumption of final electric energy generated from renewable sources on-site relative to the total final electric energy consumption by 4 times (i.e., 400%).

C. *Water*

Another critical issue is the water consumption. Our retrofitting scenarios will also focus on two different actions through maximizing the amount of the area's water consumption in liters per person per day relative to the total area population by about 60%, and to enhance the Re-use of rainwater collected from roofs of residential buildings by 5%.

D. *Solid waste*

The retrofit scenarios will also include an initiative regarding a weak point of solid waste collection infrastructure. The availability of solid waste collection represented by the percentage of population with regular solid waste collection will be improved by 50%.

F) Mobility and transportation

Regarding green mobility, the electric-vehicle infrastructure (i.e., charging stations) is a clear weak point in the neighborhood. The electric vehicle charging stations per inhabitant will ne enhanced by the scenario to be 1 for 100 inhabitants. Moreover, and with respect to safety in mobility, the bicycle network is also a critical issue. The action will improve the total length of bicycle paths in the neighborhood per inhabitant to be 5 meters per inhabitants, and percentage of the neighborhood designated as a pedestrian/car free zone by 2%

G) Social aspects

Public buildings that are accessible for use by physically disabled persons is another weak issue and category according to SWOT analysis. The scenario will have an action to increase the percentage of public buildings that are accessible for use by physically disabled persons by 4 times or 400%.

Affordability of housing property is considered another critical point in the neighborhood. The retrofitting scenario will provide an initiative to enhance the housing availability in the neighbourhood that are financially accessible to the lowest quintile of area population by 100%.

Regarding the perceptual and related to perceived safety of public areas for pedestrians which is also found out to be a weak point, the proposed scenario will improve the perceived safety of public places and pedestrian routes by 30%.

I) Climate change mitigation

Regarding the climate change mitigation, the adaptation to the climatic action in the neighborhood was diagnosed as a weak point. The retrofitting scenario will propose an action to enhance the adaptation to the heatwaves, increase of temperature and drought

3/MOUKHTARA

Weak points to address in the urban area
▪ The main weak points to address in the urban area are mainly related to unavailability of electricity from the public utility and the high cost of fuel for diesel generators. The only solution to this crisis is to install solar systems at household level, this will reduce the black out hours and give autonomy to each house to control and manage its electricity consumption effectively and efficiently to benefit from the solar system and preserve it in good condition leading to ensuring the sustainability of the equipment. ▪ Some additional weak points which might restrict the possibility of upgrades or changes in the architecture of the village are related to the type of houses in Moukhtara. The majority of houses in Moukhtara are traditional houses built from natural stones while the streets are small, cobbled lanes mainly in the center of the historic village. The aforementioned make it hard to make any changes to the material used to build the houses or to make any changes in the street's topology due to the tightness of the streets such as providing lanes for bicycles. ▪ There is no public garden in Moukhtara village, and it is not possible to create one due to unavailability of public spaces. Even though this is considered a weakness point in this exercise, it is worth noting that in Moukhtara there is the Druze Makam dated since 1700, the Jumblatt palace dating back to the 17th century, in addition to water mills and bridges from the16th century, water falls and the bride pond which make Moukhtara a well deserved village to be full of light not only to provide access to electricity to the citizens as one of their basic needs and rights but also to enlighten the beautiful of this village.

4.4 Performance targets for the building

Testing Protocol Template 4.4: Performance Targets for the building

1/SOUSSE

Environmental targets
The environmental objectives for the buildings in Sahloul 3 are as follows: 1- Reducing the specific consumption of the building for the different forms of energy (electricity and natural gas) will lead to a reduction in CO_2 emissions and consequently to better air quality and a better feeling of comfort. 2- Air filtration will help maintain the health of the building occupants. 3- The addition of the plantation will provide better shade and protection against prevailing winds that affect the thermal balance of heating and cooling. 4- The use of renewable energy will reduce GHG emissions.

Social targets
The only category of the Social, Cultural and Perceptual Aspects (F) theme is "F1.1: Universal access on site and in the building" which is represented by a single indicator active in the simulation, namely: "The scope and quality of the design measures planned to facilitate access and use of the building facilities by disabled people". The latter has a score of 3 so it represents a fairly good performance that will be maintained.

Economic targets
For Theme (G) costs and economic aspects, both categories and related indicators also have acceptable performance ratings: 1- G1.4 Economic costs: for this category, the indicator "Annual energy cost per indoor useful area" has a score of 4.4 2- G1.5 Water costs: the indicator "Annual water cost per internal useful area" scores 4.64 per simulation. The goal is to preserve these scores.

The durability target should be set for the underperforming endpoints identified at the diagnostic phase, using the tables below.

A. Site regeneration and development, urban design and infrastructure				
A2 Site development				
A2.3	**Support for bicycle use**		**Actual Value**	**Target Value**
Percentage of bicycle parking spaces available		%	*0*	12.63
Performance Note			**-1**	**2.7**

B. Energy and resources consumption				
B1 Energy				
B1.2	**Demand for supplied thermal energy**		**Actual Value**	**Target Value**
Thermal energy consumption delivered per internal useful area per year		kWh/m²/yr	*30.5*	14.2
Score			**-1**	**0.4**
B1.4	**Energy from renewable sources in total thermal energy consumption**		**Actual Value**	**Target Value**
Share of renewable energy in final thermal energy consumption		%	*0*	31.2
Score			**-1**	**0.7**
B1.5	**Energy from renewable sources in total electricity consumption**		**Actual Value**	**Target Value**

Share of renewable energy in final electricity consumption	%	*0*	37.6
Score		**-1**	**1.1**
B1.6	**Incorporated non-renewable primary energy**	**Actual Value**	**Target Value**
Non-renewable primary energy incorporated per useful internal floor of the building	.MJ/m²	*814*	814
Score		**-1**	**-1**

B3 Materials

B3.4	**Recycled materials**		**Actual Value**	**Target Value**
Weight of recycled materials on the total weight of materials		%	*8*	8
Score			**-1**	**-1**
B3.5	**Local materials**		**Actual Value**	**Target Value**
Weight of local materials on the total weight of materials		%	*100*	100
Score			**-1**	**-1**

B4 Use of Potable Water, Stormwater and Greywater

B4.3	**Drinking water consumption for indoor use**		**Actual Value**	**Target Value**
Drinking water consumption per occupant per year		m³/{occupant}/y	*175*	86

Score		-1	1
B4.4	**Drinking water consumption for irrigation**	**Actual Value**	**Target Value**
Drinking water consumption/ standardized drinking water consumption	%	60	12
Score		-1	2

D. Quality of the indoor environment

D1 Indoor Air Quality and Ventilation

D1.2	**VOC concentration**	**Actual Value**	**Target Value**
Concentration of VOCs in indoor air		0.6	0.45
Score		-1	0.63

D2 Air temperature and relative humidity

D2.3	**Thermal comfort index**	**Actual Value**	**Target Value**
Expected percentage of dissatisfaction during the cooling season	%	35	19.6
Score		-1	0.2

E. Service Quality			
E1 Controllability			
E1.2	**Smart readiness indicator**	**Actual Value**	**Target Value**
Total intelligent building preparation to meet the needs of occupants, optimize energy performance and interact with energy networks	*%*	*23.06*	48.4
Score		***-1***	***0.7***
E2 Optimization and maintenance of operational performance			
E2.1	**Continuous performance monitoring and verification**	**Actual Value**	**Target Value**
Availability of a comprehensive, long-term plan at the end of the design phase and proof of implementation during the operational phase	*number*	*0*	1.3
Score		***0***	***1.3***
E2.2	**Existence and implementation of a maintenance management plan**	**Actual Value**	**Target Value**
The provision of energy submeter metering systems and water monitoring systems in accordance with the design documentation	*number*	*0*	2
Score		***0***	***2***

H. Adaptation to climate change			
H1: Increasing climate action of temperature			
H1.2	**Heat island effect**	**Actual Value**	**Target Value**

Average solar reflectance index of paved surfaces and roofs in the region	*index*	*27.8*	70
Score		***-1***	***2***
H1.3	**Shading of the building envelope by vegetation**	**Actual Value**	**Target Value**
design/use	*index*	*5*	35.6
Score		***-1***	***0.7***
H1.4	**Shading of the building envelope by vegetation**	**Actual Value**	**Target Value**
Leaf area index: ratio of total vegetated area (soil and rooftop, including trees) divided by total site area	*index*	*8*	38
Score		***-1***	***0***
H2 Climate Action: Storm Flooding			
H2.1	**Stormwater Retention Capacity on Site**	**Actual Value**	**Target Value**
Share of on-site stormwater retention capacity versus optimal retention capacity	*%*	*15.38*	30
Score		***-1***	***1.67***
H4 Climate Action: Drought			
H4.1	**Rainwater harvesting and storage capacity for non-potable uses**	**Actual Value**	**Target Value**
Share of rainwater collected and stored for reuse in roofs and paved area of plot	*%*	*0*	60
Score		***-1***	***1***

2/IRBID

Public Buildings

Environmental targets

To enhance the environmental performance of public buildings within the neighborhood, several targets need to be achieved. First, more vegetated areas and native plants should be planted around the buildings. In terms of energy efficiency, several measures need to be implemented to decrease primary energy consumption and the delivered thermal and electrical energy consumption per internal useful floor area in public buildings. In addition, renewable energy systems need to be developed, such as solar panels to increase the share of renewable energy sources in the final thermal energy consumption of public buildings. Regarding water consumption, sustainable water management practices need to be adopted, including reducing potable water consumption and starting to collect greywater. These actions will improve the overall water sustainability of the public buildings. Solid waste management is another important aspect to take into consideration, as easy access to multiple solid waste collection points within a short distance from building entrances should be secured, in order to improve waste separation and recycling processes.

Social targets

The social performance to be achieved in Public Buildings is to make sure that people with disabilities can easily access and use the building and its facilities. This means adopting the required measures while designing the building in a way that considers their needs and allows everyone to feel included and equal when using the space. Furthermore, implement additional initiatives to raise awareness about the requirements of individuals with disabilities and enhance their inclusion in the formulation of legal laws and policies.

Economic targets
To improve the economic performance of public buildings, emphasis should be placed on energy conservation, with the aim of reducing heating and electricity costs. Utilizing renewable energy sources can result in more stable energy cost management. When constructing buildings, energy-efficient building materials should be prioritized. Management of electricity consumption during peak hours is necessary to prevent costly power surges. Water conservation and efficient usage are also recommended for lowering water costs. These measures can contribute to the improvement of our neighbourhood's public buildings' economic viability. In addition, more initiatives should be implemented to raise awareness of reducing electricity and water consumption. Implement energy audits and cost-effectiveness studies in order to increase awareness of feasibility.

Sustainability target shall be set for the low performing assessment criteria identified in the diagnosis phase, using the tables below.

A. Site regeneration and development, urban design, and infrastructure			
A2 (Site Development)			
A2.1	*Use of native plantings*	*Actual value*	*Target value*
The extent of vegetated landscaped area that is planted with native plants	*%*	*0*	10
Performance score		*0*	*0.5*

B. Energy and resources consumption			
B1 (Energy)			
B1.1	*Primary energy demand*	*Actual value*	*Target value*
Primary energy consumption per internal useful floor area per year	*kWh/m²/a*	*289*	*150*
Performance score		*-1*	*0.33*
B1.2	Delivered thermal energy demand	*Actual value*	*Target value*
Delivered thermal energy consumption per internal useful floor area per year	kWh/m²/a	*70*	*29*
Performance score		*-1*	*0.33*
B1.3	Delivered electrical energy consumption	*Actual value*	*Target value*
Delivered electrical energy consumption per internal useful floor area per year	kWh/m²/a	*201*	*115*
Performance score		*-1*	*0.83*
B1.4	Energy from renewable sources in total thermal energy consumption	*Actual value*	*Target value*

Share of renewable energy in final thermal energy consumptions	%	*12*	*25*
Performance score		*-1*	*0.31*
B1.6	Embodied non-renewable primary energy	*Actual value*	*Target value*
Embodied primary non-renewable energy per building's useful internal floor area	MJ/m²	*903*	*430*
Performance score		*-1*	*0.31*
B2 (Electrical Peak Demand)			
B2.1	Electrical peak demand for building operations	*Actual value*	*Target value*
Average of peak monthly electrical demand for one year	W/m²	*1400*	*90*
Performance score		*-1*	*0.63*
B3 (Materials)			
B3.4	Recycled materials	*Actual value*	*Target value*
Weight of recycled materials on total weight of materials	%	*0*	*20*

Performance score		-1	0.71
B4 (Use of Potable Water, Stormwater and Greywater)			
B4.4	Potable water consumption for irrigation	*Actual value*	*Target value*
Potable water consumption / standardised potable water consumption	%	*100*	*70*
Performance score		*-1*	*0.63*

C. Environmental loadings			
C3 (Solid Wastes)			
C3.2	*Solid waste from building operations*	*Actual value*	*Target value*
Ratio of the number of collectable solid waste categories within a 100 m distance from the building's entrance to the reference solid waste categories	*%*	*0*	50
Performance score		*0*	*2.5*
C1.2	GHG gas emissions during operation	*Actual value*	*Target value*

CO2 equivalent emissions per useful internal floor area per year	*74*	*50*
Performance score	*-1*	*0.77*

F. Social, cultural, and perceptual aspects

FX (Name of the category)

F1.1	*Universal access on site and within the building*		*Actual value*	*Target value*
The scope and quality of design measures planned to facilitate access and use of building facilities by persons with disabilities		*Score*	*0*	1
Performance score			*0*	*1*

H. Adaptation to climate change

HX (Name of the category)

H1.2	*Heat island effect*		*Actual value*	*Target value*
Mean Solar Reflectance Index of paved surfaces and roofs in the area		*index*	*35*	55

Performance score		*-1*	0.5
H1.3	Shading of building envelope by vegetation	*Actual value*	*Target value*
design/in use	*%*	*12*	25
Performance score		*-1*	*0.42*
H2 (Climate Action: Pluvial Flood)			
H2.2	Permeability of land	*Actual value*	*Target value*
Share of the site that is permeable to water	%	*0*	*5*
Performance score		*0*	*1*
H4 (Climate Action: Drought)			
H4.2	Capacity of greywater collection and storage for non-potable uses	*Actual value*	*Target value*
Share of greywater collected and cleaned for reuse	%	*0*	*10*
Performance score		*0*	*0.5*

Residential Buildings

Environmental targets

To enhance the environmental performance of Residential buildings within the neighborhood, several targets need to be achieved. First, more vegetated areas and native plants should be planted around the buildings. In terms of energy efficiency, several measures need to be implemented to decrease primary energy consumption and the delivered thermal and electrical energy consumption per internal useful floor area in public buildings. In addition, renewable energy systems need to be developed, such as solar panels to increase the share of renewable energy sources in the final thermal energy consumption of residential buildings. Regarding water consumption, sustainable water management practices need to be adopted, including reducing potable water consumption and starting to collect greywater. These actions will improve the overall water sustainability of the residential buildings. Solid waste management is another important aspect to take into consideration, as easy access to multiple solid waste collection points within a short distance from building entrances should be secured, in order to improve waste separation and recycling processes.

Social targets

The social performance to be achieved in Residential Buildings is to make sure that people with disabilities can easily access and use the building and its facilities. This means adopting the required measures while designing the building in a way that considers their needs and allows everyone to feel included and equal when using the space. Furthermore, implement additional initiatives to raise awareness about the requirements of individuals with disabilities and enhance their inclusion in the formulation of legal laws and policies.

Economic targets

To improve the economic performance of public buildings, emphasis should be placed on energy conservation, with the aim of reducing heating and electricity costs. Utilizing renewable energy sources can result in more stable energy cost management. When constructing buildings, energy-efficient building materials should be prioritized. Management of electricity consumption during peak hours is necessary to prevent costly power surges. Water conservation and efficient usage are also recommended for lowering water costs. These measures can contribute to the improvement of our neighborhood's public buildings' economic viability. In addition, more initiatives should be implemented to raise awareness of reducing electricity and water consumption. Implement energy audits and cost-effectiveness studies in order to increase awareness of feasibility

Sustainability target shall be set for the low performing assessment criteria identified in the diagnosis phase, using the tables below.

A. Site regeneration and development, urban design, and infrastructure				
A2 (Site Development)				
A2.1	*Use of native plantings*		*Actual value*	*Target value*
The extent of vegetated landscaped area that is planted with native plants		*%*	*0*	10%

Performance score	*0*	*0.5*

B. Energy and resources consumption			
B1 (Energy)			
B1.6	Embodied non-renewable primary energy	*Actual value*	*Target value*
Embodied primary non-renewable energy per building's useful internal floor area	MJ/m²	*903*	*430*
Performance score		*-1*	*0.31*
B2 (Electrical Peak Demand)			
B2.1	Electrical peak demand for building operations	*Actual value*	*Target value*
Average of peak monthly electrical demand for one year	W/m²	*1700*	*90*
Performance score		*-1*	*0.63*
B3 (Materials)			
B3.4	Recycled materials	*Actual value*	*Target value*

Weight of recycled materials on total weight of materials	%	*0*	*20*
Performance score		*-1*	*0.71*
B4 (Use of Potable Water, Stormwater and Greywater)			
B4.4	Potable water consumption for irrigation	*Actual value*	*Target value*
Potable water consumption / standardised potable water consumption	%	*100*	*70%*
Performance score		*-1*	*0.63*

C. Environmental loadings				
C3 (Solid Wastes)				
C3.2	*Solid waste from building operations*		*Actual value*	*Target value*
Ratio of the number of collectable solid waste categories within a 100 m distance from the building's entrance to the reference solid waste categories		*%*	*0*	20
Performance score			*0*	*1*

F. Social, cultural, and perceptual aspects			
FX (Name of the category)			
F1.1	*Universal access on site and within the building*	*Actual value*	*Target value*
The scope and quality of design measures planned to facilitate access and use of building facilities by persons with disabilities	*Score*	*0*	1
Performance score		*0*	*1*

H. Adaptation to climate change			
HX (Name of the category)			
H1.2	*Heat island effect*	*Actual value*	*Target value*
Mean Solar Reflectance Index of paved surfaces and roofs in the area	*index*	*35*	*55*
Performance score		*-1*	0.5
H1.3	Shading of building envelope by vegetation	*Actual value*	*Target value*

design/in use	%	*12*	25
Performance score		*-1*	*0.42*
H2 (Climate Action: Pluvial Flood)			
H2.2	Permeability of land	*Actual value*	*Target value*
Share of the site that is permeable to water	%	*0*	*5*
Performance score		*0*	*1*
H4 (Climate Action: Drought)			
H4.2	Capacity of greywater collection and storage for non-potable uses	*Actual value*	*Target value*
Share of greywater collected and cleaned for reuse	%	*0*	*10*
Performance score		*0*	*0.5*

3/MOUKHTARA

Environmental targets
The environmental targets set under this section are mainly related to shifting the electricity demand related to the municipality building from fuel-based power generated by the public utility and diesel based generated by the backup generator to clean green renewable energy generated by the proposed scenario to install solar PV system to benefit the municipality and the social club. In addition to installing PV solar system, installing solar water heaters for the municipality and club will also reduce the dependance of the building on thermal fuel-based energy to heat water. This change in energy type will affect the indicators under issue B Energy and Resources consumption and associated category B1 Energy. The aforementioned will increase the target of the electricity generated from Renewable energy for the municipality and club building in Moukhtara to 90%. The 10% is as safety factor to account for the rainy days. We are assuming that the thermal energy used for heating the municipality will be reduced by 25% assuming that in winter and during sunny days, the municipality will be able to reduce its dependance on diesel used to run the boilers for heating for 2 hours per day and therefore reducing the thermal energy from 36.17 KWh/m2/year to 27.12KWh/m2/year. Class A appliances need to be installed for the municipality and club building, such as inverter air conditions to consume less current and power and manage efficiently the energy consumption and enhancing the indicator under category E1.1 Effectiveness of facility management control system.

Social targets
There are no social targets forecasted for the Moukhtara municipality building since there are no social indicators ranked as low performance.

Economic targets
There are no economic targets forecasted for the Moukhtara municipality building since there are no social indicators ranked as low performance.

Sustainability target shall be set for the low performing assessment criteria identified in the diagnosis phase, using the tables below.

B. Energy and resources consumption			
B1 (Energy)			
B1.2	Delivered thermal energy demand	*Actual value*	*Target value*
Delivered thermal energy consumption per internal useful floor area per year	kWh/m²/a	*36.17*	25
Performance score		*-1*	*1.67*

B. Energy and resources consumption			
B1 (Energy)			
B1.4	Energy from renewable sources in total thermal energy consumption	*Actual value*	*Target value*
Share of renewable energy in final thermal energy consumptions	%	*0*	25
Performance score		*-1*	*0.31*

B. Energy and resources consumption			
B1 (Energy)			
B1.5	Energy from renewable sources in total electrical energy consumption	*Actual value*	*Target value*
Share of renewable energy in final electric energy consumption	%	*0*	100
Performance score		*-1*	*5*

B. Energy and resources consumption			
B1 (Energy)			
B1.6	Embodied non-renewable primary energy	*Actual value*	*Target value*
Embodied primary non-renewable energy per building's useful internal floor area	MJ/m^2	*3,000*	2500
Performance score		*-1*	*0*
The scenario adopted for the municipality building will not affect this indicator			

B. Energy and resources consumption			
B3 (Materials)			
B3.4	Recycled materials	*Actual value*	*Target value*
Weight of recycled materials on total weight of materials	*%*	*10%*	15%
Performance score		*-1*	*0*
The scenario adopted for the municipality building will not affect this indicator			

C. Environmental loadings			
C1 (Green House gas emissions)			
C1.1	Embodied carbon	*Actual value*	*Target value*
Embodied carbon dioxide equivalents per building’s useful internal floor area	kg{CO2-eq}/m²	*495*	495
Performance score		*-1*	*-1*
The scenario adopted for the municipality building will not affect this indicator			

E. Service quality			
E1 (Controllability)			
E1.1	Effectiveness of facility management control system	*Actual value*	*Target value*
Percentage of control functions within class A	%	*33*	*100*
Performance score		*-1*	*5*

4.5 Constraints and Restrictions for the Building

1/SOUSSE

Constraints/Restrictions	
Legal Constraints	No legal constraints
Technical Constraints	- Small areas on the roof for RE - No room for rainwater collection - No room for more vegetation
Financial constraints	- High investments with long payback period
Environmental Constraints	- Possible problem of shading of solar installations due to the height of the surrounding buildings
Stakeholder-based restrictions	No constraint
Other relevant constraints	- Lack of technical staff in the municipality - Periodicalization of investments in sustainability

2/IRBID

For Public Building:

Constraints/Restrictions	
Legal constraints	- *Jordanian Building codes are generated and conducted through the Jordan National Building Council (JNBC), a department in the Ministry of Public Works and Housing (MPWH). All buildings are obliged to comply with the related building codes requirements by law. The Jordanian Engineers Association (JEA) is responsible of checking design requirements, and the JNBC through the Sustainable Unit (SU) has the on-site monitoring authority, but is still not effective. Consequently, building codes are legal and no permit could be issued before construction unless the design and drawings adhere with the codes, however, enforcement and monitoring of application of the code's requirements are lacking, and cannot be checked after construction.* - *Some of the violations (any that are not related to safety) can go through by only paying a fee, therefore no adjustments are mandatory.* - *Land use is already defined in establish neighborhood, making it difficult to provide extra services for accessibility.* - *No monitoring for inclusion of disability protocols, although regulations and codes provide mandatory applications.*

Technical constraints	- *Lack of capacity, technical skills and data required to design and implement green growth public projects* - *Limited availability of trained human capital and officially certified EE engineers for public buildings construction.* - *Some of the insulation application protocols require awareness of the importance of the complete connected insulation system for the building envelope, hence the seriousness of applying insulation to avoid thermal bridges below windows, on the corners of the walls and ceiling, etc. therefore, only basic application of the insulation is done, to save time and cost.* - *Availability of parking slot around the building is a requirement for the function of the public building, therefore, it is difficult to find cost efficient permeable surface material to cover such parking space.*
Financial constraints	- *Lack of incentive schemes to encourage the use of sustainable factors, either minor or major.* - *The restricted and majority of funding is provided by concessionary lending from development banks, as well as donor aid grants.* - *Continued reliance on external sources leading to energy insecurity, disruption and energy budget challenges.* - *Energy price volatility and supply disruption issues.* - *Lack of Return of Investment studies and Energy Audits, and lack of obligation to perform such studies every interval of time for maintenance.* - *Maintenance and monitoring budget are not a priority; therefore, the cost might be very high due to the need of changing whole systems after failure.*

Environmental constraints	- *Topography of the area is considered flat, whereas no self-shading or topographical shading can be provided, therefore, architectural design is the only way to provide shading opportunities in order to lower urban heat island effects.* - *The climate of Irbid in general is considered hot arid, therefore, rainwater harvesting opportunities are not highly feasible due to low precipitation values annually.* - *Solid waste collecting points are invalid in the neighborhood due to lack of awareness of importance, although governmental strategy is developed.*
Stakeholder based restrictions	- *Top- bottom approach contribute to lack of feasibility of decisions and legislations.* - *Lack of participation for the community with inefficient communication channels.* - *Short termism in planning on the governmental scale* - *Lack of knowledge transfer and communication between the public and private sector*
Other relevant constraints	- *Overlap of ministries responsibilities and lack of coordination between ministries towards common goals* - *Lack of smart systems: recording and reporting of data (by sector), i.e electronic government.* - *Missing liability and validation of information provided, within strategies, plans, and forecasts.* - *Limited EE pilot projects and demonstration sites in Jordan, make it difficult to compare and gain experience from existing success stories.*

Constraints/Restrictions	
Legal constraints	- *Retrofitting existing residential buildings creates some limitations regarding selecting strategies, for example, it doesn't allow changes in some bioclimatic measures such as urban setting, orientation, form and window to wall ratio changes. However, some improvements can be done on important elements such as the building envelope's thermal characteristics. These improvements are: improving the envelope conductivity (U-value), controlling air infiltration, avoiding thermal bridges and controlling condensation according to the mandatory requirement of the Jordanian Thermal Insulation Code.* - *Jordanian Building codes are generated and conducted through the Jordan National Building Council (JNBC), a department in the Ministry of Public Works and Housing (MPWH). All buildings are obliged to comply with the related building codes requirements by law. The Jordanian Engineers Association (JEA) is responsible of checking design requirements, and the JNBC through the Sustainable Unit (SU) has the on-site monitoring authority, but is still not effective. Consequently, building codes are legal and no permit could be issued before construction unless the design and drawings adhere with the codes, however, enforcement and monitoring of application of the code's requirements are lacking, and cannot be checked after construction.* - *Some of the violations (any that are not related to safety) can go through by only paying a fee, therefore no adjustments are mandatory.* - *Applying setbacks regulations according to land size and location can also affect the privacy and cultural values.* - *Inadequate legislation and enforcement that enables residential and private green growth.* - *Land use is already defined in establish neighborhood, making it difficult to provide extra services for accessibility.*

Technical constraints	- *Limited availability of trained human capital and officially certified EE engineers.* - *Some of the insulation application protocols require awareness of the importance of the complete connected insulation system for the building envelope, hence the seriousness of applying insulation to avoid thermal bridges below windows, on the corners of the walls and ceiling, etc. therefore, only basic application of the insulation is done, to save time and cost.* - *some insulation application can decrease the internal area of the space or modify its finishing, therefore are not applied properly.* - *The decorative properties of some of the outdoor surface area are not compatible with SRI values, therefore awareness and more options in the market should be given to the user.*
Financial constraints	- *Lack of incentive schemes to encourage the use of sustainable factors, either minor or major.* - *The restricted and majority of funding is provided by concessionary lending from development banks, as well as donor aid grants.* - *Lack of adequate financing mechanisms to incentivize the private and residential sector to instigate green growth* - *Continued reliance on external sources leading to energy insecurity, disruption and energy budget challenges.* - *Energy price volatility and supply disruption issues.* - *Finishing is more important as first cost for residence when investing in real estate or buying a housing unit, therefore, most of the cost would go into finishing and decorative and non-functional properties of the building, disregarding efficiency and operational cost.* - *Lack of Return of Investment studies and Energy Audits, and lack of obligation to perform such studies every interval of time for maintenance.*
Environmental constraints	- *Topography of the area is considered flat, whereas no self-shading or topographical shading can be provided, therefore, architectural design is the only way to provide shading opportunities in order to lower urban heat island effects.* - *The climate of Irbid in general is considered hot arid, therefore, rainwater harvesting opportunities are not highly feasible due to low precipitation values annually.* - *Small land size and high cost make it difficult to plant trees and green cover around the building without effecting the user space and occupied zones.* - *Solid waste collecting points are invalid in the neighborhood due to lack of awareness of importance, although governmental strategy is developed.*

Stakeholder based restrictions	- *Top- bottom approach contribute to lack of feasibility of decisions and legislations.* - *Lack of participation for the community with inefficient communication channels.* - *Short termism in planning on the governmental scale* - *Lack of knowledge transfer and communication between the public and private sector*
Other relevant constraints	- *Lack of smart systems: recording and reporting of data (by sector), i.e electronic government.* - *Missing liability and validation of information provided, within strategies, plans, and forecasts.* - *Limited EE residential pilot projects and demonstration sites in Jordan, make it difficult to compare and gain experience from existing success stories.* - *Lack of awareness of cost and cost effectiveness of PV systems from the community.*

3/MOUKHTARA

Constraints/Restrictions	
Legal constraints	*The municipality and social club building is a public building managed by the head of municipality and municipality members. The municipality members are aware of and support the proposed scenario. Ther is no law or legal legislation that limit the installation of solar systems at a municipality building as long as the installed capacity is less than 1.5 MW. Once the scenario is in place and prior work initiation, an official letter will be provided by the municipality including the signature of the members and head of the municipality approving the installation of solar systems.*
Technical constraints	*The roof of the municipality is a tiled roof. The engineering procurement construction (EPC) contractor will need to conduct a design study to decide on the orientation and best engineering practices to install the solar panels while increasing the efficiency of the system. Depending on the municipality load, the system capacity and battery, inverter system will be sized.*
Financial constraints	*Installing approx. 24 panels, 4 Life PO4 batteries of 10 KWh capacity each and 2 inverters 8 kWh each with the rquired steel structure and earthing system, this will cost around 28,000 USD to install solar system and solar water heater to benefit the municipality and club building. The Return on investment will be reached in approx. 10 years.*
Environmental constraints	*Lebanon benefit from 300 days of solar, while the remaining 60 days can vary from full raining days to cloudy days, making Lebanon a good environment for solar energy*
Stakeholder based restrictions	*All the municipality members are cooperative and aware of the benefits of the scenario to support in running the municipality and providing the necessary services for the benefiting citizens of Moukhtara*
Other relevant constraints	*There are no specific constraints related to the proposed scenario*

4.6 Sustainability Targets Summary Report for the Building

1/SOUSSE

Weak points to address in the building

The Sahloul 3 Municipal District building, despite its recent construction, has several shortcomings compared to its sustainability. These issues will be addressed in a municipal action plan for a better sustainable performance of the building. The municipality, together with the expert team and the members of the LPC, will seek to address the following sustainability weaknesses:

- Percentage of bicycle parking spaces available
- Thermal energy consumption delivered per internal useful area per year
- Share of renewable energy in final thermal energy consumption
- Share of renewable energy in final electricity consumption
- Drinking water consumption per occupant per year
- Drinking water consumption/ standardized drinking water consumption
- Concentration of VOCs in indoor air
- Expected percentage of dissatisfaction during the cooling season
- Total intelligent building preparation to meet the needs of occupants, optimize energy performance and interact with energy networks
- Availability of a comprehensive, long-term plan at the end of the design phase and proof of implementation during the operational phase
- The provision of energy submeter metering systems and water monitoring systems in accordance with the design documentation
- Average solar reflectance index of paved surfaces and roofs in the region
- Shading of the building envelope by vegetation
- Leaf area index: ratio of total vegetated area (soil and rooftop, including trees) divided by total site area

2/IRBID

Public Buildings

Weak points to address in the building

For public buildings, the weak points to be addressed in the Retrofitting scenario phase in regards to Energy and resources consumption on the both the active and passive levels, one for each scenario, contributing into improvements of the weak points which are:

a)Primary energy consumption per internal useful floor area per year

b)Delivered thermal energy consumption per internal useful floor area per year

c)Delivered electrical energy consumption per internal useful floor area per year

d)Share of renewable energy in final thermal energy consumptions

e)Embodied primary non-renewable energy per building's useful internal floor area

f)Average of peak monthly electrical demand for one year

g)Weight of recycled materials on total weight of materials

On the other hand, other weak points to be addressed in the Public building Retrofitting scenario phase are in regards to Adaptation to climate change and site development, there are a number of synergies between applications that could contribute into multiple advantages when applying the recommendations in the retrofit scenarios, and contributing into improvement of the weak points which are:

a)Mean Solar Reflectance Index of paved surfaces and roofs in the area

b)Share of the site that is permeable to water

Residential Buildings:

Weak points to address in the building

For residential buildings, the weak points to be addressed in the Retrofitting scenario phase in regards to Energy and resources consumption on the both the active and passive levels, one for each scenario, contributing into improvements of the weak points which are:

a)Primary energy consumption per internal useful floor area per year

b)Delivered thermal energy consumption per internal useful floor area per year

c)Delivered electrical energy consumption per internal useful floor area per year

d)Share of renewable energy in final thermal energy consumptions

e)Embodied primary non-renewable energy per building's useful internal floor area

f)Average of peak monthly electrical demand for one year

g)Potable water consumption / standardized potable water consumption

On the other hand, other weak points to be addressed in the residential buildings Retrofitting scenario phase are in regards to Adaptation to climate change and site development. , there are number of synergies between applications that could contribute into multiple advantages when applying the recommendations in the retrofit scenarios, and contributing into improvement of the weak points which are:

a)The extent of vegetated landscaped area that is planted with native plants

b)Shading of building envelope by vegetation

3/MOUKHTARA

Weak points to address in the building
• The electricity used for energy demand is based on the energy provided by the public utility in Lebanon which rely on heavy fuel oil. In addition, the municipality rely on the power provided by the backup generators using diesel oil to cover the power shortage since currently in Lebanon and due to the severe economic situation, the public utility is able to provide maximum 4 hours a day of electricity. To address this weak point, solar PV system will be installed to answer the electricity demand of the municipality and club building turning the municipality into a functional institution and enabling the municipality to provide access to official services to the benefiting community. • The thermal energy used for heating the municipality building is based on diesel oil to feed the heating boiler. The diesel oil is not considered environmentally friendly. Shifting 25% of the municipality heating demand to the energy produced by the solar system will reduce the economic burden on the municipality due to the diesel cost and will move the municipality building toward an environmentally and sustainable building in terms of electricity and heating needs. • The municipality building was built back in 1913 as a traditional building and therefore any change in the building material is not feasible, consequently the scenario proposed for the municipality building will not enhance the indicators related to B3.4 Recycled materials and C1.1 Embodied carbon.

5. RETROFITTING SCENARIOS

5.1 Description of scenarios at urban scale

1/SOUSSE

Scenario #:	*1*
Name of the Scenario	*SCENARIO 1: THE ECOQUARTIER SAHLOUL 3*
Description of the Scenario	The scenario plans to make Sahloul 3 an eco-responsible neighborhood through the implementation of the following objectives: - Development of green areas and vegetation, - Introducing energy sobriety and promoting renewable energy, - Encouragement of eco-construction, - Optimization of water resource management, - Introduction of selective sorting and intelligent management of solid waste, - Reduction of air pollution, - Promotion of soft mobility, - Encouragement of new green urban governance.

RENOVATION WORK	
(A) Use of land and biodiversity	The scenario aims to improve landscaping by expanding the use of evergreen plantations: - along the 14.3 km of streets and avenues of the neighborhood - of the 4.22 Hectares of dedicated green areas according to the urban planning regulation - on all parts of permeable non-buildable parcels (withdrawal areas for individual residences*)* It also plans to encourage green architecture (green roofs, green facades, etc.), which will have a positive impact not only on the well-being and quality of life of the inhabitants, but also on mitigating the effects of climate change such as combating urban heat islands, reducing the carbon footprint, etc.
B) Energy	The scenario will seek to introduce energy efficiency into smart city management: - Implement a solar photovoltaic self-generation system on the roofs of buildings and for the public lighting network for partial or full coverage of needs. This will require the participation of all stakeholders in order to benefit from the high potential of available solar irradiations - Encourage the installation of electric vehicle charging stations, and facilitate parking for electric vehicles - Encourage the reinforcement of the insulation of buildings through the use of suitable materials.
(C) Water	As Tunisia is a country with "High water stress", the scenario aims to involve the neighborhood in the necessary optimization of the whole cycle (water collection, distribution and consumption) through: - The installation of storm water recovery devices to supply water points used for watering. - Encourage the use of water-efficient appliances.

(D) Solid Waste	The aim of the scenario is to get the neighborhood to contribute on its own scale to the general system (outside the competence of the neighborhood or city) of waste treatment including collection, sorting, recycling through: - Implementation of a system for the selective sorting of household waste. - Installation of connected waste bins. - Adoption of a communication and awareness-raising policy for inhabitants on this issue. - Encouraging the installation of relays for collecting recyclable waste
(E) Environmental quality	- Install air quality sensors in the neighborhood and implement a communication and awareness policy - Modulate the displacement and speed of motor vehicles to account for peaks in air pollution if necessary
F) Mobility and Transportion	The aim is to minimize the use of motorized and individual vehicles, which emit too much, by introducing the following measures - Limit the movement of motor vehicles in space and time (e.g. alternating traffic). - Pedestrianizing targeted streets and avenues - Develop continuous and safe bike lanes - Encouraging the use of biofuels in public transport - To help bring people closer to their essential services and to encourage them to make minimum use of commuting. - Helping to increase the density of transit stops
G) Social Aspects	Several social inclusion and cohesion measures can be adopted by the neighborhood, such as: - Equipping green and recreational spaces with play and entertainment facilities for children of all ages will have a very positive impact on their moral and physical health, and will strengthen social inclusion and the quality of life of citizens. - Provide all public spaces that receive the public with access facilities and amenities for people with physical disabilities. - Facilitate travel for the visually impaired through the widespread use of Braille on public spaces, and the use of tactile walking tapes and “guide

	rails" throughout the entire travel chain.
(I) Climate Change: Mitigation and Adaptation	In order to ensure the control of greenhouse gas emissions passes the scenario provides for the following measures: - The green infrastructure (green spaces and vegetation) throughout the neighborhood is able to counter many environmental problems such as global warming, the increase in greenhouse gases and urban heat islands - The carbon footprint of buildings is greatly reduced thanks to planned energy performance measures - Developing eco-construction standards - Encourage or require the use of certifications such as ECOBAT to certify that buildings in the neighborhood comply with strict environmental standards. - Increase soil permeability ratios (and thus rainwater catchment and vegetation) through urban planning regulations
(J) Governance	The objective of the scenario is for citizens to participate in the development of their environment, especially in their daily practices, and for public authorities to be the standard bearer in raising awareness and implementing sustainability approaches, this can be done through: - Communication and awareness-raising campaign among residents on the importance of sustainability issues. - Systematic use of eco-construction standards, existing certifications, optimization of the energy consumption of all buildings, spaces and areas under public authority in the neighborhood.

Quartier SAHLOUL 3 : plan d'affaires du scénario 1

Partenaires et parties prenantes clés

Secteur public:
La municipalité de Sousse
Les ministères de l'Intérieur, de l'Equipement, de l'Environnement et des Finances
La Société Tunisienne d'Electricité et du Gaz (STEG)
La Société Nationale d'Exploitation et de Distribution des Eaux (SONEDE)
Office National d'Assainissement (ONAS)
Agence Nationale de Maitrise de l'énergie (ANME)
Agence Nationale de Protection de l'Environnement (ANPE)
La Caisse des Prets et de Soutien aux Collectivités Locales (CPSCL)
Novation city (Technopole)
Université de Sousse
La Société du Transport du Sahel (STS)

Secteur privé:
Bureaux d'études Ordre des ingénieurs (OIT) architectes (OAT)
Partenaires stratégiques:
STEG, SONEDE, ANME, CPSCL, OAT, OIT, Associations Société Civile

Activités clés

Phase 1 : (sensibilisation/communication)
Campagnes d'information directe en partenariat avec des associations
Coception de supports de sensibilisation et affichage (brochures/capsule vidéo)
Phase 2 : (Diagnostic)
Evaluation du plan d'action Evaluation des besoins
Phase 3 : (Approche participative)
Adoption des lignes stratégiques de renovation et de développement durable .
Phase 4 : (Rénovation à court terme)
Mise en place des mesures ne nécessitant pas de nouvelles règlementations.
Capitalisation des actions séparées des autres programmes
Phase 5 : (Rénovation à moyen et long terme)
Mise en œuvre du plan d'action proposé.

Ressources clés

Humain et physique

Experts et consultants spécialisés
Bureaux d'études et de contrôle
Documentation et normes techniques
Matériel , matériaux et équipements nécessaires

Financement et accès au financement
Fond de transition énergétique (FTE)
Caisse des prets et de soutien aux collectivités locales (CPSCL)
Partenariat publique privé (PPP)
Banque centrale de Tunisie
Programmes nationaux
Programmes de coopération Internationales
Bailleurs de fond étrangers

Les bénéficiaires

Les habitants du quartier et de la ville de Sousse (Inclusion sociale, qualité de vie et bien-être, santé)

Le quartier et la ville de Sousse (Marketing, attractivité et compétitivité territoriales)

La municipalité et l'Etat (maîtrise de la facture énergitique, amélioration de l'environnement)

Dynamisme économique (relance, croissance et développement économique, réduction du chômage et des tensions sociales etc.)

PPP (gains financiers)

Concessionnaires publics et équilibres budgétaires (STEG, SONEDE (moins de stress hydrique))

Scenario #:	**2**
Name of the Scenario	***SCENARIO 2: AN INNOVATIVE AND ATTRACTIVE NEIGHBORHOOD***
Description of the Scenario	In a participatory approach, the City of Sousse has chosen the concept of the 15-minute city, which it has adopted in its future urban development plan and which can be translated into the following renovation axes: **1.** An **innovative** neighborhood anchored in the area and the city. **2.** A complete, **diverse**, **connected** and inclusive living environment that provides a supportive lifestyle for the neighborhood's residents. **3.** A policy of **active** and collective mobility, based on a neighborhood opens to the city. **4.** A network of **integrated** green and public spaces, at the basis of the spatial organization of the neighborhood. ***5.*** An **urban identity** of the place renovated.

RENOVATION INTERVENTIONS	
(A) use of land and biodiversity	• ***Functional diversity:*** Integrate a variety of land uses, including residential, commercial, industrial and recreational, to create a vibrant neighborhood. This can reduce the need for long-distance travel and encourage social interaction. This requires a change in urban regulation • ***Vertical construction**:* Opt for higher buildings to maximize the use of floor space. This can be particularly beneficial in the urban areas of Sahloul 3 by allowing an additional level (3rd floor) for individual constructions. • ***Community gardens and green spaces**:* Develop community gardens and green spaces that serve as places of relaxation and food production (urban agriculture), with the aim of promoting urban biodiversity. For example, green areas that have been developed or equipped should be converted back into a U.V.f. space (dedicated to this type of activity). (Space near Pump Station Avenue of the Future). • ***Multi-purpose public areas**:* Design multi-use public spaces that can be used for a variety of activities, such as markets, cultural events or playgrounds. This encourages the appropriation of space by the community.
B) Energy	• ***Development of an energy plan:*** Develop a plan that identifies targets for reducing energy consumption, using renewable energy and improving energy efficiency. • ***Smart Grids**:* Implement intelligent street lighting, which adapts as needed, uses energy-efficient LED bulbs, and incorporates sensors to detect human presence. • ***Energy storage***: Explore energy storage solutions, such as batteries, to ensure a stable supply of renewable energy, during the summer period, when there is low energy production, leading to a large equipment failure or level of operation. • ***Monitoring and evaluation:*** Put in place monitoring tools and equipment (collective and individual) to measure progress on energy efficiency and clean energy use, to make adjustments if needed. Example: use of mobile and web applications.
(C) Water	By combining the following measures, the neighborhood can not only be made more attractive by making it more sustainable in terms of water management, but also make it more resilient to water-related challenges: • ***Green infrastructure:***

	Integrate green spaces and landscaping in the neighborhood to promote rainwater infiltration and improve water quality. Artificial wetlands can also contribute to water purification. Example (partial development of the green zone east of the neighborhood) • ***Reduction of losses in the water system:*** Improve the efficiency of the water distribution system by repairing leaks and upgrading infrastructure. Use advanced technologies to monitor and control the network. • ***Protection of water resources:*** Encourage the preservation of groundwater, limiting polluting activities and raising awareness in the community of the importance of protecting these resources. • ***Water reuse:*** Explore ways to collect and treat gray water (water from showers, washbasins, etc.) for reuse in irrigation of green spaces. Convert the pumping station located in the neighborhood into a mini STEP (Sewage Treatment Plant). • ***Reducing water consumption:*** Implement awareness programs to encourage residents and institutions to reduce their water use. This may include financial incentives for the installation of water saving devices.
(D) Solid Waste	• ***Technology and tracking:*** Use smart technologies to monitor waste levels, plan collection more efficiently and proactively report problems. • ***Urban design:*** Integrate waste management infrastructure into urban planning, including separate collection points and community composting sites. The municipality of Sousse has planned a center for sorting construction waste in the Sahloul neighborhood 4, which is still to be made operational in the short term. • ***Circular economy:*** Promote the development of the circular economy by encouraging the repair, refurbishment and reuse of products and materials. • ***Waste reduction at source:*** Work with local businesses and businesses to reduce unnecessary packaging and promote online sales. • ***Efficient collection and transport:*** Optimize waste collection routes to reduce costs and carbon footprint. Use of cleaner and more energy efficient vehicles (100% electric household waste trucks) • ***Recycling and recovery of waste:*** Establish partnerships with recycling companies to treat recyclable waste. Encourage the recovery of organic waste through composting or methanization.

	Create a protocol and make agreements with ANGED.
(E) Environmental quality	• ***Reducing industrial emissions:*** Implement strict regulations on industrial emissions near Sahloul 3 and compel them to adopt cleaner technologies. • ***Traffic restrictions:*** Limit restricted traffic areas (RCAs) where only clean vehicles (hybrid, 100% electric) are allowed to operate. • ***Clean public transport:*** Promote the use of clean public transport, such as electric buses, and develop adequate infrastructure (the creation of a clean site in the important rights of way within the district (Avenue Mongi Grira, Avenue de l'Avenir, Avenue Ahmed Noureddine) • ***Pedestrian areas and green areas:*** Transform areas into pedestrian spaces and create more recreationalspaces to reduce pollution, improve air quality and providequalityspaces. The area around the service facilities located east of the neighborhood (Yasser Arafat Avenue and Ahmed Noureddine Avenue).
F) Mobility and Transportation	• ***Soft mobility:*** Promote gentle modes of transportation, such as walking and cycling, by creating user-friendly sidewalks, safe bike lanes and reducing reliance on the car. • ***Open data and mobile applications:*** Provide real-time transportation data and encourage the development of mobile apps to facilitate trip planning. • ***Road safety:*** Improve road safety by reducing speeds, installing safe pedestrian crossings and raising awareness of responsible driving. Horizontal and vertical signage should be concentrated in front of teaching facilities in future primary and secondary schools • ***Free public transport:*** Make public transport free or cheaper to encourage more people to use it. Periodically schedule car-free days organized by the residents of Sahloul neighborhood 3. • ***School mobility plan:*** Encourage walking or cycling for students by working with schools (public and private) to create safe routes. • ***Parking and Smart Connectivity:*** Implement effective real-time parking and signaling management. Mobile apps can help drivers avoid traffic congestion and congestion. • ***Shared mobility:***

	Promoting carpooling, car sharing services and on-demand transportation to reduce the number of vehicles on the road. A partnership with development startups to create a local platform for neighborhood car sharing.
G) Social Aspects	• ***Public Safety:*** Strengthen security in the neighborhood in cooperation with law enforcement and by establishing smart surveillance systems. Increasing use of urban cameras in public spaces, parks and gardens. • ***Accessibility:*** Make the built environment accessible to all, by ensuring that existing public infrastructure, buildings and public spaces are adapted to people with reduced mobility. • ***Inclusive local economy:*** Encourage the creation of artificial intelligence startups led by recent graduates from universities in the immediate area. Ensure economic opportunities for all inhabitants. • ***Accessible public transport:*** Make public transport adapted to disabled and elderly people, by providing dedicated spaces.
(I) Climate Change: Mitigation and Adaptation	• ***Geographical Information Systems (GIS):*** Use GIS to monitor and map water levels in real time, facilitating a rapid response to flooding. • ***Risk Mapping:*** Use advanced mapping technologies to identify at-risk areas and plan safe evacuation routes in the event of flooding. • ***Reduction of impermeable surfaces:*** Promote development practices that reduce impermeable surfaces, such as the installation of permeable pavers and bitumen, to combat flooding and promote groundwater recharge. • ***Artificial Intelligence Integration:*** Use artificial intelligence to analyze weather data, monitor water levels and predict floods.
(J) Governance	• ***Community participation:*** Actively include the community in the planning and design process to ensure that local needs are taken into account • ***Appropriate regulation:*** Establish flexible urban regulations that promote innovation while ensuring high standards of sustainability. • ***The democratization of new technologies:*** Organize awareness campaigns to encourage residents to adopt energy-efficient behaviors and invest in energy-efficient technologies.

Quartier SAHLOUL 3 : plan d'affaires du scénario 2

Partenaires et parties prenantes clés

Secteur public:
La municipalité de Sousse
Les ministères de l'Intérieur, de l'Equipement, de l'Environnement et des Finances
La Société Tunisienne d'Electricité et du Gaz (STEG)
La Société Nationale d'Exploitation et de Distribution des Eaux (SONEDE)
Office National d'Assainissement (ONAS)
Agence Nationale de Maitrise de l'énergie (ANME)
Agence Nationale de Protection de l'Environnement (ANPE)
La Caisse des Prets et de Soutien aux Collectivités Locales (CPSCL)
Agence nationale de gestion des dechets (ANGED)
Novation city (Technopole)
Université de Sousse
La société du transport (STS)
Secteur privé:
Bureaux d'études Ordre des ingénieurs (OIT) architectes (OAT)
Partenaires stratégiques:
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Activités clés

Phase 1 : (sensibilisation/communication)
Campagnes d'information directe en partenariat avec des associations
Coception de supports de sensibilisation et affichage (brochures/capsule vidéo ,,,),
Phase 2 : (Diagnostic)
Evaluation du plan d'action Evaluation des besoins
Phase 3 : (approche participative)
Adoption des lignes strategiques de renovation et de developpement durable .
Phase 4 : (Rénovation à court terme)
Mise en place des mesures ne nécessitant pas de nouvelles règlementations.
Capitalisation des actions séparées des autres programmes
Phase 5 : (Rénovation à moyen et long terme)
Mise en œuvre du plan d'action proposé.

Ressources clés

Humain et physique

Experts et consultants spécialisés
Bureaux d'études et de contrôle
Documentation et normes techniques
Matériel , matériaux et équipements nécessaires

Financement et accès au financement
Fond de transition énergétique (FTE)
Caisse des prets et de soutien aux collectivités locales (CPSCL)
Partenariat publique privé (PPP)
Programmes nationaux
Programmes de coopération Internationales
Bailleurs de fond étrangers

Les bénéficiaires

Les habitants du quartier et de la ville de Sousse (Inclusion sociale, qualité de vie et bien-être, santé)

Le quartier et la ville de Sousse ((Marketing, attractivité et compétitivité territoriales)

La municipalité et l'Etat (maîtrise de la facture énergitique, amélioration de l'environnement)

Dynamisme économique (relance, croissance et développement économique, réduction du chômage et des tensions sociales etc.)

PPP (gains financiers)

Concessionnaires publics et équilibres budgétaires (STEG,SONEDE,,,)

L'agglomération de sousse
Attractivité : investisseurs etranger , dans un environnement économique stable et durable

2/IRBID

Scenario No: 1	*Green Areas, Solid waste management, social Inclusion and safety, climate change mitigation adaptation.*
Name of the scenario	**<u>The Green Scenario</u>** *The Green Scenario aims to create a sustainable and livable environment in Al-Nuzha neighborhood. To achieve this, the use of land and biodiversity will be optimized by increasing the green areas through the implementation of green facades, green roofs, and urban agriculture. Moreover, the micro landscape design will be enhanced by focusing on evergreen planting.*
Description of the scenario	*The Green Scenario proposes a plan to increase the livability and sustainability of the Al-Nuzha neighborhood by introducing renewable energy, improving water and waste management, enhancing green spaces, promoting green transportation, developing green-oriented spaces, and encouraging economic benefits. By introducing renewable energy through on-site renewables, enforcing energy sustainable systems, and relying on Jordan's high solar irradiance values, carbon footprint can be reduced. Water infrastructure capability and efficiency improvements will be made alongside sanitation network maintenance and remediation projects to remove emerging contaminants. Solid waste management will focus on recycling programs, equal distribution of janitors and waste containers, and the implementation of waste disposal landfills as energy sources. The Green Scenario plans to introduce green plots to reduce noise pollution and improve air quality, as well as green mobility to decrease reliance on cars and increase carbon footprint sustainability. The plan includes green-oriented spaces that foster inclusivity, decrease stress levels, enhance social cohesion, and aid children's physical, mental and emotional development. Economic benefits include per capita gross domestic product increases and green financing strategies, and governance interventions suggest encouraging businesses to engage in sustainable practices. Green technology will be implemented to reduce environmental harm and reduce greenhouse gas emissions, while government incentives or regulations will promote sustainable practices overall. The Green Scenario is a comprehensive plan to enhance the livability and sustainability of the local community through efficient land use, green technology adoption, and community involvement..*

Retrofit Interventions	
A) Use of land and biodiversity (1)	Increase the green areas plots in Nuzha neighborhood its recommended to concentrate on the green facade and green roofs as the vacant areas are limited. These systems along with the plantation of the potential site would increase the green areas and improve wellbeing and quality of life as well as the adaptation of climate change. Increase the green space per capita by changing and enforcement of urban planning legislation and codes Enhance urban agriculture among society and provide incentives for families to grow their own food. The surplus produce can be sold in the local market or used to provide healthier food options to residents at affordable prices as well as the organic products, hydroponic, aquaponic and horticulture projects and initiatives. Enhance the micro landscape design concentrating on evergreen planting
B) Energy	Use of renewable energy, this can be achieved by relying on a well developed equipment market related to energy sustainable systems. The on-site renewables must be increased and enforced by-laws of the government as Jordan is blessed to have one of the highest solar irradiance values in the world.
C) Water	• Sanitation network needs regular maintenance, • Upgrade the water and sewerage networks to accommodate the increase in residents. • Improve water infrastructure capability and efficiency • Install a connection to the storm-water drainage system • Upgrade the water network • Provide resilient and sustainable water networks • Provide financial assistance to local governments and authorities to implement remediation projects focused on removing or reducing emerging contaminants from water sources, treatment plants,and distribution systems.
D) Solid waste (2)	Introducing a properly-designed capacity building program in Solid Waste Management Solid waste landfills as source of energy should be implemented taking into consideration the need of equal distribution of recycling collection points involving both private and public sectors(Residential and public sectors) Equal distribution of janitors and waste containers,

	Well established recycling program should be introduced Introduction of recycling centers and green spots and waste banks as well as more advanced treatment through materials recycling facilities (MRFs).
E) Environmental quality	*Its connected to land use strategies as increasing the green plots will enhance the air quality and decrease the noise pollution as this will play a role as noise barrier in specific areas.*
F) Mobility and transportation	Development of green mobility will decrease the dependency on cars which will decrease the carbon footprint along the neighborhood This will also enhance the pedestrian and biking lifestyle for the residents by providing well planned green spaces with good connectivity between different entities
G) Social aspects (3)	Developing the green oriented spaces will reflect on the inclusivity of all the residents including able and disabled people. This will decrease the urban stress level. New planning strategy for green open areas at the educational institutions which will enhance the education level and social cohesion along with various physical and psychological health benefits. More extroverted playground areas for children to overcome the current rapid technology negative effects.Child green areas are essential for a child's physical, mental, and emotional development. They provide a safe and stimulating environment for children to play and explore, which contributes to their overall health and well-being. Additionally, child green areas provide children with a safe and fun place to play, which encourages physical activity and social interaction. Green spaces will offer a sense of belonging and place attachments to the community. These well bring identity to the neighborhood.
H) Economy	The per capita gross domestic product (GDP) has a positive impact on the urban green space rate , thus the economic activity will increase. And the suggested urban agriculture will enhance food security. Green financing strategies will encourage the residents to be engaged in the proposed solutions.
I) Climate change mitigation (4)	*Increasing the green areas and green technology and tools are less harmful to the environment. This will push the neighborhood to a new edge of resilience and adaptation to climate change.* *Introduce government incentives or regulations, such as carbon taxes, cap-and-trade programs, or subsidies for green technologies to reduce their greenhouse gas emissions and mitigate climate change.*

J) Governance	Management of green space will generate employment opportunities. Enhance participatory approach in the management of neighbourhood towards more sense of belonging. Governance and green spaces are closely interconnected as responsible governance ensures the protection and enhancement of green spaces. Governments can use profit interventions to encourage businesses to engage in sustainable practices such as reducing carbon emissions, protecting natural habitats, and promoting biodiversity , including tax incentives and penalties, regulatory measures, and social pressure campaigns. These interventions can encourage businesses to adopt sustainable practices, which can result in improved environmental outcomes, healthier communities, and long-term economic growth.

SN : Green Scenario **1** Business Plan

Key Partners & Stakeholders

Public Sector:
The Greater Irbid Municipality
Ministry of municipal & rural affairs
Ministry of public works and housing
Ministry of Environment
Ministry of Energy and Mineral Resources
JREEEF.
The ministry of Education
Ministry of Human Resources and Social Development
Road Safety Center (German Jordanian University)
Private Sector:
Samsung and LG etc.
Engineering offices
NGO(s)

Strategic Partners:
Central Bank of Jordan
Jordanian Engineers Association
The electrical Company
Meyahona (Water company)
Yarmouk Water Company
Gas Stations and Companies

Key Activities

Phase 1: (Evaluation)

- Promote a holistic overview and better understanding of the urban green space situation, provision and quality as well as the needs, priorities and values of Nuzha inhabitants,

- setting out a clear Vision for how green areas should Look like and Function in the Long run.

Phase 2: (Planning)
- *Ensure Public Participation and Transparency at all Decision Making Stages.*

Phase 3: (Monitoring)
Public Authorities must have Legal powers and authority to Enforce laws that prevent environmental Damage. This can be achieved by developing an approach to mentor the neighborhood.

Key Resources

Human and Physical
Urban planners
Industrial Practitioners
Skilled Labour
Document and fast track privileges
Energy Experts
Sustainability Analysts
Academics
Assessment Tools
Evaluation Tools
Technicians

Financial and access to finance

International Funds
International and national tenders
Private sponsors
Taxes exemptions
Return on Investment percentages
Building area percentage incentives
Lower interest rates
Sales Tax reduction
Sales by installments

Beneficiaries

Government

More citizen participation ,voluntary contribution , Energy savings ,Higher biodiversity

Residents

Social capital ,Aesthetic spaces, Accessibility to green spaces, Cultural benefits .Health benefits, Recreational spaces ,Energy savings

Investors and Practitioners

Green proximity tax -Energy savings

Higher market values -Funding Agencies-

Scenario No: 2	*(Energy, climate Change: mitigation and adaptation, transportation and mobility and water)*
Name of the scenario	**<u>Smart Energy Scenario towards Future</u>** The Smart Energy Scenario towards Future Scenario depicts a future that is characterized by empowering renewable energy towards tackling the most pressing climatic issues and to reduce CO2 emissions. *(e.g., Architecture systems, etc.)*
Description of the scenario	*The Smart Energy Scenario towards Future is a comprehensive plan that promotes renewable energy to tackle climate issues and reduce carbon emissions. The scenario outlines several initiatives, including the use of land and biodiversity to increase energy storage and efficiency. Implementing renewable energy sources such as EV batteries, EV motors, solar PV, and battery storage will provide affordable access to energy and promote clean and renewable energy sources. The efficiency of energy savings can be further improved by adopting green technology and insulation enforcement, funding energy storage projects, building a secure energy supply chain and encouraging the production of critical minerals. The scenario also addresses challenges in water conservation through technology advancements, strategic planning and the use of artificial intelligence (AI). Improving solid waste management through critical mineral recycling, increasing production and monitoring critical minerals demand is also outlined. The Smart Energy Scenario advocates for a smart grid to promote environmental sustainability, including operational security, activation of customer participation in reducing environmental impact and improving quality of life. The scenario also focuses on enhancing global mobility through the use of smart sensors, cameras and traffic lights while reducing energy consumption and outdoor air pollution. Additionally, the scenario addresses financial inclusion, reducing costs and providing new livelihood and market opportunities through digital tools such as mobile money and e-wallets, crowdfunding, and alternative credit scoring. Climate technologies, such as renewable energies and drought-resistant crops, can mitigate greenhouse gas emissions, adapt to climate change, and improve environmental quality. Finally, the scenario encourages social participation and community involvement in planning through smart technologies while using a bottom-up approach. The Smart Energy Scenario towards Future is a comprehensive plan that incorporates technological advancement, community involvement, and green practices to effectively tackle climate change and contribute towards creating sustainable and livableneighborhoods.*
Retrofit Interventions	
A) Use of land and biodiversity	Higher plant diversity leads to more energy stored, greater energy flow and higher energy-use efficiency in the entire network.
B) Energy	Encourage the usage of energy related technology application by enhancing the use of electrolysers, Ev batteries, EV motors, solar PV and battery storage.

	To provide an affordable access to all energy supplies *Concentrating on the energy efficiency* savings, annual costs, and levelized costs of saved energy by relying on clean and renewable energy sources. Regarding the energy consumption, te energy security should have an association between national security and the availability of natural resources for energy consumption. In order to achieve the best energy consumption efficiency, the insulation and use of innovative insulation materials, systems and technology should be enforced by laws during the construction and renovation of buildings. Critical minerals are essential for the production of renewable energy technologies such as solar panels, wind turbines and electric vehicles. Provide funds for the energy storage projects. Building a more secure supply chain: Governments and companies can work together to build a more secure supply chain for energy supply, by diversifying sources of supply and reducing reliance on imported energy sources.
C) Water(4)	Advancements in technology will enhance water conservation, improve efficiency, and protect water quality in the different sectors. Artificial intelligence (AI) and machine learning algorithms can also play a significant role in improving water efficiency. By integrating diverse data sets — from soil and weather conditions can provide sophisticated decision support tools. These tools can help determine the most efficient strategic planning. Making the right choice among resource efficient technologies: The appropriateness of a technology depends on the local situation and the resources available. These include recycling and reuse of water, low water using appliances, efficient irrigation systems, decentralized sewerage systems, information and communication technologies, rainwater catchments and reclamation of nutrients.
D) Solid waste	Recycling: Critical minerals can be recycled from old products, which can help to reduce demand for new minerals which should be achieved through developing new technologies to reduce the demand for critical minerals in some applications. Increasing production: Governments and companies can work together to increase the production of critical minerals, both domestically and internationally by applying smart tracking systems and applications
E) Environmental quality	*Smart Grid for electricity network that can intelligently integrate the actions of all users connected to it in order to efficiently deliver sustainable, economic and secure electricity supplies.* *The smart grid technology of the neighborhood will activate the customer participation by providing Market integration and market access as well as iImprovethe operational security operational security. This will reduce the environmental impact of the whole electricity supply system.*

	Smart city technology like predictive analytics sends data to maintenance teams on any structural changes or cracks in buildings to prevent infrastructure failures and make cities safer.
F) Mobility and transportation(2)	*Smart sensors, cameras and traffic lights can collect adjust routes of cars and public transport according to demand to help improve congestion and traffic flow. This means fewer cars are sitting with engines on in traffic and letting out huge amounts of CO2 emissions. Streetlamps are fitted with smart LED technology which switch on and off automatically based on light data, reducing energy consumption. This reduced outdoor air pollution.* *New mobility technologies will play a significant role in enhancing the quality of life by reducing the climatic harm and reduce relying on the unclean energy sources.*
G) Social aspects	Providing practical experiences, technology also enables more efficient and effective learning. Online courses, e-books, and other digital resources allow healthcare students to access information and resources from anywhere, at any time. Technology can help to achieve advancing agriculture and ensuring food security. Advances in agricultural technology, such as precision farming, drip irrigation, and mechanization, have helped to improve agricultural productivity, reduce costs, and enhance food quality. Digital technology is a tool for cultural interaction. Technology helps in promoting culture and allows the residents to spread their own culture. Advanced technologies can help with the restoration and digitization of tangible cultural heritage needed in the neighborhood.
H) Economy	Digital Tools (e.g., mobile money and e-wallets, crowdfunding, alternative credit scoring, and cross-border remittances) have the potential to support financial inclusion of underserved persons and communities, reduce costs, and provide new livelihood and market opportunities
I) Climate change mitigation	*Climate technologies help us reduce greenhouse gas emissions including renewable energies such as solar power ;which is the most effective in the neighborhood due to the highest solar irradiance values; and hydropower. To adapt to the adverse effects of climate change, climate technologies such as drought-resistant crops and early warning systems can be used.* *Renewable energy reduces greenhouse gasses and protects the climate.* *Smart applications help in raising awareness about climate change impacts on the most vulnerable; easily including vulnerable groups in the adaptation planning and policy-making process; incorporating community-based adaptation into city plans.*
J) Governance	Smart technologies can support *social participation* in the *planning and increase the community involvement in the Nuzha neighborhood. It helps the decision makers to apply the bottom up approach and reach the largest number of residents.*

SN : Smart Energy Scenario 2 Business Plan

Key Partners & Stakeholders

Public Sector:
The Greater Irbid Municipality
Ministry of municipal & rural affairs
Ministry of public works and housing
Ministry of Environment
Ministry of Energy and Mineral Resources
JREEEF.
The ministry of Education
Ministry of Human Resources and Social Development
Ministry of Transportation

Private Sector:
Samsung and LG etc.
Engineering offices
Civil society organizations
NGO(S)

Strategic Partners:
Central bank of Jordan
Jordanian Engineers Association
The electrical Company
Meyahona (Water company)
Yarmouk Water Company
Gas Stations and Companies

Key Activities

Phase 1: (Evaluation), (Smart energy indicators)

- *Promote a holistic overview and better understanding of the current energy situation and emissions of neighborhood. Furthermore, setting out a smart energy scenario , which will focus on future that is characterized by empowering renewable energy towards tackling the most pressing climatic issues and to reduce CO2 emissions and how it will function in the Long run.*

Phase 2: (Planning)

- *Ensure Public Participation and Transparency at all Decision Making Stages. Also, Using innovative technology to build and operate a sustainable energy management system. This can be achieved by integrating artificial intelligence and sensitive energy simulation studies*

Phase 3: (Monitoring)
Public Authorities must have Legal powers and authority to Enforce laws that reduce energy consumption. This can be achieved by developing an approach to mentor the neighborhood through the establishment of energy platform through data mining .

Key Resources

Human and Physical
Urban planners
Industrial Practitioners
Skilled Labour
IT experts
Statistician
Document and fast track privileges
Energy Experts
Sustainability Analysts
Academics
Assessment and Evaluation Tools
Technicians
Private energy companies

Financial and access to finance
International Funds
Green Finance opportunities
International and national tenders
Private sponsors
Taxes exemptions
Return on Investment percentages
Building area percentage incentives
Lower interest rates
Sales Tax reduction
Sales by installments

Beneficiaries

Government

More citizen participation , share of renewable energy in the global energy mix, upgraded technology for supplying modern and sustainable energy services in the neighborhood , voluntary contribution , Energy savings , secured data management analysis , time management and online services , better approach to the residents and this can increase the capability to achieve sustainable development goals that are relevant to energy : for instance, SDG (7) : affordable and clean energy.

Residents

Health and well being benefit ,Energy savings, energy security, accessibility to online services this will reduce the GHG emissions and to ensure that everyone has the opportunity to energy services

Investors and Practitioners

Green proximity tax -Energy savings - Higher market values -Funding Agencies - Technicians

3/MOUKHTARA§

Retrofit Interventions	
Scenario No: 1	*Green Moukhtara*
Name of the scenario	*Renewable Energy for All (REFA)*
Description of the scenario	*The Renewable Energy for ALL scenario consists of:* ➢ *Switching the dependance of Moukhtara village on electricity produced by the thermal energy plants and back up diesel generators to green renewable energy produced by solar photovoltaic panels and storing it in lead acid batteries to overcome the power shortage and long black out hours. The purpose of this scenario is to provide access to clean energy to Moukhtara residents and give them the basic right to affordable, reliable, sustainable, and modern energy for all electricity as per the sustainable development goal 7 (SDG 7).* ➢ *Providing access to heated water by installing solar water heaters at household level to reduce the dependance of households on expensive diesel fuel oil.* ➢ *Switching the traditional high-pressure sodium streetlights to clean energy solar streetlights to increase the safety and visibility of the roads.* ➢ *The REFA scenario will entail the following activities:* ▪ *Installation of solar PV panels for 116 houses consisting of 6 solar panels, 4 lead acid batteries with required inverter and steel structures, cables, panelsand accessories.* ▪ *Installation of 200 Liters solar water heaters for 39 houses with required booster pump and water tank* ▪ *Installation of 185 solar streetlights on existing poles.*

B) Energy	The execution of the REFA scenario will increase the renewable energy share from the total electrical energy to 90% and therefore reducing the energy consumption from the public grid while helping to lower the burden on the electricity produced by the thermal energy. The installation of solar PV for each household in Moukhtara (not having an existing solar system) will increase the level of responsibility of the benefiting families and help them become energy efficient consumer while introducing a positive behavioral change in terms of reducing consumption and the usage of clean energy. The availability of clean power for 24 hours a day will indirectly affect the reliance of households on non-renewable sources like fossil fuel for heating and water heating and therefore reducing the thermal energy consumption from non-renewable energy.
E) Environmental quality	*The implementation of the REFA scenario will indirectly affect the environmental quality in Moukhtara by reducing noise, emissions, and pollution due to shorten in the hours of running of the back-up generators and due to reduction in the power needed to serve the households since the households will be mainly depending on the residential solar systems.*
G) Social aspects	The REFA scenario will indirectly affect the food security since residents will be able to conserve their food and eliminate losses. Thie challenge of throwing food during the peak of the crisis in 2000 and 2001 affected gravely the Lebanese population since storing food was not possible due to the total black out in the country, the lack of knowledge related to renewable energy and the economic crisis which deprived the Lebanese citizens from their purchasing power.
H) Economy	The REFA scenario will directly affect the economy of the Moukhtara residents by lowering the public energy bill and minimizing/cancelling the back-up generators bill. The solar system will support the houses in emergency cases such as total black out in the country which is frequently happening in Lebanon. The REFA scenario will indirectly be creating jobs related to solar systems installation, cleaning and checking purposes.
I) Climate change mitigation	*The REFA scenario will positively impact the climate change mitigation measures by reducing the green houses gas emissions and the reliance on fossil fuel as a source for renewable energy. The residential solar systems for generating electricity, the solar water heaters and solar street lights will transform Moukhtara to a greener urban area in term of Energy adding a light on top of the charming village.*

5.2 Description of scenarios at building scale

1/SOUSSE

the Sahloul3 Municipal District Building

Scenario #:	*1*
Name of the Scenario	***Scenario 1**: Integration of green technologies*
Description of the Scenario	*The scenario foresees interventions to replace different energy-intensive equipment, mainly air conditioning, heat generation, lighting, with others with better energy performance. The integration of renewable energy will reduce the building's carbon footprint. Other actions related to water consumption and air quality will lead to a more sustainable building.*

	Retrofit Interventions
(A) Site Regeneration and Development Urban Design and Infrastructure	*-Set up bicycle parking spaces to activate soft mobility.* *-Redevelop and equip outdoor recreational spaces near the building.* *-Planting trees in the rear garden to shade the south facade of the building, which is highly exposed to the sun, resulting in a reduction in cooling requirements in summer.*
B) Energy and resource consumption	*- The implementation of a SAS at the building entrance will improve the tightness of the reception hall and minimize thermal losses. The municipality may also consider the installation of an air curtain at the entrance door, which will improve the waterproofing but have less impact on durability.* *- Replace the split air conditioning system individual systems at the large service room with central air conditioning using variable volume ventilation (VAV) or variable refrigerant volume (VRV) or variable flow refrigerant (RDV) techniques which all have high energy performance coefficient (EER>3.5)* *- At the office level the existing air conditioners will be replaced by new units of INVERTER type with better energy performance.* *- installation of microwiches on the windows to cut the air conditioning when the windows are open.* *- Add a time schedule on the electrical control of air conditioners to avoid night operation.*

	- Verify and maintain the boiler by adjusting the burner combustion parameters and cleaning the exchanger. Support this action with a periodic maintenance contract with a specialized company. *- To control lighting to ambient light quality by means of photometric sensors which do not allow lighting to be switched on unless there is insufficient natural lighting.* *- Implement third-generation motion detectors in offices and presence sensors in common spaces and premises.* *- Install solar thermal water heaters for domestic hot water (CHW) production* *- Improve the intelligence of the building by installing centralized technical management (GTC/DOMOTIQUE)* *- Designate an energy manager and involve him in the energy management system through the available and functional Energy Management Dashboard at the municipality (TBGE). This will allow better monitoring of energy consumption and rigorous monitoring of the energy performance of the building.* *- Implement a solar photovoltaic self-generation system on the roof of the building for partial or full coverage of needs.* *- Set up a rainwater harvesting device to supply water points used for garden watering.* *- Equip water points and flushes with appropriate economizers to bring water consumption back to normal.* *- Provide for an evaluation of the impact of the energy audit carried out by the municipality of the building and put in place the human and financial resources for the implementation of the proposed action plan.*

(C) Environmental loadings	*- Set up a selective sorting system inside the building in coordination with the system that will be upgraded to neighborhood level.* *- The carbon footprint of the building is significantly reduced through planned energy performance measurements* *- Implementation of recycling and waste management programs to minimize the amount of waste sent to landfills.*
(D) **Indoor Environmental Quality**	*-Placing sunshine on windows will reduce heat input from direct sunlight while maintaining diffuse radiation to allow for natural lighting.* *-The installation of selective stop-ground reflective film will reduce the risk of direct exposure to solar radiation in the reception hall with a glazed facade on the North-West side.* *-Set up an air conditioning system with an adequate filtration system* to ensure a good quality of air breathed in the building. *The system will be equipped with a humidity control and regulation device that will significantly reduce the percentage of dissatisfied people inside the premises.* *-The installation of SAS at the entrance will also reduce the noise coming from the main track in front of the building characterized by a strong road traffic, resulting in better sound insulation.*

E) Service Quality	*- The use of the Energy Management Dashboard will optimize the operating costs of the building by means of the system for generating performance indicators, a project monitoring and planning tool and finally the warning device enabling preventive maintenance operations to be started on time and also reducing corrective maintenance delays, thus improving the quality of the service provided.* *- Centralized Technical Management (GTC) makes use of the best control, regulation and monitoring technologies leading to better energy performance combined with better quality of service.*
(F) Social, cultural and perceptual aspects	*- Take back the entrance ramp for the disabled and make it more adapted to people with reduced mobility.* *- Develop a more accessible service counter for PRMs.* *- Put in place a mechanism to give them priority in the service provided.* *- Obtain certifications such as ECOBAT to attest the building's compliance with strict environmental standards and serve as a model of energy efficiency for occupants and visitors.*
G) Cost and economy	*The energy management dashboard that will be put in place is a powerful tool to monitor both energy and water spending. It makes it possible to monitor and monitor expenditure relating to the consumption and maintenance of energy-intensive equipment. The TBGE also has a project simulator for estimating the costs and calculating the economic profitability of the actions to be implemented.*

H) Adaptation to climate change	- *The tree planting on the SOUTH side improves the shade of the Façades exposed to direct solar radiation.* - *The main façade side tree plantation protects the building from prevailing winds from the north.* - *The installation of a storm water recovery system will reduce water consumption and reduce the amount of runoff that can lead to flooding in the event of heavy rains.*

Financial Schemes and Business Models

for public buildings - Scenario 1

Bâtiment SAHLOUL 3 : plan d'affaires du scénario 1

Partenaires et parties prenantes clés

Secteur public:
La municipalité de Sousse
La société tunisienne d'électricité et du gaz (STEG)
La société tunisienne de distribution des eaux.
Agence Nationale de Maitrise de l'énergie
Agence nationale de protection de l'environnement
La caisse des prets et de soutien aux collectivités locales
Secteur privé:
Bureaux d'études
Ordre des ingénieurs
Ordre des architectes
Partenaires stratégiques:
ANME
CPSCL
OAT
OIT
FNCT
Associations

Activités clés

Phase 1 : (sensibilisation/communication)
Campagnes d'information directe en partenariat avec des associations
Coception de supports de sensibilisation et affichage (brochures/capsule vidéo ,,,),
Phase 2 : (Analyse)
Révision de l'audit énergétique
Evaluation du plan d'action d'EE
Evaluation des besoins et du potentiel PV et solaire thermique
Elaboration des prescriptions techniques des achats durables
Phase 3 : (rénovation mineure)
Mise à jour de la BD du TBGE et édition des rapports d'EE,
Plan de comptage
Plan de maintenance
Entretien préventif et curatif
Phase 4 : (Rénovation majeure)
Mise en œuvre du plan d'action proposé.

Ressources clés

Humain et physique

Experts et consultant
Bureaux d'études et contrôle
Techniciens
Équipements de mesures
Documentation techniques
TBGE

Financement et accès au financement
Fond de transition énergétique (FTE)
Caisse des prets et de soutien aux collectivités locales (CPSCL)
Partenariat publique privé (PPP)
Banque centrale
Programmes nationaux
Programmes de coopération Internationales
Bailleurs de fond

Les bénéficiaires

Gouvernement (réduction de la facture d'électricité et d'eau, amélioration de l'environnement)

Employé de bureau (bien-être et santé)

Citoyen meilleure environnement et qualité de service

Techniciens (productivité et environnement)

PPP (gains financiers)

STEG (demande d'énergie reduite)
SONEDE (moins de stress hydrique)

Scenario #:	*2*
Name of the Scenario	***Scenario 2:*** *Eco-responsible renovation*
Description of the Scenario	*This scenario prioritizes the intervention on the building envelope mainly the actions of insulation of walls and roofs, the choice of adequate carpentry for exterior openings, the increase of green spaces, the use of renewable energies, the adoption of intelligent building management, the replacement of equipment and furniture by others made of recyclable materials and with low incorporated energy.*

	Retrofit Interventions
A) Site Regeneration and Development, Urban Design and Infrastructure	*- Installation of bicycle parking with charging stations for electric bicycles powered by photovoltaic panels installed on the roof of the shelter (to be built).* *- Redevelop and equip outdoor recreational areas near the building.* *- Rehabilitation of the exterior sun coating with a high permeability coating to retain the maximum amount of rainwater by infiltration.*

B) Energy and resource consumption	*- Thermal insulation of roofs by cellular concrete with low density and very low overall coefficient of heat exchange to reduce cold losses and heat input from the most exposed wall of the building.* *- Direct the slope shape to a storm water harvester for later use for watering and cleaning.* *- PVC outdoor carpentry installation with thermal break bridge and double glazing stop-floor with very low emissivity.* *- Treatment of thermal bridges at the building envelope.* *- Add a special layer of white paint to the roof to ensure tightness and reflect direct sunlight while lowering its temperature and improving its thermal insulation performance.* *- Re-insulate the walls of the building envelope with a suitable coating (plaster and additive mixture) applied from the outside and painted in white.* *- Install sunshades over the sun-exposed SOUTH and West openings and install selective interior curtains.* *- Implement openings at the outer walls allowing natural circulation of fresh air by chimney effect.* *- Install economizers on water points mainly washbasins. Modification of flushing by a network of pipes with pressurized water and controlled by pushers.* *- installation of microwiches on the windows to cut the air conditioning when the windows are open.* *- Add a time schedule on the electrical control of air conditioners to avoid night operation.*

	- Reduce lighting consumption by installing new, energy-efficient technology. *Improve building intelligence by installing centralized technical management (GTC/HOME AUTOMATION)* *- Designate an energy manager and involve him in the energy management system through the available and functional Energy Management Dashboard at the municipality (TBGE). This will allow better monitoring of energy consumption and rigorous monitoring of the energy performance of the building.* *To provide for an evaluation of the impact of the energy audit carried out by the municipality on the building and to put in place the human and financial resources for the implementation of the proposed action plan.*
(C) Environmental loadings	*-Set up a selective sorting system inside the building in coordination with the system that will be upgraded to neighborhood level.* *- The carbon footprint of the building is significantly reduced through planned energy performance measures*

***(D)* Indoor Environmental Quality**	*-Mounting of an ambient air filtration device on air conditioners.* *-The installation of selective stop-ground reflective film will reduce the risk of direct exposure to solar radiation in the reception hall with a glazed facade on the North-West side.* *-The installation of SAS at the entrance will also reduce the noise coming from the main track in front of the building characterized by a strong road traffic, resulting in better sound insulation.* *- Addition of humidity controlled fragrant steam diffuser for a better feeling of comfort and lower energy consumption.*
E) Service Quality	*- The scheduling of training sessions for permanent occupants of the building on the subject of energy efficiency, the display of instructions for optimal operation of equipment, the dissemination of awareness spots and information on comfort conditions inside and outside the building increases the sensitivity of space users and promotes good energy efficiency practices.* *-The addition of extractor with a heat recuperator on the reception receiving a large number of visitors allowing a standardized air renewal with a minimum of heat loss.*

(F) Social, cultural and perceptual aspects	*-Take back the entrance ramp for the disabled and make it more adapted to people with reduced mobility.* *- Develop a more accessible service counter for PRMs.* *- Put in place a mechanism to give them priority in the service provided.* *- Obtain certifications such as ECOBAT to attest the building's compliance with strict environmental standards and serve as a model of energy efficiency for occupants and visitors.*
G) Cost and Economics	*- Implementation of sustainable systems, such as energy-efficient lighting and efficient HVAC equipment, reduces ongoing operating costs.* *- Take advantage of tax incentives or subsidies for sustainable construction projects provided by the state, which can help offset the initial costs.* *- The sustainable building will have increased real estate value due to their energy efficiency and reduced environmental impact.* *- Durable materials often have a longer lifespan and require less maintenance, which can reduce maintenance costs over time.*

H) Adaptation to climate change	- *Environmentally responsible buildings are designed to be more energy efficient, reducing emissions from the consumption of electricity and fuels for heating, cooling and lighting.* - *Rainwater harvesting systems and water saving schemes help reduce water consumption, which is crucial in regions facing water stress such as Tunisia.*

Financial Schemes and Business Models

for public buildings - Scenario 2

Bâtiment SAHLOUL 3 : plan d'affaires du scénario 2

Partenaires et parties prenantes clés

Secteur public:
La municipalité de Sousse
Agence Nationale de Maitrise de l'énergie
La caisse des prets et de soutien aux collectivités locales
Centre technique de matériaux de construction
Secteur privé:
Bureaux d'études
Ordre des ingénieurs
Ordre des architectes
Chambres syndicales
Fournisseurs de matériaux et équipements
Partenaires stratégiques:
CTMCCV
CSPI
ANME
CPSCL
OAT
OIT
FNCT
Associations

Activités clés

Phase 1 : (sensibilisation/communication)
Campagnes d'information directe en partenariat avec des associations
Coception de supports de sensibilisation et affichage
Phase 2 : (Analyse)
Etude de rénovation
Lancement de la procédure de certification ECOBAT
Elaboration des prescriptions techniques du dossier de rénovation
Phase 3 : (études et interventions sur l'enveloppe)
Intervention sur les gros œuvres
Intervention sur la menuiserie
Revêtement et peinture
Phase 4 : (études et rénovation majeure)
Intervention sur les équipement de climatisation, Intervention sur l'éclairage, Mise en œuvre des actions d'économie d'eau

Ressources clés

Humain et physique

Experts et consultant
Bureaux d'études et contrôle
Techniciens
Équipements de mesures
Documentation techniques
TBGE

Financement et accès au financement
Fond de transition énergétique (FTE)
Caisse des prets et de soutien aux collectivités locales (CPSCL)
Partenariat publique privé (PPP)
Banque centrale
Programmes nationaux
Programmes de coopération Internationales
Bailleurs de fond

Les bénéficiaires

Gouvernement (réduction de la facture d'électricité et d'eau, amélioration de l'environnement)

Employé de bureau (bien-être et santé)

Citoyen meilleure environnement et qualité de service

Techniciens (productivité et environnement)

PPP (gains financiers)

STEG (demande d'énergie reduite)
SONEDE (moins de stress hydrique)

2/IRBID

Public Building

Scenario No:	*1*
Name of the scenario	***Active** Retrofit of public buildings*
Description of the scenario	*The application of **active** systems to improve energy efficiency and energy consumptions on most levels, including changing active mechanical and lighting systems and control devices and updating energy consuming appliances, in addition to introducing some renewable systems that could contribute to lowering energy consumption and increase the building's adaptation to climate change*

	Retrofit Interventions
A) Site Regeneration and Development, Urban Design and Infrastructure	*-Provide* ***electric car charging stations*** *in the parking lot of the public building, with preferred location close to the entrance(s) of the building, in addition to the handicap car parking locations. This would encourage the use of electric cars and decrease GHG and CO2 emissions.* *-Increase* ***outdoor recreation areas*** *around the public building, by substituting a parking area by a green or outdoor space where vegetation can be provided and shading. This would increase health and wellbeing of users, and lower the heat island effect of the public building.* -***Vegetating*** *the green space should be by native plants or adapted plants. They require low maintenance & consume less water for irrigation.* -***Shading*** *of parking spaces can be provided by adding* ***Photovoltaic panels*** *as a shading element. This would decrease primary energy consumption, & lower the urban heat island effect.*

B) Energy and Resources Consumption	*-Change the **Air-conditioning system** to a high-performance system with energy star label above 50%, with minimum Coefficient of Performance (COP) value according to the Energy Efficient Building code of Jordan.* *-Choose Air Conditioning systems with **refrigerants** with low Ozone depletion values, and Low Global warming values.* *-Change the **boiler** of the heating system to an efficient boiler according to the energy efficient building code* *-Change the **heating system** to be operated with natural gas instead of diesel. In order to increase efficiency and lower cost.* *-Change the **artificial lighting** to highly efficient LED lamps.* *-Change the **hot water system** used in public building to be connected to renewable solar thermal heating system* *-Install **motion detectors and occupancy sensors** to be operated after hours, to save energy, especially in corridors and non-regularly occupied spaces* *-install **heat pumps** with minimum efficiency as required by the energy efficient building code of Jordan* *-Provide **commissioning and verification** of the newly installed system in order to provide the highest possible performance.* *-Plan for regular quarterly **maintenance for elevators** in the public building.* *-Connect all electricity consuming systems with the **BMS** for monitoring and verification.* *-Connect the public building with **a wheeling of renewable energy project**. This would lower primary energy consumption in public buildings.* *-Buy furniture and fixtures with **high recycled content** materials, and encourage the purchase of locally produced products. This would lower the embodied energy and lower the CO_2 footprint of the project.* *-Install **sensor-operated** faucets, and sensor operated toilets, to be operated by occupancy sensors.*

C) Environmental Loadings r	*-providing **energy efficiency measures** through active systems contributes to lowering the GHG footprint of the project.* *-providing **proper access** to and from a solid waste collectable zone encourages the recycling of resources and materials.*
D) **Indoor Environmental Quality**	*-Provide **task lighting** for each office and user, in order to increase controllability of lighting.* *-Provide **thermostat** control in each office to offset the central heating, or cooling whenever needed, this would increase comfort and wellbeing for the occupant.* *-Exchange **all CFL with LED**, with a sufficient lumen index, in order to save energy without compromising the quality of illumination indoors.* *-Prepare a monthly, quarterly and yearly maintenance plan for **Air conditioning filter** cleaning and changing, this would lead to better indoor air quality.* *-Locate **CO2 and VOC sensors** in all occupied spaces, and link them to a central monitoring system*
E) Service Quality	*-**Submetering** of the public building, by providing submetering for each floor at least, and for 2 individual electrical uses to monitor and verify electrical consumption inside the building.* *-Install a **Building Management System (BMS)** that connects all building operation systems and monitors them.* *-The BMS could contribute to **data collection systems**, smart recording of data, and availability of detailed energy consumption levels, leading to creating the base of local and national database platforms.* *-Perform annual **energy audits.*** *-Establish and **document energy goals** and expectations and apply appropriate modeling techniques to assess achievement of the goals.*

F) Social, Cultural and Perceptual Aspects	*-Install **daylight sensors**, where artificial lighting is controlled according to availability of daylight and level of illumination.* *-Provide **door sensors** to open automatically for wheelchair users within entrance(s) and exits.* *-Encourage the use of **outdoor gathering space** for all members of the community, by connecting the area with the outside boundary of the location.*
G) Cost and Economics	*-By choosing **optimized energy efficient systems**, equipment and appliances, with high COPs and by adopting energy star ratings, energy saving will be achieved, and operational costs will be lowered. This should be monitored and gradually adjusted to ensure feasibility of return of investment vs. estimated savings*
H) Adaptation to Climate Change	*-Utilizing the **external top roof** of the public building for **Photovoltaic Panels**, that would insure renewable energy, lower dependence on fuel, lower CO2 and GHG emissions, and lower the heat island effect of the public building footprint by providing shading for the roof.* *-Add a local **rain water reservoir** on site that would collect rainwater from the non-permeable roof, and connect it with the rainwater collected by pathways around the building on site. This would decrease the dependence on potable water used for irrigation, and lower stormwater run-offs.*

Financial schemes and business models

for Public Buildings- Scenario 1

Public Building: Scenario 1 Business Plan

Key Partners & Stakeholders

Public Sector:
The Greater Irbid Municipality
Ministry of Energy and Mineral Resources/ JREEEF.
Ministry of transportation
The ministry of Education
Ministry of Environment
Ministry of Finance
Ministry of Water & Irrigation

Private Sector:
Technology companies (Samsung and LG etc.)
Engineering offices
Commercial Banks

Strategic Partners:
Jordanian Central Bank
Jordanian Engineers Association
Electricity distribution Companies
Miyahuna (Water Authority of Jordan)
Gas Stations and Companies

Key Activities

Phase 1: (Awareness)
Informative Campaigns
Distribution of Information through hardcopy material & virtual platforms
Incentive schemes & initiatives information sessions

Phase 2: (Analytical)
Energy Audits
Life cycle cost analysis studies
Maintenance Plans
Retrofitting plans

Phase 3: (Minor Retrofitting)
Assessment of existing systems maintenance of existing mechanical systems
Changing parts in the systems

Phase 4: (Major Retrofitting)
Changing the mechanical systems
Adding Renewable energy sources
Changing exterior surfaces & renovation.

Key Resources

Human and Physical

Document and fast track privileges
Energy Experts
Educators
Assessment Tools
Evaluation Tools
Technicians
Electronic Government

Financial and access to finance
Taxes exemptions/ Return on Investment percentages
Building area percentage incentives
Lower interest rates/ Sales Tax reduction/ Sales by installments
Current projects & interventions operating in Jordan
Commercial & Islamic banks
Microfinance companies
Local funding organizations/ NGOs

Beneficiaries

Government (lowering the electrical and water bill, environmental enhancement)

Office worker (well-being and health)

Technicians (productivity and environment)

Investors (return of investment)

Funding Agencies (target)

Partners (lower taxes)

Public Building

Scenario No:	*2*
Name of the scenario	***Passive** Retrofit of public buildings*
Description of the scenario	*The application of **passive** systems to improve energy efficiency and energy consumptions on most levels, including changing glazing systems, addition of insulation to avoid thermal bridges, and introducing shading devices.* *, in addition to introducing some changes in the exposed surface materials that could contribute to lowering energy consumption and increase the building's adaptation to climate change.*

	Retrofit Interventions
A) Site Regeneration and Development, Urban Design and Infrastructure	*-Provide **carpool or car share parking spots** in the parking lot of the public building, with preferred location close to the entrance(s) of the building, in addition to the handicap car parking locations. This would encourage the use of less cars per group of people and decrease GHG and CO2 emissions.* *-Increase **outdoor recreation areas** around the public building, by substituting a parking area by a green or outdoor space where vegetation can be provided and shading. This would increase health and wellbeing of users, and lower the heat island effect of the public building.* *-**Vegetating** the green space should be by native plants or adapted plants. They require low maintenance and consume less water for irrigation.* *-Changing the **tiling of the pathways** leading from the parking to the entrance(s) of the public building to a material with high **SRI** value and permeability, such as interlock tiles from light colored material. This would lower the urban heat island effect and increase permeability of the land, and minimize stormwater runoffs.*

B) Energy and Resources Consumption	*-Change the **glazing of the windows** into double glazing with G-value lower than 2.4* *-Change the **frames of the windows** for well-sealed frame and insulted cross-section with U-Value of lower than 2:00* *-Add **thermal insulation on the corners** of the walls and columns, with a U-Value of 0.57 or below, to avoid thermal bridges, and then finish the corners with proper recycled finishing plastering material.* *-Add **thermal insulation** layer above and below **windows**, with a U-Value of 0.57 or below.* *-Add **continuous thermal insulationon the roof** of the buildings, to achieve a U-value of 0.55 or lower. in addition to proper water and vapor insulation. This could also be integrated with a cool roof system as tiling to protect the insulation layer,* *-Add **internal shading** devices to control solar radiation* *-Add **external automated and movable shading** devices to control the admittance of solar radiation whenever needed or unwanted.* *-Encourage the use of **natural ventilation** through operable windows, this would lower energy consumption and increase comfortability.* *-Change the **exterior surfaces color** to white, this would lower the heat absorption of the building, and lower energy consumption used for cooling.* *-Provide a well-ventilated, accessible space for the allocation of **collection bins** for recyclables in the public building.* *-Install **water saving fixtures**, such as low-flow toilets, or dual flush toilets, and low-flow faucets.*

C) Environmental Loadings	*-providing **energy efficiency measures** through passive systems contributes to lowering the GHG footprint of the project.* *-providing **proper access** to and from a solid waste collectable zone encourages the recycling of resources and materials.*
D) **Indoor Environmental Quality**	*-Adjust **floor padding** by choosing materials that are low in VOC, and increase noise control and sound efficiency inside occupied spaces* *-Install **internal shading devices** to control glare, and provide a more comfortable indoor environment for the users.* *-Install a **Low-E film** on the inside of the windows glazing, this would lower glare and decrease uncomfortable solar radiation admittance. This contributes to lowering energy consumption needed for cooling inside the public building.* *-Maintenance of **operable windows** to be easily accessible for opening/closing by the occupant, in order to provide fresh air through ventilation when desired by the user. This would increase the well-being and health of the occupant.* *-Provide **night ventilation** by the operating team through the spring and summer seasons, this would increase indoor air quality, and flush-out pollutants, and help lower the temperature of the building, thus saving energy.*

E) Service Quality	*-Provide **information screens and interactive interfaces** that display energy consumption related data and awareness information for users and visitors of the public building.* *-Provide regular **awareness campaigns** for occupants and visitors of the public building, through flyers, seminars, displays, and interactive exhibitions.* *-Perform annual **energy audits.*** *-Establish and **document energy goals** and expectations and apply appropriate modeling techniques to assess achievement of the goals.*
F) Social, Cultural and Perceptual Aspects	*-**Re-arrange furniture** of public building offices to remove obstacles in front of windows, and provide more exposure to outdoor views and daylight.* *-Adjust **outdoor ramps** to be more comfortable and easier accessibility for wheelchair users. This could be done by decreasing the slope and changing the material to non-slippery.* *-Encourage the use of **outdoor gathering space** for all members of the community, by connecting the area with the outside boundary of the location.*
G) Cost and Economics	*-By retrofitting the **building envelope** to include the minimum requirements of insulation and minimum air leakage and avoid thermal bridges; heating and cooling demand would be **optimized** and energy consumption would decrease due to the high effectiveness of the building envelope* *-The lowered operational cost and small sized mechanical systems optimized to the retrofitted energy saving building envelope would **offset the cost** of retrofit and investment needed.*

H) Adaptation to Climate Change	*-Provide a green **roof**, by planting parts of the roof with native and adapted plants that require low maintenance and minimum irrigation, this would lower the urban heat island effect.* *-Provide **cool roof** materials as cover for non-permeable surfaces on the roof and on the pathways surrounding the footprint of the building. Cool roof materials are materials with high SRI values. This would contribute to lowering the urban heat island effect.* *-Provide greenery &**plantations in the parking lot**. This would add shade and lower the urban heat island effect, and control stormwater runoffs.*

Financial schemes and business models

for Public Buildings- Scenario 2

Public Building: Scenario 2 Business Plan

Key Partners & Stakeholders

Public Sector:
The Greater Irbid Municipality
Ministry of Energy and Mineral Resources
Ministry of transportation
The ministry of Education
Ministry of Environment
Ministry of Finance
Ministry of Water & Irrigation

Private Sector:
Engineering offices
Interior Design Offices
Commercial Banks

Strategic Partners:
Jordanian Central Bank
Jordanian Engineers Association
Electricity distribution Companies
Miyahuna (Water Authority of Jordan)

Key Activities

Phase 1: (Awareness)
Informative Campaigns
Distribution of Information through hardcopy material & virtual platforms
Incentive schemes & initiatives information sessions

Phase 2: (Analytical)
Energy Audits
Maintenance Plans
Retrofitting plans

Phase 3: (Minor Retrofitting)
Assessment of existing systems
maintenance of existing building envelope systems
Changing parts in the systems

Phase 4: (Major Retrofitting)
Changing the fenestration systems
Adding Insulation
Changing exterior surfaces & renovation.

Key Resources

Human and Physical

Document and fast track privileges
Energy Experts
Educators
Assessment Tools
Evaluation Tools
Technicians
Electronic Government

Financial and access to finance
Taxes exemptions/ Return on Investment percentages
Building area percentage incentives
Lower interest rates/ Sales Tax reduction/ Sales by installments
Current projects & interventions operating in Jordan
Commercial & Islamic banks
Microfinance companies
Local funding organizations/ NGOs

Beneficiaries

Government (lowering the electrical and water bill, environmental enhancement)

Office worker (well-being and health)

Technicians (productivity and environment)

Investors (return of investment)

Funding Agencies (target)

Partners (lower taxes)

Residential Building

Scenario No:	*1*
Name of the scenario	***Active** Retrofit of residential buildings*
Description of the scenario	*The application of **active** systems to improve energy efficiency and energy consumptions on most levels, including changing active mechanical and lighting systems and control devices and updating energy consuming appliances, in addition to introducing some renewable systems that could contribute to lowering energy consumption and increase the building's adaptation to climate change*

	Retrofit Interventions
A) Site Regeneration and Development, Urban Design and Infrastructure	*-Provide a shared* ***electric car charging station*** *for the multifamily housing unit in the underground parking provided**.** This would encourage the use of electric cars & decrease GHG & CO2 emissions.* *-Increase the* ***accessibility and walkability of the pavement*** *around the building unit, by rearranging the street furniture and relocating the planting to remove obstacles, without compromising shading. This would increase health and wellbeing of users, and lower the heat island effect of the residential building.* *-**Vegetating** the green space should be by native plants or adapted plants. They require low maintenance and consume less water for irrigation.* *-**Shading** of outdoor parking spaces can be provided covering the wooden roof with* ***Photovoltaic panels*** *on top of the wooden (or clay brick) shading element. This would decrease primary energy consumption, and lower the urban heat island effect.*

B) Energy and Resources Consumption	*-Change the **Air-conditioning system** to a high-performance system with energy star label above 50%, with minimum Coefficient of Performance (COP) value according to the Energy Efficient Building code of Jordan.* *-Choose Air Conditioning systems with **refrigerants** with low Ozone depletion values, and Low Global warming values.* *-Change the **boiler** of the heating system to an efficient boiler according to the energy efficient building code* *-Change the **heating system** to be operated with natural gas instead of diesel. In order to increase efficiency and lower cost.* *-Change the **artificial lighting** to highly efficient LED lamps.* *-Change the **hot water system** used in the residential building to be connected to renewable solar thermal heating system.* *-Install **heat pumps** with minimum efficiency as required by the energy efficient building code of Jordan* *-Plan for regular quarterly **maintenance for elevators** in the residential building.* *-Choose **energy efficient household appliances**, such as microwaves, irons, dryers, etc.* *-Buy furniture and fixtures with **high recycled content** materials, and encourage the purchase of locally produced products. This would lower the embodied energy and lower the CO2 footprint of the project.* *-Change **clothes washing** machines, **dish-washing machines** into low water consumption types, and high energy efficiency according the Jordanian codes.* *-Install **low flow- high pressure** faucets and showers, and **dual flow** operated toilets.* *-Install **low flow- high pressure** faucets for kitchen sinks.*

C) Environmental Loadings r	*-providing **energy efficiency measures** through active systems contributes to lowering the GHG footprint of the household project.* *-providing **proper access** to and from a solid waste collectable zone encourages the recycling of resources and materials.*
***D)* Indoor Environmental Quality**	*-Provide **task lighting** for each room and household space in order to increase controllability of lighting.* *-Provide **thermostat** control in each room or household space to offset the central heating, or cooling whenever needed, this would increase comfort and wellbeing for the occupant.* *-Exchange **all CFL with LED**, with a sufficient lumen index, in order to save energy without compromising the quality of illumination indoors.* *-Prepare a quarterly and yearly maintenance plan for **Air conditioning filter** cleaning and changing, this would lead to better indoor air quality.*
E) Service Quality	*-Perform annual **energy audits.*** *-Establish and **document energy goals** and expectations and apply appropriate modeling techniques to assess achievement of the goals, for one of the household units per building.*
F) Social, Cultural and Perceptual Aspects	*-Install **daylight sensors**, where artificial lighting is controlled according to availability of daylight and level of illumination.* *-Encourage the use of **outdoor gathering space** and include a well ventilated, view-out provided- terrace or balcony per household.*
G) Cost and Economics	*-By choosing **optimized energy efficient systems**, equipment and appliances, with high COPs and by adopting energy star ratings, energy saving will be achieved, and operational costs will be lowered. This should be monitored and gradually adjusted to ensure feasibility of return of investment vs. estimated savings*

H) Adaptation to Climate Change	*-Utilizing the **external top roof** of the residential building for **Photovoltaic Panels**, that would insure renewable energy, lower dependence on fuel, lower CO2 and GHG emissions, and lower the heat island effect of the residential building footprint by providing shading for the roof.* *-Add a local **rain water reservoir** on site that would collect rainwater from the non-permeable roof, and connect it with the rainwater collected by pathways around the building on site. This would decrease the dependence on potable water used for irrigation, and lower stormwater run-offs.*

Financial schemes and business models

for Residential Buildings- Scenario 1

Residential Building: Scenario 1 Business Plan

Key Partners & Stakeholders

Public Sector:
The Greater Irbid Municipality
Ministry of Energy and Mineral Resources/ JREEEF.
The ministry of Education
Ministry of Environment
Ministry of Finance
Ministry of Water & Irrigation

Private Sector:
Technology companies (Samsung and LG etc.)
Engineering offices
Commercial Banks

Strategic Partners:
Jordanian Central Bank
Jordanian Engineers Association
Electricity distribution Companies
Miyahuna (Water Authority of Jordan)
Gas Stations and Companies

Key Activities

Phase 1: (Awareness)
Informative Campaigns
Distribution of Information through hardcopy material & virtual platforms
Incentive schemes & initiatives information sessions

Phase 2: (Analytical)
Energy Audits
Life cycle cost analysis studies
Maintenance Plans
Retrofitting plans

Phase 3: (Minor Retrofitting)
Assessment of existing systems maintenance of existing mechanical systems
Changing parts in the systems

Phase 4: (Major Retrofitting)
Changing the mechanical systems
Adding Renewable energy sources
Changing exterior surfaces & renovation.

Key Resources

Human and Physical

Document and fast track privileges
Energy Experts
Educators
Assessment Tools
Evaluation Tools
Technicians
Electronic Government

Financial and access to finance
Taxes exemptions/ Return on Investment percentages
Building area percentage incentives
Lower interest rates/ Sales Tax reduction/ Sales by installments
Current projects & interventions operating in Jordan
Commercial & Islamic banks
Microfinance companies
Local funding organizations/ NGOs

Beneficiaries

Government (lowering the electrical and water bill, environmental enhancement)

Residence (well-being and health, lower energy ad water bills)

Investors (return of investment)

Funding Agencies (target)

Partners (lower taxes)

Residential Building

Scenario No:	*2*
Name of the scenario	***Passive** Retrofit of residential buildings*
Description of the scenario	*The application of **passive** systems to improve energy efficiency and energy consumptions on most levels, including changing glazing systems, addition of insulation to avoid thermal bridges, and introducing shading devices.* *In addition to introducing some changes in the exposed surface materials that could contribute to lowering energy consumption and increase the building's adaptation to climate change.*

§

	Retrofit Interventions
A) Site Regeneration and Development, Urban Design and Infrastructure	*-Provide a shared* ***electric car charging station*** *for the multifamily housing unit in the underground parking provided****.*** *This would encourage the use of electric cars and decrease GHG and CO2 emissions.* *-Increase* ***outdoor recreation areas*** *around the residential building, by substituting a parking area by a green or outdoor space where vegetation can be provided and shading. This would increase health and wellbeing of users, and lower the heat island effect of the residential building.* *-****Vegetating*** *the green space should be by native plants or adapted plants. They require low maintenance and consume less water for irrigation.* *-Changing the* ***tiling of the pathways*** *leading from the outside of the residential building to the entrance(s) of the to a material with high* ***SRI*** *value and permeability, such as interlock tiles from light colored material. This would lower the urban heat island effect and increase permeability of the land, and minimize stormwater runoffs.*

B) Energy and Resources Consumption	*-Change the **glazing of the windows** into double glazing with G-value lower than 2.4* *-Change the **frames of the windows** for well-sealed frame and insulted cross-section with U-Value of lower than 2:00* *-Add **thermal insulation on the corners** of the walls and columns, with a U-Value of 0.57 or below, to avoid thermal bridges, and then finish the corners with proper recycled finishing plastering material.* *-Add **thermal insulation** layer above and below **windows**, with a U-Value of 0.57 or below.* *-Add **continuous thermal insulationon the roof** of the building, to achieve a U-value of 0.55 or lower. in addition to proper water and vapor insulation. This could also be integrated with a cool roof system as tiling to protect the insulation layer,* *-Add **internal shading** devices to control solar radiation* *-Add **external movable shading** devices to control the admittance of solar radiation whenever needed or unwanted.* *-Encourage the use of **natural ventilation** through operable windows, this would lower energy consumption and increase comfortability.* *-Change the **exterior surfaces color** to light color, this would lower the heat absorption of the building, and lower energy consumption used for cooling.* *-Provide a well-ventilated, accessible space for the allocation of **collection bins** for recyclables in the residential building, most probably underground in the parking level.* *-Install **water saving fixtures**, such as low-flow toilets, or dual flush toilets, and low-flow faucets for W.C and kitchen sinks.*

C) Environmental Loadings	*-providing **energy efficiency measures** through passive systems contributes to lowering the GHG footprint of the project.* *-providing **proper access** to and from a solid waste collectable zone encourages the recycling of resources and materials.*
***D)* Indoor Environmental Quality**	*-Adjust **floor padding** by choosing materials that are low in VOC, and increase noise control and sound efficiency inside occupied spaces* *-Install **internal shading devices** to control glare, and provide a more comfortable indoor environment for the users.* *-Install a **Low-E film** on the inside of the windows glazing, this would lower glare and decrease uncomfortable solar radiation admittance. This contributes to lowering energy consumption needed for cooling inside the residential building.* *-Maintenance of **operable windows** to be easily accessible for opening/closing by the occupant, in order to provide fresh air through ventilation when desired by the user. This would increase the well-being and health of the occupant.* *-Provide **night ventilation** by the residence through the spring and summer seasons, this would increase indoor air quality, and flush-out pollutants, and help lower the temperature of the building, thus saving energy.*
E) Service Quality	*-Provide regular **awareness campaigns** for occupants through flyers, seminars, displays, and interactive exhibitions.* *-Perform annual **energy audits.*** *-Establish and **document energy goals** and expectations and apply appropriate modeling techniques to assess achievement of the goals.*

F) Social, Cultural and Perceptual Aspects	-***Re-arrange furniture*** *of regularly occupied rooms to remove obstacles from in front of windows, and provide more exposure to outdoor views and daylight.* *-Adjust* ***outdoor ramps*** *to be more comfortable and easier accessibility for wheelchair users. This could be done by decreasing the slope and changing the material to non-slippery.* *-Encourage the use of* ***outdoor gathering space*** *and include a well ventilated, view-out provided-terrace or balcony per household*
G) Cost and Economics	*-By retrofitting the* ***building envelope*** *to include the minimum requirements of insulation and minimum air leakage and avoid thermal bridges; heating and cooling demand would be* ***optimized*** *and energy consumption would decrease due to the high effectiveness of the building envelope.* *-The lowered operational cost and small sized heating/ cooling systems optimized to the retrofitted energy saving building envelope would* ***offset the cost*** *of retrofit and investment needed.*
H) Adaptation to Climate Change	*-Provide* ***green roof and green terraces****, by planting parts of the roof with native and adapted plants that require low maintenance and minimum irrigation, this would lower the urban heat island effect.* *-Provide* ***cool roof*** *materials as cover for non-permeable surfaces on the roof and on the pathways surrounding the footprint of the building. Cool roof materials are materials with high SRI values. This would contribute to lowering the urban heat island effect.* *-Provide greenery and* ***plantation on the ground floor/street connecting floor****. This would add shade and lower the urban heat island effect, and control stormwater runoffs.*

Financial schemes and business models

for Residential Buildings- Scenario 2

Residential Building: Scenario 2 Business Plan

Key Partners & Stakeholders

Public Sector:
The Greater Irbid Municipality
Ministry of Energy and Mineral Resources
The ministry of Education
Ministry of Environment
Ministry of Finance
Ministry of Water & Irrigation

Private Sector:
Engineering offices
Interior Design Offices
Commercial Banks

Strategic Partners:
Jordanian Central Bank
Jordanian Engineers Association
Electricity distribution Companies
Miyahuna (Water Authority of Jordan)

Key Activities

Phase 1: (Awareness)
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Key Resources

Human and Physical

Document and fast track privileges
Energy Experts
Educators
Assessment Tools
Evaluation Tools
Technicians
Electronic Government

Financial and access to finance
Taxes exemptions/ Return on Investment percentages
Building area percentage incentives
Lower interest rates/ Sales Tax reduction/ Sales by installments
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Local funding organizations/ NGOs

Beneficiaries

Government (lowering the electrical and water bill, environmental enhancement)

Residence (well-being and health, lower energy ad water bills)

Investors (return of investment)

Funding Agencies (target)

Partners (lower taxes)

3/MOUKHTARA

Scenario No:	*Moukhtara Municipality*
Name of the scenario	*Moukhtara Municipality Greener (MMG)*
Description of the scenario	*The Moukhtara Municipality Green scenario have one specific purpose to provide access to clean electricity and heated water to the municipality and club buildings. The achieved purpose will not only reduce the electricity bills of the municipality building, but it will also empower the municipality as a public institution to be able to accomplish its duties and enhance public services by being able to respond to the residents' queries since the completion of any service require the availability of electricity.* *The scenario aim to install the followings:* ➢ *24 PV solar panels of minimum 550 W each with steel structures.* ➢ *4 LifePO4 storage batteries of 10 KWh each* ➢ *2 inverters 8 KW each* ➢ *Cables, panel, and accessories* ➢ *3 solar water heaters of 250 Liters each with booster pump, cold water tanks, piping and required accessories.* ➢ *Replacing the electrical devices and the municipality and club building to class A to manage electricity consumption and being in compliance with the solar system installed.*

Retrofit Interventions	
B) Energy and Resources Consumption	The MMG scenario will increase the dependance of the municipality and club building on the clean renewable energy and will minimize the reliance on the fossil fuel energy. The solar PV and solar water heater system will move the municipality building toward an energy efficient building since it will be up to 90% independent of the public and back-up generators electricity and therefore energy saving measures will need to be adopted by the municipality employees to sustain the system and increase its benefits. The installation of solar system will reduce the electrical energy consumption of the municipality building from 6,048 KWh/year to 605 KWh/year and the thermal energy from 13,021KWh/year to 9,766 KWh/year this will result in reducing the overall primary energy demand by 54% from 19,070 KWh/year to 10,371 KWh/year. The solar system installed will directly affect the diesel consumption of the municipality needed to heat the municipality building by reducing it up to 25%, this will reduce the consumption of the public resources in terms of electricity and the resources of diesel for heating purposes.
C) Environmental Loadings	*The reduction of electricity demand by 90 % and the thermal demand by 25% will reduce the primary energy demand by 54%. This reduction will result in reducing the green houses gas emissions by avoiding 7,260 KgCO2 equivalent per year due to the execution of MMG scenario.*
***D)* Indoor Environmental Quality**	The scenario will reduce the thermal energy by 25%, meaning that 25% less fossil fuel will be burned by the boiler to heat the municipality building. The reduction of burning fossil fuel will enhance the indoor environmental quality by enhancing the quality of the air and reducing the CO_2 emissions.
E) Service Quality	The replacementof the electrical and electronic devices to class A will enhance the service quality of the equipment in the Moukhtara building.

	Such as replacing the air conditioning with an inverter type condition, replacing the photocopy machine with a class A machine.
F) Social, Cultural and Perceptual Aspects	The availability of power source at the municipality building will help the municipality to be reachable by the residents easily and to enhance the quality of social services provided by the municipality council to the benefit of Moukhtara urban area and residents.
G) Cost and Economics	The shifting of the energy resources to renewable energy will reduce the cost of electricity bills paid by the municipality to the public utility and back-up generator up to 90% from approx. 230$ per month to 25$ per month this will be equal to a saving up to 2,460$ per year. The reduction of 25% of the thermal energy for heating the municipality building will reduce the quantity and cost of fossil fuel by 25% resulting in saving up to 240$ per year.
H) Adaptation to Climate Change	The MMG scenario will increase the adaptation of the municipality building to climate change since extreme weather conditions are one of the main reasons causing failure in the public electricity utility and distribution system. Being 90% independent of the public electricity grid, the municipality is considered as an adaptive building to harsh environment.

Financial schemes and business models

The possible financing of the MMG scenario is through a grant funding to the municipality of Moukhtara. The current economic situation and the devaluation of the Lira compared to the USD make it impossible for the municipality of Moukhtara to finance the MMG from the municipal fund since the Lebanese ministry of interior is not being able to pay the share of the municipalities due to the failing state situation. Even if the ministry of interior is able to finance the municipalities revenues, the amount shared will not be enough to cover the daily needs of the municipality in terms of potable water, cleaning services and stationeryin addition to cover the human resources expenses such as salaries of the employees and transportation fees. While considering that the Moukhtara municipality resides in the Chouf district with around 2800 registered citizens, and based on the available data of 2010, the share of the Moukhtara municipality will be around 1,500$ per year.

Assuming the MMG scenario is funded by the Sustainable Med Cities project, the execution of the scenario will cost around 28,000 USD for the price of the equipment, while adding 10% to 15 % for the design, the total will range between 31,000 and 32,000 USD. This scenario will reach the return on investment in approximately 10 years since the municipality spending on electricity and thermal energy is around 240$ per month.

Phase 6: Decision Making

6.1: Assessment of an urban scale scenario with SNTool

	SOUSSE	IRBID	MOUKHTARA
Scenario #:	**1**	**1**	**1**
Scenario Name	***THE ECOQUARTIER SAHLOUL 3***	***TheGreen Scenario***	***Renewable Energy for All (REFA)***
Scenario #:	**2**	**2**	**2**
Scenario Name	***SAHLOUL 3: AN INNOVATIVE AND ATTRACTIVE DISTRICT***	***Smart Energy Scenario towards Future***	******

A. Use of land and biodiversity													
A2 Urban Green Spaces													
			Sousse1		**Sousse2**		IRBID 1		**IRBID 2**		**Moukhtara**		
A2.1	**Availability of green areas**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	
	Proportion of all vegetation areas within neighborhood boundaries to total area	%	*6.91*	*6.91*	*6.91*	*6.91*	*15*	*17*	*15*	*15*			
	Score		***-1***	***-1***	***-1***	***-1***	*0*	*2*	*0*	*0*			
			Sousse1		**Sousse2**		IRBID 1		**IRBID 2**		**Moukhtara**		
A2.2	**Green spaces in relation to the population of the district**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	
	Total area of greenery in the city divided by the total population of the neighborhood	m²/inhabitant	*14*	*7.42*	*14*	*7.42*	*2.1*	*5*	*2,1*	*2,1*			
	Score		*1*	***0.3***	*1*	***0.27***	*0.75*	*2,1*	*0,75*	*0,75*			
			Sousse1		**Sousse2**		IRBID 1		**IRBID 2**		**Moukhtara**		
A2.3	**Green Area Accessibility**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	
	Percentage of inhabitants with accessibility to green areas						*48*	*55*	*48*	*55*			

	Score						0	0,67	0	0,67		
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
A2.4	**Density of green areas**		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Density of green spaces in the area	%	15	10.7	15	9,52	6,3	7	6,3	15		
	Score		0	-1	0	-1	-1	-1	-1	0		

B. Energy												
B2 (Energy consumptions)			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
B2,1			Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Total final thermal energy consumption for building operations	kWh/m²/a									150	167
	Performance score										1,43	0,21
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
B2.4	*Total final electrical energy consumption for building operations*		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
		Unit of measure										
	Aggregated annual total final electric energy consumption per aggregated internal useful floor area	*kWh/m2/year*					25	23	25	18	5	5
	Performance score						0	0,5	0	1.75	1,43	1,43
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
B2.5	*Total final electrical energy consumption for residential building operations*		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
		Unit of measure										
	Aggragated annual final electrical energy consumption of residential buildings per aggregated ondoor useful floor area	*kWh/m2/year*					15	15	15	12		
	Performance score						0	0	0	1,5		
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
B2.7	***Total primary energy demand for building operations***		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value

	Indicator	Unit of measure								
	Aggregated annual total primary energy consumption per	*kWh/m2/year*	24,3	48	24,3	30	*50*	*50*	*50*	*40*
	Performance score		**1,3**	0,3	**1,3**	2,9	0	0	*0*	*1,43*

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
B3 (Renewable energy)			**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
B3.1	*Share of renewable energy on-site, relative to total final thermal energy consumption for building operations*											
	Indicator :	*Unit of measure*										
	Total consumption of final thermal energy generated from renewable sources on-site divided by total final thermal energy consumption	*%*	40	40	40	20	*10*	*10*	*10*	*25*	*50*	*37*
	Performance score		*0,7*	*0,7*	*0,7*	*-1*	***-1***	***-1***	*-1*	*0*	*1,43*	*0,5*

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
			Target Value	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
B3.4	*Share of renewable energy on-site, relative to final electric energy consumption*											
	Indicator	*Unit of measure*										
	Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption	*%*	100	100	100	50	*40*	*40*	*40*	*42*		
	Performance score		5	5	5	1,4	*0.63*	*0.63*	*0,63*	*0,88*		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
B3.5	Share of renewable energy on-site, relative to total final electric energy consumption for residential building operations		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Indicator	*Unit of measure*										
	Total consumption of final electric energy generated from renewable sources on-site divided by total final electric energy consumption of residential buildings.	*%*									*95*	*90*
	Performance score										*4,64*	*4,29*

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
B3.7	Share of renewable energy on-site, relative to total primary energy consumption for building operations		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**

	Indicator	*Unit of measure*										
	Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption	*%*	*1*	*1*	*1*	*1*	*33*	*33*	*33*	*35*	*30*	*1,11*
	Performance score		-1	-1	-1	-1	*0.21*	*0.21*	*0,21*	*0,36*	*0*	*-1*

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
B3.8	Share of renewable energy on-site, relative to total primary energy consumption for residential building operations		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Indicator	*Unit of measure*										
	Total consumption of primary energy generated from renewable sources on-site divided by total primary energy consumption of residential buildings	*%*									*90*	*90*
	Performance score										*4,29*	*4,29*

C.
Water

C2 Water consumption			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
C2.3	**Drinking water consumption in residential buildings**	*Unit of measure*	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Annual drinking water consumption per occupant	Liters / day / person	*71.5*	*106*	*71.5*	*128*						
	Score		***4.7***	**3.8**	***4.7***	**3,2**						

			Sousse1		Sousse2		IBRID 1		IBRID 2		Moukhtara	
			Target Value	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
C2.6	**Re-use of rainwater in residential buildings**	*Unit of measure*										
	Share of rainwater collected from roofs of residential buildings for reuse	*%*					*5*	*5*	*5*	*10*		
	Score						*0,83*	*0,83*	*0,83*	*1,67*		

D. Solid Waste

D1 Solid waste collection Infrastructure)			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
D1.1			Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Availability of solid waste collection											
	Indicator	*Unit of measure*										
	Percentage of population with regular solid waste collection	*%*					*60*	*65*	*60*	*60*		
	Performance score						*0*	*0,83*	*0*	*0*		

D2 Solid waste management			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
D2.1	**Access to solid waste and recycling collection points**		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Indicator	**Unit of measure**										
	Proximity of the resident population to the solid waste and recycling collection point	**%**					**5**	**10**	**5**	**7**		
	Performance score						**1,32**	**2,63**	**1,32**	**1,84**		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
D2.2	**"Access to solid waste and recycling collection points**		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Indicator	**Unit of measure**										
	Percentage of inhabitants with access to solid waste and recycling collection points within 400 meters walking distance	*%*	92,21	92,21	92,21	92,21	*5*	*10*	*5*	*7*		
	Score		4,3	4,3	4,3	4,3	***1,32***	***2,63***	***1,32***	***1,84***		

E. Environmental quality

E1 Air quality			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
E1.2	**Particle concentration (PM10)**	**Unit of measure**	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Sum of daily concentrations for the whole year divided by 365 days	days/year	21	21	21	21						
	Score		-1	-1	-1	-1						

F. Transportion and Mobility

F2 Green Mobility			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
F2.2	Electric-vehicle infrastructure (charging stations)		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	indicator	Unit of measure										
	Electric vehicle charging stations per inhabitant	1/{inhabitant}					0.01	0.01	0,01	0,04		
	Score						0	0	0	3,75		

F3 Security in mobility			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
F2.3	Bicycle network		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Total length of bicycle paths in the neighborhood per inhabitant	Unit of measure	1	1	1	1	5	5	5	25		
	Score	m/{inhabitant}	-1	-1	-1	-1	0	0	0	2,86		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
F3.1	Pedestrian infrastructure		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Percentage of town designated as pedestrian/car-free	%	10	10	10	10	2	2.5	2	6		
	Score		0	0	0	0	1	1.25	1	3		

G. Social Aspects

G1 Accessibility (persons with disabilities)			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G1.1	Public buildings accessible to physically disabled persons		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Percentage of key public buildings accessible to persons with physical disabilities	%	86,8	86,8	86,8	86,8	5	20	5	10		
Score			4,6	4,6	4,6	4,6	0.19	1.15	0,19	0,51		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G1.2	Sidewalks and other pedestrian pathways accessible to physically disabled persons		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Percentage of sidewalks and other pedestrian pathways accessible to persons with disabilities	%	51	27	51	51						

	Score		0,1	-1	0,1	0,1						
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G1.3	**Sidewalks and other pedestrian pathways accessible to physically disabled persons**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Percent of public buildings that are accessible for use by physically disabled persons	%					52	*70*	52	*70*		
	Score						***0.25***	***2.5***	***0,25***	***2,5***		
G2 Housing			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G2.1	**Affordability of housing property**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	housing properties in the neighbourhood that are financially accessible to the lowest quintile of area population	%					10	*10*	10	*10*		
	Score						***1***	***1***	***1***	***1***		
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G2.2	**Affordability of housing rental**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Percentage of the average salary of the lowest quintile of the population used for rental payments	%					*45*	*40*	*45*	*45*		
	Score						*1.25*	*2.5*	*1,25*	*1,25*		
G3 Availability of public and private facilities and services												
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G3.1	**Availability and proximity of key services**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Percentage of inhabitants within 800 meters of at least 3 essential services on foot	%	40	25	40	25						
	Score		-1	-1	-1	-1						
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G3.2	**Availability and proximity of a public primary school**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Percentage of population near a public primary school	%					*55*	*55*	*55*	*55*		
	Score						*0,68*	*0.68*	*0.68*	*0,68*		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G3.4	**Availability and proximity of children's' play facilities**		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Percentage of population near a children's' play facilities	%					20	22	20	20		
	Score						1.43	2.14	1,43	1,43		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G3.5	**Outdoor public spaces**		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Average share of the built-up area of the neighbourhood that is open space for public use	%					26	27	26	26		
	Performance score						0.56	1.11	0,56	0,56		

G5 Social Inclusion

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G5.1	**Energy poverty of households**		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Percentage of households unable to afford the most basic levels of energy (more than 10% of the income spent on energy bills)	%					9	9	9	9		
	Performance score						1.67	1.67	1,67	3,33		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G6.1	**Police Service**		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Number of police officers per 1.000 inhabitants						4	4	4	4		
	Performance score	1/1000{inhabitant}					2.5	2.5	2.5	2.5		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
G6.2	**Fire service**		Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
	Number of firefighters per 1.000 inhabitants	1/1000{inhabitant}					0.8	0.8	0,8	0,8		
	Performance score						1.04	1.04	1,04	1,04		

G10 Perceptual		Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
	Perceived safety of public areas for pedestrians	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
G10.1	Perceived safety of public places and pedestrian routes, as determined by a sample of pedestrians										
	Score					2	2	*2*	*3*		
	Performance score					*1.25*	*2.5*	*1,25*	*2,5*		

I. CLIMATE CHANGE: Mitigation and Adaptation

I1 Climate change mitigation			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
I1.1	**Greenhouse gas emissions**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Total amount of greenhouse gases in tons (carbon dioxide equivalent) produced in a calendar year divided by the current population of the neighborhood	Tons CO2 equivalent per 7capita	*1.061*	*1.061*	*1.061*	*1.061*					*1,7*	*1,86*
	Score		*5*	*5*	*5*	*5*					*1,5*	*0,7*

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
I1.2	**Greenhouse gas emissions from**											
	residential buildings		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Total amount of greenhouse gases in Kg (units of carbon dioxide equivalent) generated over a calendar year per aggregated inland useful area	Kg CO2 eq/m2	*8,07*	*8,07*	*8,07*	*8,07*						
	Score		***5***	***5***	***5***	***5***						

I2Adaptation to climate action: heat waves and temperature rise			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
I2.2	**Use of vegetation to provide ambient outdoor cooling**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Leaf area index: ratio of total vegetation area (on soil and on roofs, including trees) divided by total site area	Index	18	18	18	18						
	Score		***-1***	***-1***	***-1***	***-1***						

I3 Adaptation to climate action: storm surge			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
I3.3	**Soil permeability**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Share of urban area permeable to water	%	20	10	20	20						
	Score		0	-1	0	0						

I5.1	**" Rainwater collection and storage from buildings for non-potable uses**		Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
			Target Value	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Indicator: share of buildings in the area with a rainwater collection system	Unit of measure							4	7		
	Performance score								1,33	2,33		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
	Raiwater collection and storage from outdoor areas		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
I5.2												
	Share of rainwater collected from paved (not permeable) surfaces in the area (excluding buildings' roofs and plots)	Unit of measure										
		%	4	5	4	5	2	3	2	6		
	Performance score		1,33	1,67	1,33	1,67	1,25	1,88	1.25	3.75		

			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
I5.3	**Greywater collection in buildings for non-potable uses**		**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**	**Target Value**	**Scenario Value**
	Indicator											
		Unit of measure	10	20	10	20	10	10	10	20		
	Share of building in the are with a greywater collection system	%	0.83	1.67	0.83	1.67	0,83	0,83	0,87	1,67		
	Performance score											

J. Governance	Sousse1	Sousse2	IRBID 1	IRBID	Moukhtara

									2			
J1 Urban Planning			Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
J1.1	**Community participation in urban planning activities**											
	Percentage of residents active in public urban planning	Level	3	2	3	3						
	Score		3	2	3	3						
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
J3 Operation of public buildings			Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
J3.1	**Sustainability of public buildings**											
	Percentage of public buildings with recognized sustainability certifications for ongoing operations	%	61.6	50	61.6	50	0,15	0,15	0,15	0,25		
	Score		2.6	1.9	2.6	1.9	0,32	0,32	0,32	1,94		
			Sousse1		Sousse2		IRBID 1		IRBID 2		Moukhtara	
			Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
J3.3	**Energy consumption of public buildings**											
	Total final energy consumption in public buildings of a city	kWh/m2										
	divided by the total indoor useful area of those buildings		25	80	25	80						
	Score		0	-1	0	-1						

	Sousse		Sousse2		IRBID1		IRBID2		Moukhtara	
Issue	Weight	Score	Weight	Score	Weight	Score	Weight	Score	Weight	Score
A. Use of Land and Biodiversity	12.5%	0.02	12.5%	0.27	8	1.18	8	1.18	12%	3.00
B. Energy	12.5%	2.9	12.5%	2.49	13	2.31	13	2.31	24%	2.70
C. Water	12.5%	3.20	12.5%	2.99	11	4.69	11	4.69	18%	4.52
D. Solid Waste	12.5%	2.15	12.5%	2.15	13	0.16	13	0.66	18%	3.29
E. Environmental Quality	9.4%	-0.27	9.4%	-0.27	8	5	8	5	12%	5
F. Transportation and Mobility	9.4%	2.45	9.4%	2.45	11	3.09	11	3.09	6%	-1
G. Social Aspects	9.4%	0.76	9.4%	0.83	11	1.51	11	1.47	6%	3
H. Economy	**	**	***	***	13	5	13	5	***	***
I. Climate Change	12.5%	0.92	12.5%	1.11	8	2.30	8	2.3	6%	0.56
J. Governance	9.4%	0.96	9.4%	1.34	5	2.66	5	2.66	***	***
Total Score	1.51			1.53	2.77		2.84		3.11	

Phase 6: Decision-making SCENARIO 1

6.2:Assessment of a scenario at building-scale with SBTool

	SOUSSE	IRBID 1	IRBID 2	MOUKHTARA
Scenario #:	**1**	**1**	**1**	**1**
Scenario Name	*Integration of green technologies*	*Active*	Active	*Moukhtara Municipality Greener (MMG)*

			SOUSSE		IRBID 1		IRBID 2		MOUKHTARA	
A. Site regeneration and development, urban design and infrastructure										
A2 Site development										
A2.1	Use of native plantings		*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Number of leisure services offered in the outdoor areas of the building		*%*			*10*	10	*10*	10		
Performance score					*0.5*	*0.5*	*0.5*	*0.5*		
A2.2	Provision of outdoor leisure areas		*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Number of leisure services offered in the outdoor areas of the building		*%*	*5*	*5*						
Performance score			*5*	*5*						
A2.3	Help with the use of bicycles		*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*

Percentage of bicycle parking spaces available	%	25	20							
Performance score		5	5							

B. Energy and resource consumption										
B1 Energy										
B1.1	Demand for primary energy	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Primary energy consumption per internal useful area per year	kWh/m²/year	226	226	150	125				
Performance score		3.83	3.83	0.33	2				
B1.2	Demand for supplied thermal energy	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Thermal energy consumption per internal useful area per year	kWh/m²/year	14.2	15	29	21			25	27,12
Performance score		0.4	0	0.33	3			1,67	0,96
B1.3	Power consumption delivered	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Electrical energy consumption per internal useful area per year	kWh/m²/year	80,25	80,25	115	100				

Performance score		2.82	2.82	0.83	12114				
B1.4	Energy from renewable sources in total thermal energy consumption	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Share of renewables in final thermal energy consumption	%	31.2	25	25	25			25	25
Performance score		0.7	0.31	0.31	0.31			0,31	0,31
B1.5	Energy from renewable sources in total electricity consumption	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Share of renewable energy in final electricity consumption	%	37.6	30					100	90
Performance score		1.1	0.63					5	4,38
B1.6	Non-renewable gray primary energy	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Intrinsic non-renewable primary energy per internal building floor area	.MJ/m²	814	814	430	430	430	420		
Performance score		-1	-1	0.31	0.31	0.31	1,88		
B2.1	***Electrical peak demand for building operations***	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Average of peak monthly electrical demand for one year	*W/m²*			90	60	90	70		
Performance score				0.63	2,5	0.63	1,88		

Hardware B3										
B3.4	Recycled materials	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Weight of recycled materials as a percentage of total weight of materials	%	8	8	20	20	20	25		
Performance score		-1	-1	0.71	0.71	0.71	1,34		
B3.5	Local materials	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Weight of local materials over total weight of materials	%	100	100						
Performance score		-1	-1						
B4 Use of Stormwater and Drinking Greywater									
B4.3	Drinking water consumption for domestic uses	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Drinking water consumption per occupant per year	m^3/{occupant}/y	86	100						
Performance score		1	0						
B4.4	Drinking water consumption for irrigation	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Drinking water consumption / standardized drinking water consumption	%	12	12	70	70	70	70		
Performance score		2	2	0.63	0.63	0.63	0.63		

C. Environmental charges

C1. Greenhouse gas emissions									
C1.1	Demand for primary energy	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Embedded carbon	kg{CO_2-eq}/m^2	*2.61*	2.61						
Performance score		*2.72*	*2.72*						
C1.2	Greenhouse gas emissions during operation	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
CO_2 equivalent emissions per indoor useful area per year	kg{CO_2-eq}/m^2	*35.62*	*35.62*	*50*	*30*			30	17
Performance score		*3.63*	*3.63*	*0.77*	*4,62*			4,62	5
C1.3	Life cycle global warming potential	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
CO_2 equivalent emissions per useful internal floor area for a period of 50 years	kg{CO_2-eq}/m^2							7	6,66
Performance score								2,14	2,39
C3. Solid waste									
C3.1	construction waste	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Weight of waste and materials generated per m^2 of indoor useful surface	kg/m^2	*0.01*	0.01						
Performance score		*5*	*5*						
C3.2	Solid waste from building operations	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*

Ratio of the number of collectable solid waste categories within a 100 m distance from the building's entrance to the reference solid waste categories	kg/m²			*50*	*50*	*20*	*20*		
Performance score				*2,5*	*2,5*	*1*	*1*		

D Quality of the indoor environment									
D1 Indoor air quality and ventilation									
D1.2	VOC concentration	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Concentration of VOCs in indoor air	µg/m³	*0.45*	0.5						
Performance score		*0.63*	*0*						
D1.7	Mechanical ventilation	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Mechanical ventilation rate per indoor useful area	l/s/m²	*0.75*	0.75						
Performance score		*1,25*	*1,25*						
D2 Air temperature and relative humidity									
D2.3	Thermal comfort index	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Projected percentage of dissatisfaction during the cooling season	%	*45462*	25						
Performance score		*0.2*	*-1*						
D3. Daylight and lighting									

D3.1	Daylight	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Average daylight factor	%	*4,7*	4,7						
Performance score		*5*	*5*						
D3.2	Daylight arrangement	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Natural light level		*1*	1						
Performance score		*0*	*0*						
D4. Noise and acoustics									
D4.1	Protection against noise: insulation of facades	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Weighted normalized level difference for traffic noise (sound insulation)	dB	*54*	54						
Performance score		*5*	*5*						

E. Quality of services									
Controllability E1									
E1.1	Effectiveness of facility management control system	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Percentage of control functions within class A	%							100	90
Performance score								5	4
E1.2	Intelligent readiness indicator	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Intelligent, total availability of buildings to meet occupants' needs, optimize energy performance and interact with energy networks	%	*48.4*	40					100	90
Performance score		*0.7*	0					4	4,17

E2 Optimize and maintain operational performance

E2.1	Continuous performance monitoring and verification	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Availability of a comprehensive, long-term plan at the end of the design phase and proof of implementation during the operational phase	*number*	*1.3*	1					5	3
Performance score		*1.3*	*1*					5	3
E2.2	Existence and implementation of a maintenance management plan	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
The provision of energy sub-metering systems and water monitoring systems, in accordance with the design documentation	*number*	2	2						
Performance score		2	2						

F. Social, cultural and perceptual aspects

F1: Social aspects

F1.1	Universal access on site and within the building	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
The extent and quality of design measures planned to facilitate access to and use of building facilities by persons with disabilities	*clue*	3	3	*1*	*1*	*1*	*1*		
Performance score		3	3	*1*	*1*	*1*	*1*		

G. Cost and economic aspects									
G1: Cost and economy									
G1.4	Energy cost	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Annual energy cost per indoor useful area	DT/m²/year	26	26					5	0,75
Performance score		*4,4*	*4,4*					5	5
G1.5	Cost of water	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Annual cost of water per indoor useful area	DT/m²/year	*1,3*	1,3						
Performance score		*5*	*5*						

H. Adaptation to climate change									
H1: Climate action temperature increase									
H1.2	Heat island effect	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Average solar reflection index of paved surfaces and roofs of the area	*clue*	*70*	50	*55*	*55*	*55*	*55*		
Performance score		*2*	*0*	*0.5*	*0.5*	*0.5*	*0.5*		
H1.3	Shading of the building envelope by vegetation	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
design/use	*clue*	*35.6*	30	*25*	*25*	*25*	*25*		
Performance score		*0.7*	*0*	*0.42*	*0.42*	*0.42*	*0.42*		
H1.4	Shading of the building envelope by vegetation	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Leaf area index: ratio of total vegetated area (including soil and roofs, and trees) divided by total area of the site.	*clue*	*38*	30						

Performance score		*1*	*0*						

H2: Climate-driven storm flood									
H2.1	Stormwater Retention Capacity on Site	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Share of site stormwater retention capacity versus optimal retention capacity	%	*30*	3.38pm						
Performance score		*-1*	*-1*						
H2.2	Permeability of the land	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Part of the site permeable to water	%	*8*	8	5	5	5	5		
Performance score		*-1*	*-1*	*1*	*1*	*1*	*1*		
H4: Climate Action Project									
H4.1	Stormwater collection and storage capacity for non-potable uses	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Share of rainwater collected and stored for reuse on roofs and paved surfaces of the plot	%	*60*	0						
Performance score		*1*	*-1*						
H4.2	***Capacity of greywater collection and storage for non-potable uses***	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*

Share of greywater collected and cleaned for reuse	*%*			*10*	*10*	*10*	*10*		
Performance score				*0.5*	*0.5*	*0.5*	*0.5*		

SBTool Assessment Results

	SOUSSE		**IRBID 1**		**IRBID 2**		**MOKHTARA**	
Issue	Weight	Score	Weight	Score	Weight	Score	Weight	Score
A. Site Regeneration and Development, Urban Design, and Infrastructure	14	0.04	16%	1,98	16%	1.98	0%	0
B. Energy and Resources Consumption	14	0.06	16%	2,61	16%	1.99	24%	2,66
C. Environmental Loadings	14	0.41	10%	2,54	10%	1.89	18%	2,13
D. Indoor Environmental Quality	11	0.15	13%	2,19	13%	2.92	12%	2,66
E. Service Quality	8	0.07	10%	1,67	10%	3.33	12%	3,6
F. Social, Cultural and Perceptual Aspects	11	0.17	13%	2,39	13%	2.80	12%	1,9
G. Cast and Economic Aspects	14	0.65	13%	1,33	13%	5	18%	5
H. Adaptation to Climate Change	14	-0.05	10%	0.62	10%	0.62	6%	2,26
TOTAL		**1,5**		**1,97**		**2,59**		**2,98**

Phase 6: Decision-making SCENARIO 2

	SOUSSE	IRBID 1	IRBID 2	MOKHTARA
Scenario #:	**2**	**2**	**2**	**2**
Scenario Name	*Eco-responsible renovation*	*Active*	Passive	*Moukhtara Municipality Greener (MMG)*

			SOUSSE		IRBID 1		IRBID 2		MOKHTARA	
A. Site regeneration and development, urban design and infrastructure										
A2 Site development										
A2.1	Use of native plantings		*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Number of leisure services offered in the outdoor areas of the building		*%*			*10*	20	*10*	20		
Performance score					*0.5*	*1*	*0.5*	*1*		
A2.2	Provision of outdoor leisure areas		*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Number of leisure services offered in the outdoor areas of the building		*%*	*5*	*5*						
Performance score			*5*	*5*						

A2.3	Help with the use of bicycles	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Percentage of bicycle parking spaces available	%	25	20						
Performance score		5	5						

B. Energy and resource consumption									
B1 Energy									
B1.1	Demand for primary energy	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Primary energy consumption per internal useful area per year	kWh/m²/year	226	226	150	150				
Performance score		3.83	3.83	0.33	0,33				
B1.2	Demand for supplied thermal energy	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Thermal energy consumption per internal useful area per year	kWh/m²/year	14.2	14.2	29	25				
Performance score		0.4	0.4	0.33	1,67				
B1.3	Power consumption delivered	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Electrical energy consumption per internal useful area per year	kWh/m²/year	80,25	80,25	115	115				
Performance score		2.82	2.82	0.83	0,83				
B1.4	Energy from renewable sources in total thermal energy consumption	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value

Share of renewables in final thermal energy consumption	%	31.2	0	25	25				
Performance score		0.7	-1	0.31	0.31				
B1.5	Energy from renewable sources in total electricity consumption	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Share of renewable energy in final electricity consumption	%	37.6	0						
Performance score		1.1	-1						
B1.6	Non-renewable gray primary energy	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Intrinsic non-renewable primary energy per internal building floor area	.MJ/m²	814	814	430	430	430	430		
Performance score		-1	-1	0.31	0.31	0.31	0,31		
B2.1	***Electrical peak demand for building operations***	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Average of peak monthly electrical demand for one year	*W/m²*			90	80	90	80		
Performance score				0.63	1,25	0.63	1,25		

Hardware B3									
B3.4	Recycled materials	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Weight of recycled materials as a percentage of total weight of materials	%	8	8	20	20	20	20		
Performance score		-1	-1	0.71	0.71	0.71	0,71		
B3.5	Local materials	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Weight of local materials over total weight of materials	%	100	100						
Performance score		-1	-1						

B4 Use of Stormwater and Drinking Greywater									
B4.3	Drinking water consumption for domestic uses	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Drinking water consumption per occupant per year	m³/{occupant}/y	*86*	100						
Performance score		*1*	*0*						
B4.4	Drinking water consumption for irrigation	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Drinking water consumption / standardized drinking water consumption	*%*	*12*	12	*70*	*60*	*70*	*60*		
Performance score		2	2	*0.63*	*1,25*	*0.63*	*1,25*		

C. Environmental charges									
C1. Greenhouse gas emissions									
C1.1	Demand for primary energy	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Embedded carbon	kg{CO2-eq}/m²	*2.61*	2.61						
Performance score		*2.72*	2.72						
C1.2	Greenhouse gas emissions during operation	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
CO2 equivalent emissions per indoor useful area per year	kg{CO2-eq}/m²	*35.62*	35.62	*50*	*45*				
Performance score		*3.63*	3.63	*0.77*	*1,73*				
C1.3	Life cycle global warming potential	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
CO2 equivalent emissions per useful internal floor area for a period of 50 years	kg{CO2-eq}/m²								

Performance score									
C3. Solid waste									
C3.1	construction waste	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Weight of waste and materials generated per m2 of indoor useful surface	kg/m²	*0.01*	0.01						
Performance score		*5*	*5*						
C3.2	Solid waste from building operations	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Ratio of the number of collectable solid waste categories within a 100 m distance from the building's entrance to the reference solid waste categories	kg/m²			*50*	*50*	*50*	*50*		
Performance score				*2,5*	*2,5*	*2,5*	*2,5*		

D Quality of the indoor environment									
D1 Indoor air quality and ventilation									
D1.2	VOC concentration	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Concentration of VOCs in indoor air	μg/m³	*0.45*	0,15						
Performance score		*0.63*	*0,63*						
D1.7	Mechanical ventilation	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Mechanical ventilation rate per indoor useful area	l/s/m²	*0.75*	0.75						
Performance score		*1,25*	*1,25*						
D2 Air temperature and relative humidity									
D2.3	Thermal comfort index	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Projected percentage of dissatisfaction during the cooling season	%	*19,6*	*19,6*						
Performance score		*0.2*	*0,2*						
D3. Daylight and lighting									

D3.1	Daylight	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Average daylight factor	%	4,7	4,7						
Performance score		5	5						
D3.2	Daylight arrangement	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Natural light level		1	1						
Performance score		0	0						
D4. Noise and acoustics									
D4.1	Protection against noise: insulation of facades	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Weighted normalized level difference for traffic noise (sound insulation)	dB	54	54						
Performance score		5	5						

E. Quality of services									
Controllability E1									
E1.1	Effectiveness of facility management control system	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Percentage of control functions within class A	%								
Performance score									
E1.2	Intelligent readiness indicator	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Intelligent, total availability of buildings to meet occupants' needs, optimize energy performance and interact with energy networks	%	48.4	48						
Performance score		0.7	0,67						
E2 Optimize and maintain operational performance									

E2.1	Continuous performance monitoring and verification	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Availability of a comprehensive, long-term plan at the end of the design phase and proof of implementation during the operational phase	*number*	1.3	1,3						
Performance score		1.3	1,3						
E2.2	Existence and implementation of a maintenance management plan	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
The provision of energy sub-metering systems and water monitoring systems, in accordance with the design documentation	*number*	2	2						
Performance score		2	2						

F. Social, cultural and perceptual aspects									
F1: Social aspects									
F1.1	Universal access on site and within the building	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
The extent and quality of design measures planned to facilitate access to and use of building facilities by persons with disabilities	*clue*	3	3	1	1	1	1		
Performance score		3	3	1	1	1	1		

G. Cost and economic aspects									
G1: Cost and economy									
G1.4	Energy cost	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*

Annual energy cost per indoor useful area	DT/m²/year	26	26						
Performance score		4,4	4,4						
G1.5	Cost of water	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Annual cost of water per indoor useful area	DT/m²/year	1,3	1,3						
Performance score		5	5						

H. Adaptation to climate change									
H1: Climate action temperature increase									
H1.2	Heat island effect	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Average solar reflection index of paved surfaces and roofs of the area	clue	70	70	55	55	55	55		
Performance score		2	2	0.5	0.5	0.5	0.5		
H1.3	Shading of the building envelope by vegetation	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
design/use	clue	35.6	35,6	25	25	25	25		
Performance score		0.7	0,7	0.42	0.42	0.42	0.42		
H1.4	Shading of the building envelope by vegetation	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value
Leaf area index: ratio of total vegetated area (including soil and roofs, and trees) divided by total area of the site.	clue	38	38						
Performance score		1	1						

H2: Climate-driven storm flood									
H2.1	Stormwater Retention	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value	Target Value	Scenario Value

	Capacity on Site								
Share of site stormwater retention capacity versus optimal retention capacity	%	*30*	30						
Performance score		*-1*	*-1*						
H2.2	Permeability of the land	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Part of the site permeable to water	%	8	8	5	5	5	5		
Performance score		*-1*	*-1*	*1*	*1*	*1*	*1*		
H4: Climate Action Project									
H4.1	Stormwater collection and storage capacity for non-potable uses	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Share of rainwater collected and stored for reuse on roofs and paved surfaces of the plot	%	60	60						
Performance score		*1*	*1*						
H4.2	***Capacity of greywater collection and storage for non-potable uses***	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*	*Target Value*	*Scenario Value*
Share of greywater collected and cleaned for reuse	*%*			*10*	*10*	*10*	*10*		
Performance score				*0.5*	*0.5*	*0.5*	*0.5*		

SBTool Assessment Results

	SOUSSE		IRBID 1		IRBID 2		MOKHTARA	
Issue	Weight	Score	Weight	Score	Weight	Score	Weight	Score
A. Site Regeneration and Development, Urban Design, and Infrastructure	14	0.04	16%	2.2	16%	2.20	****	****
B. Energy and Resources Consumption	14	0.07	16%	2.1	16%	1.73	****	****
C. Environmental Loadings	14	0.41	10%	1.82	10%	2.64	****	****
D. Indoor Environmental Quality	11	0.18	13%	2.19	13%	2.92	****	****
E. Service Quality	8	0.10	10%	1.67	10%	3.33	****	****
F. Social, Cultural and Perceptual Aspects	11	0.17	13%	2.39	13%	2.8	****	****
G. Cast and Economic Aspects	14	0.65	13%	1.33	13%	5	****	****
H. Adaptation to Climate Change	14	0,07	10%	0.62	13%	0.62	****	****
TOTAL		**1,79**		**1,85**		**2,66**	****	****

6.3: Calculation of the Sustainability Global Score

SOUSSE		IRBID 1		MOKHTARA	
Assessment	**Weight (%)**	**Assessment**	**Weight (%)**	**Assessment**	**Weight (%)**
Sahloul Neighborhood 3	90	Urban Area	80	Moukhtara Urban Area	90%
Building Arrondissement Municipal Sahloul 3	10	Building A - Public	8	Municipality Building	10%
**	**	Building B - Residential	12	**	**

SOUSSE

Scenario #:		**1**	
Scenario name:		**Eco-Neighborhood / Integration Green Technologies**	
Assessment	*Assessment Score (z)*	*Prioritylevel (y)*	*Weighted Assessment (Z x Y)*
Sahloul 3 SNTool	*1.51*	*0.90*	*1,359*
Building Arrondissement Municipal Sahloul 3 SBTool	*1.50*	*0.10*	*0.15*
Global Sustainability Score			***1.51***

Scenario #:	2		
Scenario name:	Innovative and attractive neighborhood / Integration Technologies Vertes		
Assessment	*Assessment Score (z)*	*Prioritylevel (y)*	*Weighted Assessment (Z x Y)*
Sahloul 3 SNTool	*1.53*	*0.90*	*1,377*
Building Arrondissement Municipal Sahloul 3 SBTool	*1.50*	*0.10*	*0.150*
Global Sustainability Score			***1.53***

Scenario #:	3		
Scenario name:	Eco-Quartier / Renovation Eco-Responsible		
Assessment	*Assessment Score (z)*	*Weightprioritylevel (y)*	*Weighted Assessment (Z x Y)*
Sahloul 3 SNTool	*1.51*	*0.90*	*1,359*
Building Arrondissement Municipal Sahloul 3 SBTool	*1.79*	*0.10*	*0.179*
Global Sustainability Score			***1.54***

Scenario #:	**4**		
Scenario name:	**Innovative and attractive neighborhood / Renovation Eco-Responsible**		
Assessment	*Assessment Score (z)*	*Weightprioritylevel (y)*	*Weighted Assessment (Z x Y)*
Sahloul 3 SNTool	*1.53*	*0.90*	*1,377*
Building Arrondissement Municipal Sahloul 3 SBTool	*1.79*	*0.10*	*0.179*
Global Sustainability Score			***1.56***

IRBID

Scenario No:	Global 1		
Scenario Name:	SN Smart Energy - SB (A) active - SB (B) passive		
Assessment	Assessment Score (z)	Weightprioritylevel (y)	Weighted Score (Z x Y)
SNToolurban area	2.84	0.8	2.27
SBTool Building A (Public)	1.97	0.08	0.16
SBTool Building B (Residential)	2.66	0.12	0.32
Global sustainability score			2.75

Scenario No:		Global 2		
Scenario Name:		SN Smart Energy - SB (A) passive - SB (B) active		
Assessment	Assessment Score (z)	Weightprioritylevel (y)	Weighted Score (Z x Y)	
SNToolurban area	2.84	0.8	2.27	
SBTool Building A	1.85	0.08	0.15	
SBTool Building B	2.59	0.12	0.31	
Global sustainability score			2.73	

Scenario No:		Global 3		
Scenario Name:		SN Smart Energy - SB (A) active - SB (B) active		
Assessment	Assessment Score (z)	Weightprioritylevel (y)	Weighted Score (Z x Y)	
SNToolurban area	2.84	0.8	2.27	
SBTool Building A	1.97	0.08	0.16	
SBTool Building B	2.59	0.12	0.31	

Global sustainability score			2.74	
Scenario No:		Global 4		
Scenario Name:		SN Green - SB (A) active - SB (B) passive		
Assessment	*Assessment Score (z)*	*Weightprioritylevel (y)*	*Weighted Score (Z x Y)*	
SNToolurban area	*2.77*	*0.8*	*2.22*	
SBTool Building A	*1.97*	*0.08*	*0.16*	
SBTool Building B	*2.66*	*0.12*	*0.32*	
Global sustainability score			*2.70*	

Scenario No:		Global 5		
Scenario Name:		SN Green - SB (A) passive - SB (B) active		
Assessment	*Assessment Score (z)*	*Weightprioritylevel (y)*	*Weighted Score (Z x Y)*	
SNToolurban area	*2.77*	*0.8*	*2.22*	

SBTool Building A	*1.85*	*0.08*	*0.15*	
SBTool Building B	*2.59*	*0.12*	*0.31*	
Global sustainability score			*2.68*	
Scenario No:		Global 6		
Scenario Name:		SN Green - SB (A) active - SB (B) active		
Assessment	Assessment Score (z)	Weightprioritylevel (y)	Weighted Score (Z x Y)	
SNToolurban area	2.77	0.8	2.22	
SBTool Building A	1.97	0.08	0.16	
SBTool Building B	2.66	0.12	0.32	
Global sustainability score			2.70	

Scenario No:		Global 7	
Scenario Name:		SN Smart Energy - SB (A) passive - SB (B) passive	
Assessment	*Assessment Score (z)*	*Weightprioritylevel (y)*	*Weighted Score (Z x Y)*
SNToolurban area	*2.84*	*0.8*	2.27
SBTool Building A	*1.85*	*0.08*	*0.15*
SBTool Building B	*2.66*	*0.12*	*0.32*
Global sustainability score			*2.74*
Scenario No:		Global 8	
Scenario Name:		SN Green - SB (A) passive - SB (B) passive.	
Assessment	*Assessment Score (z)*	*Weightprioritylevel (y)*	*Weighted Score (Z x Y)*
SNToolurban area	*2.77*	*0.8*	2.22
SBTool Building A	*1.85*	*0.08*	*0.15*
SBTool Building B	*2.66*	*0.12*	*0.32*
Global sustainability score			*2.68*

MOUKHTARA

Scenario No:		1	
Scenario Name:		*Renewable Energy for Moukhtara village*	
Assessment	*Assessment Score (z)*	*Weightprioritylevel (y)*	*Weighted Score (Z x Y)*
SNToolMoukhtara Area	*3.11*	*0.9*	2.799
SBToolMunicipality Building	*2.98*	*0.10*	*0.298*
Global sustainability score			*3.097*

6.4: Ranking of Scenarios

Scenarios are ranked based on their Sustainability Global Score.

	SOUSSE		IRBID		MOUKHTARA	
Position in the ranking	Scenario	Global Sustainability Score	Scenario	Global Sustainability Score	Scenario	Global Sustainability Score
#1	**Scenario 4**	**1.56**	Global 1 (SN Smart Energy - SB (A) active - SB (B) passive)	2.75	Scenario #1	3.097
#2	Scenario 3	1.54	Global 3 (SN Smart Energy - SB (A) active - SB (B) active)	2.74		
#3	Scenario 2	1.53	Global 7 (SN Smart Energy - SB (A) passive - SB (B) passive)	2.74		
#4	Scenario 1	1.51	Global 2 (SN Smart Energy - SB (A) passive - SB (B) active)	2.73		
#5			Global 4 (N Green - SB (A) active - SB (B) passive)	2.70		
#6			Global 6 (SN Green - SB (A) active - SB (B) active)	2.70		
#7			Global 8 (SN Green - SB (A) passive - SB (B) passive)	2.68		
#8			Global 5 (SN Green - SB (A) passive - SB (B) active)	2.68		

6.5: Selection of the optimal scenario

	SOUSSE	IRBID			MOUKHTARA
Scenario No	1	2	1	2	1
Name of the Scenario	Eco-Neighborhood / Integration Green Technologies	**Smart Energy**	**Public Buildings – Active**	**Residential Buildings – Passive**	***Renewable Energy for Moukhtara village***

Justification of the selection	The optimal scenario was chosen at the 5th LPC meeting by unanimous vote of the partners present After the presentation and validation of the 4 scenarios from the previous phases (2 for the neighborhood and 2 for the building) , and after the choice of weighting coefficients to be assigned to the neighborhood and the building in the overall sustainability score, the present and after a rich debate, unanimously (14 votes/14) chose the optimal scenario -which had the lowest overall score (even if it was very close to that of the other scenarios)- for the following reasons: -The Scenario best corresponds to the mindset of the decision-makers and citizens of the neighborhood. - Complies with applicable regulations. - Is consistent with the financial incentives put in place by public authorities (concerning PV and the preservation of water resources). - Financing schemes appear attainable. -the compatibility of several national programs with the actions in this scenario. The optimal scenario chosen was also considered feasible, even if it requires definite efforts by all stakeholders (public authorities and citizens). It is the result of the combination of the following 2 scenarios: 1- Eco-Quartier: - Development of green areas and vegetation, - Introducing energy sobriety and promoting renewable energy, - Encouragement of eco-construction, - Optimization of water resource management, - Introduction of selective sorting and intelligent	The Smart Energy Scenario towards Future is a comprehensive plan that promotes renewable energy to tackle climate issues and reduce carbon emissions. The scenario outlines several initiatives, including the use of land and biodiversity to increase energy storage and efficiency. Implementing renewable energy sources such as EV batteries, EV motors, solar PV, and battery storage will provide affordable access to energy and promote clean and renewable energy sources. The efficiency of energy savings can be further improved by adopting green technology and insulation enforcement, funding energy storage projects, building a secure energy supply chain and encouraging the production of critical minerals. The scenario also addresses challenges in water conservation through technology advancements, strategic planning and the use of artificial intelligence (AI). Improving solid waste management through critical mineral recycling, increasing production and monitoring critical minerals demand is also outlined. The Smart Energy Scenario advocates for a smart grid to promote environmental sustainability, including operational security, activation of customer participation in reducing environmental impact	The application of active systems to improve energy efficiency and energy consumptions on most levels, including changing active mechanical and lighting systems and control devices and updating energy consuming appliances, in addition to introducing some renewable systems that could contribute to lowering energy consumption and increase the building's adaptation to climate change.	*The application of* ***passive*** *systems to improve energy efficiency and energy consumptions on most levels, including changing glazing systems, addition of insulation to avoid thermal bridges, and introducing shading devices.*	The Scenario No.1 is the most favorable scenario to be executed in the Moukhtara village. The scenario combine the *Renewable Energy for All (REFA) scenario for the SN Tool indicators adopted and the Moukhtara Municipality Greener (MMG) for the SB Tool indicators related to the municipality and club building.*

	management of solid waste, - Reduction of air pollution, - Promotion of soft mobility, - Encouraging new green urban governance 2- Integration of Green Technologies The scenario foresees interventions to replace different energy-intensive equipment, mainly air conditioning, heat generation, lighting, with others with better energy performance. The integration of renewable energy will reduce the building's carbon footprint. Other actions related to water consumption and air quality will lead to a more sustainable building. The horizon for this scenario is the medium term (in the following decade)	and improving quality of life. The scenario also focuses on enhancing global mobility through the use of smart sensors, cameras and traffic lights while reducing energy consumption and outdoor air pollution. Additionally, the scenario addresses financial inclusion, reducing costs and providing new livelihood and market opportunities through digital tools such as mobile money and e-wallets, crowdfunding, and alternative credit scoring. Climate technologies, such as renewable energies and drought-resistant crops, can mitigate greenhouse gas emissions, adapt to climate change, and improve environmental quality. Finally, the scenario encourages social participation and community involvement in planning through smart technologies while using a bottom-up approach. The Smart Energy Scenario towards the Future is a comprehensive plan that incorporates technological advancement, community involvement, and green practices to effectively tackle climate change and contribute towards creating sustainable and livable neighborhoods.

Phase 7: Retrofitting Concept

	SOUSSE	IRBID	MOUKHTARA
Name of the retrofitting concept	**The Eco-Quartier Sahloul 3**	**Smart Energy Scenario towards Future**	**Renewable Energy for Moukhtara village**
Summary of the retrofitting concept	The scenario plans to make Sahloul 3 an eco-responsible neighborhood through the implementation of the following objectives: - Development of green areas and vegetation, - Introducing energy sobriety and promoting renewable energy, - Encouragement of eco-construction, - Optimization of water resource management, - Introduction of selective sorting and intelligent management of solid waste, - Reduction of air pollution, - Promotion of soft mobility, Encouragement of new green urban governance.	The Smart Energy Scenario towards the Future is a holistic strategy aimed at addressing climate concerns and lowering carbon emissions by promoting the use of renewable energy. This plan encompasses various initiatives, including leveraging land and biodiversity for enhanced energy storage and efficiency. It involves the adoption of renewable energy sources like electric vehicle (EV) batteries, EV motors, solar PV, and battery storage to ensure affordable energy access and the advancement of clean and sustainable energy options. To further enhance energy conservation, the scenario suggests implementing green technology, reinforcing insulation, funding energy storage projects, establishing a secure energy supply chain, and supporting critical mineral production. Water conservation challenges can be addressed through technological innovations, strategic planning, and the integration of artificial intelligence (AI). Additionally, solid waste management can be improved by recycling critical minerals, increasing production, and monitoring demand for these minerals. The Smart Energy Scenario advocates for the implementation of a smart grid to promote environmental sustainability. This involves enhancing operational security, involving customers in reducing environmental impact, and enhancing overall quality of life. The plan also focuses on improving global mobility through the use of smart sensors, cameras, and traffic lights, with the goal of reducing energy consumption and outdoor air pollution. Furthermore, the scenario addresses financial inclusion by reducing costs and providing new economic opportunities through digital tools like mobile money, e-wallets, crowdfunding, and alternative credit scoring. It underscores the importance of climate technologies, such	The retrofitting concept's main objective is to provide access to electricity for the residents of Moukhtara village by installing solar PV system at household level to overcome the power outage challenge and reduce the risks of total black out. The application of the retrofitting concept will enable the residents of Moukhtara to acquire their human right to access to electricity as per SDG 7 the right to affordable, reliable, sustainable, and modern energy for all. This retrofitting concept will also allow the replacement of traditional streetlights with solar lights to ensure the streets of Moukhtara are safe for driving at night. The retrofitting scenario will also include the installation of solar system at the municipality and club building to enable the municipality better serve the residents since without electricity all systems will shut down.

		as renewable energies and drought-resistant crops, in mitigating greenhouse gas emissions, adapting to climate change, and improving environmental quality. Ultimately, the Smart Energy Scenario encourages community participation and involvement in urban planning, utilizing smart technologies and a bottom-up approach. This comprehensive plan combines technological advancement, community engagement, and environmentally-friendly practices to effectively tackle climate change challenges and contribute towards creating sustainable and livable neighborhoods	

7.1: Retrofitting interventions at urban scale

	sousse	IRBID	MOKHTARA
(A) Use of land and biodiversity			
Retrofitting intervention	**Sahloul 3: Eco-Quartier Vert**	Increase the vegetated areas within AlNuzhaNeighbourhood ,Increase the green areas plots in Nuzha neighborhood Planting sidewalks, Planting varied vegetation , trees and free fruit and vegetables for residents Construct a comprehensive accessibility within the neighborhood to green areas Plan Mini-parks , playgrounds for children, communal spaces for residents. Increase the green space per capita by changing and enforcement of urban planning legislation and codes Enhance the micro landscape design concentrating on evergreen planting	
Description	The scenario aims to improve landscaping by expanding the use of evergreen plantations: - Along the 14.3 km of streets and avenues of the neighborhood - Of the 4.22 Hectares of dedicated green areas according to the urban planning regulations - On all parts of permeable non-buildable parcels (withdrawal areas for individual residences) It also plans to encourage green architecture (green roofs, green facades, etc.)	Use of land and biodiversity Focuses on increasing the vegetated areas within the neighborhood in order to increase the density of green spaces within Al Nuzha neighborhood with the focus on (A2.1, A2.2, A2.3,A2.4). It is recommended to concentrate on the green facade and green roofs as the vacant areas are limited.These systems along with the plantation of the potential site would increase the green areas and improve wellbeing and quality of life as well as the adaptation of climate change.	

Expected results	The density of green spaces in the area is expected to increase from 7.45% to 10.7%. This will have a positive impact not only on the well-being and quality of life of the inhabitants, but also on mitigating the effects of climate change such as combating urban heat islands, reducing the carbon footprint etc. Improving the aesthetics of the urban area and strengthening environmental resilience	*Better Quality of life in terms of health and wellbeing* *Reducing the health diseases such as chronic diseases that are resulted from technology and lack of physical performance. reducing the diseases including (obesity, high blood pressure, high blood cholesterol and diabetes)* *Resilient and sustainable Neighborhood that fight the in active lifestyle.* *Introducing of urban Farming in Irbid city*	
Activities/works to implement the intervention	- Planting evergreen trees on streets and avenues in the neighborhood - Trees in the green areas not yet planted in the district - Implement an efficient irrigation system for the trees during their first year of growth, to ensure they are rooted. Provide regular maintenance for the trees planted, including pruning, watering, fertilization and disease control.	*Avoid using chemicals* *Support local farms in Irbid* *Reduce CO2 emissions by increasing green areas density* *Support local and regional projects aimed at tackling biodiversity loss* *Participatory Approach that leads to better use of land and biodiversity management systems* *A biodiversity-inclusive circular economy :* *Circular Economy approach to food waste would enable to recognize and maintain the value and utility of food products, nutrients and resources for as long as possible, minimizing resource use and upcycling food waste and by-products.* *Reusing and recycling products would slow down the use of natural resources, reduce landscape and habitat disruption and help to limit biodiversity loss.* *Circular food systems in order to improve food security by increasing food productivity, improving access to food and boosting urban resilience.*	
Timescale	Period 2024-2040	*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* *for this category(A) , the medium term timescale is recommended.*	

Budget estimation	€94,500 for the planting of evergreen trees along the streets and avenues of the neighborhood and €141,500 for the development and maintenance of the green areas of the neighborhood.	*450,000 Euro*	
Financial scheme	€189,000 ANME €566,000 by the inhabitants of the neighborhood	*Funding and grants from:* - *The Food and Agriculture Organization of the United Nations (FAO) in Jordan, in cooperation with the United Nations World Food Programme (WFP) and the International Fund for Agricultural Development (IFAD), with the support of the Ministry of Agriculture.* Local governmental funding – Greater Irbid Municipality Financing solutions and loans by Cities and Villages Development Bank	
Responsible for the implementation	Residents of the neighborhood and the public authorities through the implementation of regulations and Financial that encourage	*Greater Irbid Municipality in cooperation with the partnerships below*	
Partnerships	- ANME - PV Installers' Union - Collective Residences Unions - UTICA (Chamber of Construction Companies) - Order of Tunisian Engineers ILO - Order of Architects of Tunisia OAT - Tunisian Renewable Energy Association - ANME: National Energy Management Agency - Novation City - CSPV - Photovoltaic Trade Union Chamber The United Nations Industrial Organization	*•Cities and Villages Development Bank* *• EDAMA* *•Jordan Investment Community (JIC)* *•Jordan Engineers Association (JEA)* *•Jordan Environment Society (JES)* *•Jordanian Green Building Council* *•Ministry of Agriculture (MoAg)* *Ministry of Health (MoH)* *•Ministry of Interior, Environmental Protection* *•Ministry of Public Works and Housing (MPWH)* *• Ministry of Planning and International Cooperation* *• (MOPIC)* *• Municipalities (Cooperation between GAM and GIM)* *• National Building Council (NBC)* *Key Donors and Development Partners:* *• Agence Française de Développement (AFD)*	

		• Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ) • European Investment Bank (EIB) • European Union (EU) • international Finance Cooperation (IFC) • United Nations Development Programme (UNDP) • United States Agency for International Development (USAID) • World Bank (WB)	
Reference stakeholders	- STEG (Tunisian Electricity and Gas Company) Ministries of Energy, Ministry of Environment and Ministry of Finance	*Farmers* *landowners, and local users of natural resources.* *Landscape Design Expertise* *Urban planners* *Industrial Practitioners* *Skilled Labour* *Document and fast track privileges* *Energy Experts* *Sustainability Analysts* *Academics* *Assessment and Evaluation Tools* *Technicians* *Private energy companies*	
Links with strategies, plans, programs	- ACT - Project "Intensifying the adoption of electric mobility in Tunisia" Integrated Urban Development Program PDUI phase 2	*Government representatives* *Central bank of Jordan* *Jordanian Engineers Association* *Meyahona (Water company)* *Yarmouk Water Company* *Private sector sponsorship* *Landscape offices*	

(B) Energy			
Retrofitting intervention	**Sahloul 3: The Eco-District of Renewable Energy**	*1.Activate a holistic energy management plan. 2.Encourage the usage of energy related technology applications by enhancing the use of Ev batteries, EV motors, solar PV and battery storage. 3.To provide an affordable access to all energy supplies 4.Provide funds for the energy storage projects. 5.Establish Impact of energy efficiency programs 6.Promote the use of energy strategies into efficient policies and legislations 7.Building a more secure supply chain: Governments and companies can work together to build a more secure supply chain for energy supply, by diversifying sources of supply and reducing reliance on imported energy sources. 8. Integrate the smart technology systems towards independence in energy use and supply. 9.Integrate smart infrastructure grids in planning of the neighborhood 10.Enhance the inspection process of new buildings construction to ensure the compliance with green and smart building technologies. 11. International cooperation for the sustainable Rating System. 12. Enhance the integration of reliant and up to date databases for the benchmarks already introduced in this project in order to be enforced in the future policies.*	*Renewable Energy for All (REFA)*
Description	The scenario will seek to introduce energy efficiency through: - Implementation of a self-generating electrical energy system by installing photovoltaic panels on the roofs of buildings. This will require the participation of all stakeholders in order to benefit from the high potential of available solar	*Concentrating on the energy efficiency savings, annual costs, and levelized costs of saved energy by relying on clean and renewable energy sources. Regarding energy consumption, energy security should have an association between national security and the availability of natural resources for energy consumption. In order to achieve the best energy consumption efficiency, the insulation and use of innovative insulation materials, systems and technology should be enforced by laws during the construction and renovation of buildings. Critical minerals are essential for the production of renewable energy technologies such as solar panels, wind turbines and*	*This intervention aim to provide all the households in Moukhtara currently relying on standby generators to support their needs in electricity with renewable and sustainable energy sources to eliminate their dependance on fuel-based power which is very expensive, intermittent and pollutant. This retrofitting scenario will also support the residents in Moukhtara to have access to hot water produced by solar water heaters installed at household level. The solar water heaters will also have an economic aspect since it will not only provide hot water to households elevated 900 meters above sea level but also will*

	irradiations - Encourage the installation of electric vehicle charging stations, and facilitate parking for electric vehicles Encourage the reinforcement of the insulation of buildings through the use of suitable materials.	*electric vehicles.* *To foster the widespread adoption of energy-related technology applications, our strategy involves enhancing the utilization of EV batteries, EV motors, solar PV, and battery storage. The overarching goal is to ensure affordable access to energy for all by providing necessary funds for energy storage projects and evaluating the impact of energy efficiency programs. Additionally, we are committed to promoting the integration of energy strategies into efficient policies and legislations, ensuring a sustainable and responsible approach. Building a more secure energy supply chain is a collaborative effort between governments and companies, aimed at diversifying energy sources and reducing reliance on imported resources. Smart technology systems will be integrated to enhance energy independence, and smart infrastructure grids will become an integral part of neighborhood planning. Furthermore, rigorous inspections will be implemented for new building construction to guarantee compliance with green and smart building technologies. International cooperation will play a vital role in developing a sustainable Rating System, while the integration of reliable and up-to-date databases will facilitate the enforcement of benchmarks introduced in this project within future policies.*	*ensure that their electricity bills paid for the power supplied by the public grid is decreased since the residents of Moukhtara rely on traditional electrical heaters to heat water in the current situation.* The retrofitting scenario will have a tremendous positive effect on the Moukhtara residents since most of them are cash-strapped population and not being able to be released from the dependency on back-up generators.
Expected results	- Total consumption of final residential electricity from renewable sources would increase from 6.9% to 100% Total consumption of final residential thermal energy from renewable sources would increase from 4.3% to 40%	*1- Reduce energy demand in al-Nuzha neighborhood.* *2- Enhance quality of life.* *3- This energy scenario will help to establish energy systems till 2050, and help to shape a resilient energy strategy for al Nuzha neighborhood.* *4- Achieve integrating artificial intelligence and sensitive energy simulation planning strategies.* *5- The establishment of an energy platform through data mining, documentation of the neighborhood.* *6- ensure a participatory approach in the decision making stages.* *7- increase the capability to achieve sustainable development goals relevant to SDG 7 : affordable and clean energy, and SDG 11: Sustainable cities and communities.*	1. *Access to 21 hours of electricity generated by clean energy assuming that the solar PV system will provide 90% of the yearly electricity needs taking into consideration that Lebanon benefits from 300 sunny days on yearly average.* 2. *Access to 24 hours of continuous electricity, this will be possible for the first time since 2019 noting that even in presence of back-up generators, households in Moukhtara don't have access to continuous hours of electricity since the back -up generators are stand-by and not prime generators and need to be shut down to avoid overloading and overheating which might cause*

			breakdown of the generators. 3. *Being able to store food since refrigerators will be able to run and hold their working temperature as per design requirements.* 4. *Being able to accomplish housekeeping duties such as ironing, washing clothes, cleaning. Being able to have a warm shower.* 5. *Being able to study and work freely and not according to the back up generators schedule.* 6. *Being able to drive safely due to the lighted streets which will increase the visibility of the drivers and their personal security.* 7. *Eliminate the dependance on back-up generators.* *Reduce the public electricity bills since even with 2 to 4 hours of supply from the public grid and with the recent increase of KWh fees by the Lebanese government, the citizens are not able to afford the expensive bills.*
Activities/works to implement the intervention	- Implement regulations that encourage the development of renewable electricity and thermal energy (e.g. allowing the resale of overproduction by residents to STEG) Facilitate procedures and procedures for access to the financing mechanism for the inhabitants of the neighborhood	*1- Set goals and create an action plan for the development of the scenario in the neighborhood boundaries.* *2- Tracking and evaluating the progress of the neighborhood.* *3- Adjust the plans and implementation process accordingly.* *4- Develop a capacity building program for the practitioners in the field of planning and energy efficiency, bridging the gap between academia and industrial energy management systems.*	1. *Conducting a site visit to prepare an assessment to evaluate the conditions of the household roofs in Moukhtara such as structural condition, space availability, shading conditions.* 2. *Preparation of a design for 3.3 KWp of solar PV system including drafting the technical specifications and calculation as follow:* ➢ *Design of the streel structure taking into consideration wind and snow load.* ➢ *Calculation design for the sizing of PV panels, inverter, lead acid batteries, cables, panel and accessories* ➢ *Calculation design for the*

			earthing system to protect the systema and household appliances from lightning strike. 3. *Installation of solar system for 116 houses, consisting of minimum:* ➢ *6 solar panels monocrystalline of minimum 550Wp as per EU standards* ➢ *4 lead acid batteries with minimum storage capacity of 2400 Watt each as per EU standards* ➢ *1 hybrid inverter 3.5 KW* ➢ *6 galvanized steel structure* ➢ *Cables, panels, and accessories* ➢ *Installation of earthing rods and surge arrestor.* 4. *Installation of solar water heaters for 39 houses, consisting of minimum:* ➢ *200 Liters solar water heaters* ➢ *Booster pump of 1.5 horsepower* ➢ *Cold Storage tank of 500 Liters* ➢ *Cables, panels and accessories* 5. *Installation of 185 solar streetlamps on existing poles of 200 watt each.* 6. *Training for the households' owners on the operation and maintenance of the systems* *Testing and commissioning*
Timescale	Period 2024-2040	*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* *for this category(B) , the long term timescale is recommended.*	▪ *The assessment phase, including a drafting of a site visit report will require 1 month.* ▪ *The design phase will last 2 weeks.* ▪ *The installation of the solar system, solar water heaters and solar streetlights will be conducted in parallel and will be assumed to span over a period of 2.5 months.* ▪ *O&M training will take up to 2 weeks.* ▪ *Testing and commissioning will take around 2 weeks.* *The overall timeline to execute the retrofitting scenario will be approximately 5 months assuming*

			that the project will be executed during wet season.
Budget estimation	€707,500	*750,000 Euro*	*The budget estimation is based on the current w/$ cost in the Lebanese market for RE systems at household levels.* 1. *The assumed budget for the design and installation of 116 solar PV system is estimated to be around 290,000 USD equal to 270,000 Euros approximately.* 2. *The assumed budget for the design and installation of 39 solar water heaters is 39,000 USD equal to 36,000 Euros approximately.* 3. *The assumed budget for the installation of 185 solar streel lamps is around 7500 USD equal to 7,000 Euros approximately.* *The overall budget of the retrofit scenario is equal to 313,000 Euros.*
Financial scheme	€189,000 ANME €566,000 by the inhabitants of the neighborhood	*Funding and grants from:* 1. *European Bank for Reconstruction and Development (EBRD)* 2. *European Investment Bank (EIB)* 3. *United Nations Development Programme (UNDP)* 4. *United States Agency for International Development (USAID)-* Municipality Support Program (MSP) 5. *World Bank (WB)* 6. *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* *In collaboration with Ministry of Energy and Mineral Resources and* *Ministry of Environment*	*The Renewable Energy for All (REFA) retrofit scenario will need to be totally funded by the Sustainable MED Cities project due to the current economic crisis which deprived the Lebanese citizens from their financial strength and kept them unable to finance and purchase a solar PV system from their own savings. The collapse of the banking system in Lebanon make it impossible to apply for any type of loans since the bank are not able to finance any loan even if it is not more than 2,500 USD.*

		Local governmental funding – Greater Irbid Municipality Financing solutions and loans by : *European Bank for Reconstruction and Development (EBRD)and the European Investment Bank (EIB)*	
Responsible for the implementation	Residents of the neighborhood and the public authorities through the implementation of regulations and Financial that encourage	*Greater Irbid Municipality (GIM)* *Ministry of Energy and Mineral Resources* *Ministry of Environment* *The Ministry of Planning and International Cooperation (MoPIC)* *The Ministry of Public Works and Housing (MoPWH)* *Housing and Urban Development Corporation (HUDC)*	*An EPC, Engineering, Procurement and Construction company will be responsible for implementation of the retrofitting scenario by designing and building the project. The Municipality of Moukhtara will play the role of coordination and focal point between the funded agency and the EPC company.*
Partnerships	- ANME - PV Installers' Union - Collective Residences Unions - UTICA (Chamber of Construction Companies) - Order of Tunisian Engineers ILO - Order of Architects of Tunisia OAT - Tunisian Renewable Energy Association - ANME: National Energy Management Agency - Novation City - CSPV - Photovoltaic Trade Union Chamber The United Nations Industrial Organization	• *Cities and Villages Development Bank* • *EDAMA* • *Jordan Investment Community (JIC)* • *Jordan Engineers Association (JEA)* • *Jordanian Green Building Council* • *Ministry of Public Works and Housing (MPWH)* • *Ministry of Planning and International Cooperation (MOPIC)* • *Municipalities (including GAM and GIM)* • *National Building Council (NBC)* • *Key Donors and Development Partners:* • *Agence Française de Développement (AFD)* • *Bank ausVerantwortung (KFW)* • *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* • *European Bank for Reconstruction and Development (EBRD)* • *European Investment Bank (EIB)* • *European Union (EU)* • *International Finance Cooperation (IFC)* • *United Nations Development Programme (UNDP)* • *United States Agency for International Development (USAID)* • *World Bank (WB)*	*The municipality of Moukhtara and the funded agency will enter into partnership in order to secure the fund and execute the project. The municipality of Moukhtara will coordinate with the resident households and represent them in coordination meetings and legal by laws with the funded agency.*
Reference stakeholders	- STEG (Tunisian Electricity and Gas Company) Ministries of Energy, Ministry of	*IT experts and AI developers* *Energy Experts* *Private energy companies* *Sustainability Analysts*	*The stakeholders of the retrofit scenario are:* 1. *International donor who is the funding agency*

	Environment and Ministry of Finance	*Industrial Practitioners* *Academics* *Urban planners* *Skilled Labour* *Statistician* *Document and fast track privileges* *Assessment and Evaluation Tools* *Technicians*	2. *The Municipality of Moukhtara will play the role of the coordinator of the project and representative of the community.* 3. *Residents of Moukhtara, who are the direct beneficiaries of the project.* *The EPC company will be the entity responsible for the execution and will be benefiting financially from the project and is responsible of the operation and maintenance of the project during defects liability period.*
Links with strategies, plans, programs	- ACT - Project "Intensifying the adoption of electric mobility in Tunisia" Integrated Urban Development Program PDUI phase 2	*Government representatives* *Energy sector, Green Growth National Action Plan 2021-2025* *National Resilience Plan* *Sustainable Energy and Climate Action Plan* *Central bank of Jordan* *Jordanian Engineers Association* *Meyahona (Water company)* *Yarmouk Water Company* *Private sector sponsorship* *Landscape offices*	*This retrofitting scenario falls under the overall strategy of the Moukhtara municipality to enhance the quality of life of the residents and motivate them to continue living in their village*

(C) Water			
Retrofitting intervention	**Sahloul 3: The Eco-Quartier is water-efficient and self-sufficient**	*Evaluating the existing conditions of water infrastructure in AlNuzha district, specifically focusing on the urban area. Moreover, identifying areas of improvement and highlighting the most crucial issues within the water infrastructure system. This can be achieved by technological interventions like Artificial intelligence (AI) and machine learning algorithms will play a significant role in improving water efficiency. By integrating diverse data sets — from soil and weather conditions can provide sophisticated decision support tools. These tools can help determine the most efficient strategic planning. Moreover, making the right choice*	

		among resource efficient technologies: The appropriateness of a technology depends on the local situation and the resources available. These include recycling and reuse of water, low water using appliances, efficient irrigation systems, decentralized sewage systems, information and communication technologies, rainwater catchments and reclamation of nutrients. Interventions, like upgrading the water and sewerage networks to accommodate the increase in Irbid context. Moreover, up to date maintenance, the sanitation network needs regular maintenance. This corresponds to the findings of the capacity analysis, which indicated that the water and sewerage networks within Al Nuzha neighborhood are overloaded. Additionally, a water quality management framework can be established in order to have Sustainable management strategies in the long run. *The systems below will be helpful for monitoring and the improvement of water infrastructure and can be applied for retrofit interventions* ● *Infrastructure Systems* ● *Infrastructure Monitoring and financing* ● *Water Recovery* ● *Wastewater Management* ● *Climate Change Impacts* ● *Water Infrastructure* ● *Artificial Intelligence* ● *Water Desalination Systems*	

		• *Infrastructure Resilience* • *Urban Ecosystem* • *Sustainable Water System* • *Smart Infrastructure* • *Water Quality Control* • *Urban Informatics* *Smart Water Management (SWM)*	
Description	As Tunisia is a country with "High water stress", the scenario aims to involve the neighborhood in the necessary optimization of the whole cycle (water collection, distribution and consumption) through: - Installation of storm water recovery systems to supply water points used for watering and other residential uses (excluding human consumption) Encourage the use of water-efficient appliances.	*As per the National Water Strategy (2016-2025), its objective is to achieve a holistic development in the water sector encompassing social, economic, and environmental aspects. This will be accomplished through five key components:* *(i) Integrated Water Resources Management* *(ii) Water, sewage, and sanitation services* *(iii) Water for irrigation, energy, and other purposes* *(iv) Institutional reform* *(v) Sector information management and monitoring* *The assessment highlighted the weaknesses in the water infrastructure of the Al-Nuzha district, particularly in water consumption and effluent management. These weaknesses need immediate attention and improvements in the water infrastructure to ensure the provision of safe and efficient water services in the area while mitigating environmental and health risks. Retrofit interventions are needed for water challenges in Al NuzhaNeighbourhood, for instance, the aging and Inefficient Distribution System, outdated Water Treatment Facilities, and for Insufficient Water Storage Infrastructure in Al-Nuzha district.*	

Expected results	Annual drinking water consumption per resident of residential buildings is expected to decline from 169.84 to 106 liters/day/person	*-Improvements in Water efficiency in Nuzha neighborhood makes good environmental, economic and social sense. Improvements are influenced by environmental awareness, corporate social responsibility, delivering better lifetime value to residents.* *-Advancements in technology will enhance water conservation, improve efficiency, and protect water quality in the different sectors.* *-Promote innovative technology solutions for smart water infrastructure management systems* *-Raising Awareness for rapid expansion, with delivering sustainable, efficient, secure, and affordable water supply services.* *-Reduce public health hazards by incorporating renewable resources and water recycling systems due to the rising water scarcity, along with various environmental sustainability concerns, increased societal worries, financial limitations, and operational obstacles.* *-For the achievement of relevant sustainable development goals, targets and indicators in terms of (SDG 6: clean water and sanitation) and (SDG 3: Good health and wellbeing)* -	
Activities/works to implement the intervention	Construction of a retention basin in each residential building to collect rainwater for reuse in household uses	• *Conduct a local needs assessment.* • *Identify water problems and challenges and provide expertise to find the right*	

	(excluding human consumption)	*solutions.* ● *Data Analysis* ● *Identify the most appropriate technology to address most water critical issues.* ● *Provide for ongoing maintenance.* *For the water quality management system:* 1. *Examine the current situation, develop conceptual models of how the waterway systems work, the issues they face and how to manage them.* 2. *Define community values and management goals, this can be achieved by stakeholder involvement workshops.* 3. *Define relevant indicators* 4. *Determine water quality guideline values* 5. *Define draft water quality objectives* 6. *Use measurements from monitoring of each relevant indicator to assess whether current water quality meets the draft water quality objectives.* 7. *Consider additional indicators or refine water quality objectives* 8. *Assess the need to add to the required indicators within the quality guideline values.* 9. *Consider alternative management strategies* 10. *Assess if water quality objectives are*	

		achievable *Implement agreed management strategy*	
Timescale	Period 2024-2039	*Short term: Up to 24 months* *Medium term: 2-5 years* *Long term: more than 5 years* ***For this category(C) , the long term timescale is recommended.***	
Budget estimation	A detention pond costs about US$7,000 (in 2023), and there are about 950 buildings in Sahloul 3, giving us a budget of about €6.226 million (2023 prices) For low-consumption equipment, it takes about 1000 US€ per household, which gives us a budget of about 1.9 M€ (2023 prices)	*120,000 Euro*	
Financial scheme	The 2023 budget provides for subsidized loans for the construction of these basins, and the residents of the neighborhood are essentially the ones who have to bear the cost of each of its works.	*Funding and grants from:* · *AgenceFrançaise de Développement (AFD)* · ***Bank ausVerantwortung (KFW)*** · *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* · ***European Bank for Reconstruction and Development (EBRD)*** · ***European Investment Bank (EIB)*** · *European Union (EU)* · *International Finance Cooperation (IFC)* · *United Nations Development Programme (UNDP)* · *United States Agency for International Development (USAID)* · *World Bank (WB)* *In collaboration with the Ministry of Water and irrigation and the water authority of Jordan (WAJ)* *Local governmental funding – Greater Irbid*	

		Municipality and Central Bank of Jordan *Financing solutions and loans by :* *European Bank for Reconstruction and Development (EBRD)and the European Investment Bank (EIB)*	
Responsible for the implementation	- The inhabitants of the neighborhood The competent departments responsible for monitoring and following up town planning regulations within the Municipality of Sousse	*Greater Irbid Municipality (GIM)* *Ministry of Environment* *The Ministry of Planning and International Cooperation (MoPIC)* *The Ministry of Water and irrigation*	
Partnerships	- Banks (Habitat Bank BH) - Order of Tunisian Engineers ILO - Order of Architects of Tunisia OAT Ministry of Equipment and Ministry of Finance	· *The ministry of Water and Irrigation* · *Ministry of Human Resources and Social Development* · *Engineering offices* · *Civil society organizations* · *NGO(S)* · *Central bank of Jordan* · *Jordanian Engineers Association* · *The electrical Company* · *Meyahona (Water company)* · *Yarmouk Water Company* · *Cities and Villages Development Bank* · *EDAMA* · *Jordan Investment Community (JIC)* · *Jordan Engineers Association (JEA)* · *Jordanian Green Building Council* · *Ministry of Public Works and Housing (MPWH)* · *Ministry of Planning and International Cooperation (MOPIC)* · *National Building Council (NBC)* · *Key Donors and Development Partners:* · *Agence Française de Développement (AFD)* · *Bank ausVerantwortung (KFW)* · *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* · *European Bank for Reconstruction and*	

		Development (EBRD) · *European Investment Bank (EIB)* · *European Union (EU)* · *International Finance Cooperation (IFC)* · *United Nations Development Programme (UNDP)* · *United States Agency for International Development (USAID)* · *World Bank (WB)*	
Reference stakeholders	- PROBE Ministry of Agriculture.	*-Urban planners* *-Industrial Practitioners* *-Skilled Labour* *-IT experts* *-Statistician* *-Document and fast track privileges* *-Hydrologists* *-Sustainability Analysts* *-Academics* *-Assessment and Evaluation Tools* *-Technicians* *-Private Water companies* *-Civil Engineers*	
Links with strategies, plans, programs	- Nawamed: Smart water management WATER SECTOR STRATEGY IN TUNISIA: Ministry of Agriculture	*Ministry Of Water And Irrigation reports* *-National Water strategy* *-Energy sector, Green Growth National Action Plan 2021-2025* *-National Resilience Plan* *-Sustainable Energy and Climate Action Plan* *-Central bank of Jordan Annual Reports* *-Jordanian Engineers Association* *-Meyahona (Water company)* *-Yarmouk Water Company* *-Private sector sponsorship* *-Irbid Spatial Profile* *-The Food and Agriculture Organization (FAO)*	

(D) Solid waste			
Retrofitting intervention	**Sahloul 3: The Clean Eco-District**	*-Recycling: Critical minerals can be recycled from old products, which can help to reduce demand for new minerals which should be achieved through developing new technologies to reduce the demand for critical minerals in some applications.* *-Increasing production: Governments and companies can work together to increase the production of critical minerals, both domestically and internationally by applying smart tracking systems and applications* *-The required intervention is to improve the solid waste collection systems within AlNuzha neighborhood. Also, to add waste containers and assign more janitors to serve the neighborhood equally and efficiently.* *-Simulation of sustainable solid waste management system*	
Description	The aim is to bring the district to contribute on its own scale to the general waste treatment system, including collection, sorting, recycling through: - Introduction of a system for the selective sorting of household waste. - Installation of connected waste bins. - Adoption of a communication and awareness-raising policy for inhabitants on this issue. - Encouraging the installation of relays for collecting recyclable waste	*Solid waste management is considered to be an environmental challenge in Irbid. Irbid is one of the cities targeted by the solid waste management plan reformation, to handle the increase in solid waste due to population growth and refugee influx. where solid waste management has been highlighted as a challenge in AL Nuzha , particularly in the unequal allocation of waste containers. There is also a deficiency in knowledge and lack of awareness about proper waste disposal, leading to instances where individuals use trash bins for other purposes.*	

Expected results	The percentage of inhabitants with access to solid waste and recycling is expected to increase from 0 to 92.21%	*-The proper disinfection method and technological choices can mitigate the risk of spreading infections and can improve the waste management system's sustainability, especially the contaminated waste.* *-Solid waste management will help to mitigate the potential adverse impacts of waste on both the environment and human health. Moreover, it encourages a shift toward prioritizing waste prevention, reduction, and recycling at a higher level.* *-Achieving sustainable development goals from the perspective of a solid waste management plan, in order to reduce waste generation through prevention, reduction, recycling and reuse. Relevant sustainable development goals to solid waste : (SDG 12 , SDG 11 , SDG 3)* *- Reducing the presence of harmful chemicals and additives in different waste fractions*	
Activities/works to implement the intervention	Provide the entire district with selective sorting bins for household and similar waste. Launch a campaign to raise awareness and monitor citizens and the implementation of this policy.	*1.Conduct Pre-planning Activities* *2.Develop a Comprehensive Waste Management Plan* *3.Keep the Waste Management Plan (WMP) Updated* *4.Implement the Waste Management Plan (WMP)* ***This Waste management plan can be achieved by :*** *-Monitoring of compliance to legal practices* *-Management of waste disposal and facilities* *-Data collection and update* *-Waste Classification research and development* *-Solid waste treatment* *-Resources recovery*	

		-Develop Waste Collection strategies *-Document Waste strategies and activities in a waste management plan* *-Establish storage areas for managing waste* *-Simulation of a sustainable solid waste management system can be achieved by developing different modeled scenarios in terms of recycling, landfilling and composting.*	
Timescale	Period 2024-2034	*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* ***For this category(D) , the short and medium term timescale are recommended.***	
Budget estimation	€170,000	*550,00 Euro*	
Financial scheme	Budget of the municipality of Sousse CPSCL - Ministry of the Environment (Global Environment Facility (GFE))	*Funding and grants from:* ***Japanese International Cooperation Agency (JICA)*** ***Bank ausVerantwortung (KFW)*** *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* ***United Nations Development Programme (UNDP)*** ***United States Agency for International Development (USAID) – recycling in Jordan (RIJ) Activity*** ***United States Agency for International Development (USAID) – Municipality Support Program (MSP)*** ***Oxfam*** *In collaboration with the Ministry of Municipal Affairs and The Ministry of Environment* Local governmental funding – Greater Irbid Municipality and the Ministry of Municipal Affair Financing solutions and loans by : - *European Bank for Reconstruction and*	

		Development (EBRD) - *European Investment Bank (EIB)* - *International Finance Cooperation (IFC)*	
Responsible for the implementation	Sub-Directorate of Waste Management of the Directorate of Cleanliness of the Municipality of Sousse.	*-Ministry of Municipal Affairs* *-The Greater Irbid Municipality* *-The Ministry of Environment* *-Ministry of Planning and International Cooperation (MOPIC)*	
Partnerships	- Civil Society Associations - ANGED Ministry of the Environment	- *The Greater Irbid Municipality* - *Ministry of public works and housing* - *Ministry of Environment* - *Ministry of Municipal Affairs* - *Ministry of Energy and Mineral Resources* - *Ministry of Human Resources and Social Development* - *Ministry of Transportation* - *Public Security Directorate* - *Jordan Engineers Association (JEA)* - *Jordanian Green Building Council* - *Ministry of Planning and International Cooperation (MOPIC)* - *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* - *European Bank for Reconstruction and Development (EBRD)* - *European Investment Bank (EIB)* - *European Union (EU)*	

		- *International Finance Cooperation (IFC)* - *United Nations Development Programme (UNDP)* - *Cities and Villages Development Bank* *EDAMA*	
Reference stakeholders	Ministry of Environment: ANGED (National Waste Management Agency) Municipality of Sousse	*Urban planners* *Industrial Practitioners* *Skilled Labour* *IT experts* *GIS experts* *Energy Experts* *Statistician* *Document and fast track privileges* *Solid waste management Experts* *Sustainability Analysts* *Academics* *Assessment and Evaluation Tools* *Technicians*	
Links with strategies, plans, programs	- National Plan of Implementation of the Stockholm Convention. - Plans and routes for the management of recyclable and recoverable waste. - Waste Wise Cities (WaCT) UN HABITAT - GODEM SOUSSE PROJECT - CLIMA: ENI CBC MED - SDV SOUSSE: PROJECT 55 - MED3R	*-Waste Sector Green Growth National Action Plan 2021-2025* *-Jordan Economic Growth Plan* *-National Green Growth Plan* *-Sustainable Energy and Climate Action Plan* *-Irbid 2030: Regional Growth Plan* *-Regional Refugee & Resilience Plan* *-Jordan 2025* *-Jordan solid waste and wastewater policies, strategies and action plans.*	

(E) Environmental quality			
Retrofitting intervention	**Sahloul 3: The Eco-Neighborhood with Clean Air**	- *Implementing a smart energy grid within the neighborhood boundaries connecting all potential users.* *Integrating smart air quality monitors within the grid providing real time measurements to maintain a healthy environment.*	
Description	-Installing air quality sensors in the neighborhood and implementing a communication and awareness policy for residents on these aspects - Modulate the movement and speed of motor vehicles according to air pollution peaks if necessary	*Smart energy grid designed to effectively coordinate the actions of all its connected users, ensuring efficient and reliable delivery of sustainable and cost-effective electrical power. In the context of a smart neighborhood grid, it encourages customer engagement through market integration and accessibility, while simultaneously enhancing operational security. This, in turn, contributes to a* ***reduction in the environmental impact of the entire energy supply system****.* *Furthermore , smart city technologies, such as realtime reporting, and predictive analytics, transmit data to maintenance teams regarding structural alterations or potential building shortcomings to proactively prevent infrastructure failures and maintain a safe urban environment.*	
Expected results	The number of days in a year when the PM10 concentration does not exceed the allowable limit would increase from 42 to 21.	*1- Lower peak electricity demands potentially leading to lower consumption rates,* *2- Efficiency in electricity transmission.* *3- Rapid power restoration among disruptions.* *4- Reduced operational and management costs for utilities and users.* *5- Creating a better integration environment for renewable power resources and PV panels.* *6- Lower carbon footprint and gas emissions.* *7- Enhanced air quality reporting and communication system.* *9- Improved awareness of earlier indications of pollution hotspots* *9- Cloud based systems that allow creating reliable and up to date data bases.* *10- Visibility in communicating air quality reports*	

		with neighborhood residents through real-time data and mobile phone applications	
Activities/works to implement the intervention	Prohibit or regulate the access of motor vehicles to certain targeted lanes and regulate the maximum authorized speed inside the district according to the observed or foreseeable results of air pollution.	*1- Build a specialized Database for the neighborhood.* *2- Evaluate the potential for smart transition and act according to a long term action plan.* *3- Spread awareness and encourage smart transition through media campaigns, NGOs, and local community meetings.* *4- Facilitate the transition process through fiscal policies, lower costs, and tax exemptions.* *5- Implement smart meters to allow for a real-time monitoring process.* *6- Implement an automation system that can detect and respond to issues that may arise.* *7- Increase the share of renewable energy resources and encourage utilizing energy storage systems.* *8- Enhance and maintain an efficient communication network and grid management software.* *9- Continuous monitoring and inspection of the systems to allow quick and durable maintenance incase of failure.* *10- Support online, and direct customer support system.*	
Timescale	2024-2030	*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* ***For this category(E) , the long term time scale is recommended to ensure smooth and efficient transition.***	
Budget estimation	Around 283 000 US €	*650,000 Euro*	

Financial scheme	Budget of the ANPE and the municipality of Sousse	*Funding and grants from:* ***The United Nations Environment Programme (UNEP)*** *European Bank for Reconstruction and Development (EBRD)* ***Global Green Growth Institute (GGGI)*** ***United Nation Framework Convention on Climate Change (UNFCCC)*** *The World Bank* *United States Agency for International Development (USAID) – Municipality Support Program (MSP)* *In collaboration with the Ministry of Municipal Affairs and The Ministry of Environment* Local governmental funding – Greater Irbid Municipality and the Ministry of Environment Financing solutions and loans by : - *Bank ausVerantwortung (KFW)* - *European Bank for Reconstruction and Development (EBRD)* *Cities and Villages Development Bank*	
Responsible for the implementation	The National Air Quality Monitoring Network (RNSQA), which is part of the ANPE (National Environmental Protection Agency) in coordination with the urban travel directorate of the municipality of Sousse and the traffic police.	*1- Irbid Electricity Company (IDICO) in close collaboration with Ministry of Communication and Information Technology.* *2- Greater Irbid Muncipality (GIM)* *3- Ministry of Energy and Renewable Resources.* *4- Ministry of Environment*	
Partnerships	- UTICA - ASSOCIATIONS UNIVERSITY OF SOUSSE: ISTLS	• *Smart Technologoes and AOT enterprises.* • *Arab Forum for Smart Cities.* • *U.S. Trade and Development Agency (USTDA)* • *Housing and Urban Development Corporation (HUDC)*	

		• *Cities and Villages Development Bank* • *EDAMA* • *Jordan Engineers Association (JEA)* • *Jordanian Green Building Council* • *Ministry of Planning and International Cooperation (MOPIC)* • *Municipalities (including GAM and GIM)* *Key Donors and Development Partners:* • *Agence Française de Développement (AFD)* • *Bank ausVerantwortung (KFW)* • *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* • *European Investment Bank (EIB)* • *European Union (EU)* • *International Finance Corporation (IFC)* • *United Nations Development Programme (UNDP)* • *United States Agency for International Development (USAID)* • *World Bank (WB)*	
Reference stakeholders	- Direction of urban movements of the municipality of Sousse - Traffic police.	*IT experts and AI / AOT developers* *Energy Experts* *Data analysts and data reporting specialists* *Private energy companies* *Sustainability Analysts* *Industrial Practitioners* *Academics* *Technicians* *UI/ UX Designers*	
Links with strategies, plans, programs	- PNMU (National Urban Mobility Plan) - SOUSSE VDS - PUP: DISPLACEMENT PLANE TRAFFIC PLAN	*Jordan Energy Sector Strategy (ESS) action plan for 2020-2030* *The Green Growth National Action Plan 2021-2025* *Sustainable Energy and Climate Action Plan*	

(F) Mobility and transportation			
Retrofitting intervention	**Sahloul 3: The Eco-Quartier of Soft and Active Mobility**	- *Promote smart mobility* - *Enhance the use of EV batteries, EV motors, Electric vehicles* - *Encourage the reliability on public transport by improving the infrastructure of green urban mobility and networks* - *improve congestion and traffic flow.* - *Spread the use of Solar Street Lamps* - *Reduce air pollution by enhancing the clean energy sources of mobility and reduce the independency on private cars* - *Promote car sharing solutions* - *Planning for Complete Street design with space for bicycles, public transportation, and larger sidewalks*	
Description	The aim is to minimize the use of motorized and individual vehicles, which emit too much, by introducing the following measures - Limit the movement of motor vehicles in space and time (e.g. alternating traffic). - Pedestrianizing targeted streets and avenues - Develop continuous and safe bike lanes - Encouraging the use of biofuels in public transport - To help bring people closer to their essential services and to	*Utilizing sustainable energy sources such as electric vehicle (EV) batteries, EV motors, and electric cars can provide cost-effective access to environmentally friendly transportation.* *Smart sensors, cameras, and traffic lights can collect and adjust vehicle routes, both for private automobiles and public transit, in response to demand, leading to improved traffic flow and the reduction of congestion. Consequently, there are fewer instances of vehicles idling in traffic and emitting significant amounts of CO2 emissions. Additionally, streetlights incorporate solar lighting and intelligent LED technology, reducing energy consumption and consequently lowering outdoor air pollution.* *Emerging transportation technologies will have a crucial role in enhancing overall quality of life by mitigating*	

	encourage them to make minimum use of commuting. - Helping to increase the density of transit stops	*environmental harm and reducing reliance on polluting energy sources.*	
Expected results	Controlled fall in car traffic, and consequently development of gentle modes of travel: - The aggregate length of bike lanes in the neighborhood per capita would increase from 0.0215 to 1 m (about 6 km of bike lanes in the neighborhood) - The percentage of the area designated as pedestrian/car-free would increase from 2.9% to 10%.	● *Decreases in congestion, parking and road costs, and pollution reductions.* ● *improve livability.* ● *Increasing walkability which leads to strengthened community cohesion.* ● *Citizens can afford transportation at lowest costs by using green public transport, which can cut down on carbon emissions and oil dependence.* ● *Offer groups with limited access to automobiles safe transit options such as children, the elderly, and people with disabilities.* ● *significant benefits for pedestrian safety, air quality, and overall urban livability.*	
Activities/works to implement the intervention	Creation of safe and consistent continuous pedestrian areas and bike lanes in the neighborhood	- *Develop and expand public transportation systems, including buses and Bus Rapid Transit (BRT).* - *Encourage the adoption of electric vehicles by offering incentives, subsidies, and charging infrastructure including setting up EV charging stations.* - *Create a bike lane for scholars to promote cycling as a sustainable and eco-friendly mode of transport.* - *Promote carpooling and ridesharing programs to reduce the number of vehicles on the road, thereby reducing emissions and congestion.*	

		- *Implement intelligent traffic management systems that use data mining to optimize traffic flow, reducing congestion and emissions.* - *Design pedestrian zones, and well-maintained sidewalks to encourage walking as a means of transportation.* - *Incorporate green mobility concepts into urban planning,* - *Launch public awareness campaigns to educate citizens about the benefits of green mobility and the importance of reducing their environmental impact.* *Enforce regulations that promote green mobility*	
Timescale	Period 2024-2040	*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* ***for this category(F) , the short and medium term timescale are recommended.***	
Budget estimation	Approximately €1,415,000	*(3.5 – 5) M Euro*	
Financial scheme	Budget of the municipality of Sousse through the CPSCL	*Funding and grants from:* ***European Bank for Reconstruction and Development (EBRD)*** ***Japan International Cooperation Agency (JICA)*** *The World Bank* *United States Agency for International Development (USAID) – Municipality Support Program (MSP)* *In collaboration with the Ministry of public works and housing and* *Ministry of Transportation* Local governmental funding – Greater Irbid Municipality and the Ministry of public works and housing Financing solutions and loans by :	

		- *Bank ausVerantwortung (KFW)* - *European Bank for Reconstruction and Development (EBRD)* - *Cities and Villages Development Bank* - *European Investment Bank (EIB)* *International Finance Corporation (IFC)*	
Responsible for the implementation	Works Department of the Municipality of Sousse	*The Greater Irbid Municipality* *Ministry of public works and housing* *Ministry of Transportation* *Public Security Directorate* *Road Safety Center of Excellence/ German Jordanian University*	
Partnerships	Traffic police services	- *The Greater Irbid Municipality* - *Ministry of public works and housing* - *Ministry of Environment* - *Road Safety Center of Excellence/ German Jordanian University* - *Ministry of Energy and Mineral Resources* - *Ministry of Human Resources and Social Development* - *Ministry of Transportation* - *Public Security Directorate* - *Jordan Engineers Association (JEA)* - *Jordanian Green Building Council* - *Municipalities (including GAM and GIM)* - *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* - *European Bank for Reconstruction and*	

		Development (EBRD) - *European Investment Bank (EIB)* - *European Union (EU)* - *International Finance Cooperation (IFC)* *United Nations Development Programme (UNDP)*	
Reference stakeholders	- Municipality of Sousse - Regional Directorate for Transport - Regional Equipment Directorate Société de Transport du Sahel (STS)	● *Cars private sector* ● *Energy Experts* ● *Private energy companies* ● *Transportation Analysts* ● *Industrial Practitioners* ● *Academics* ● *green mobility planners* ● *Skilled Labour* ● *Skillful labors* *Technicians*	
Links with strategies, plans, programs	- SDVS (Development Strategy of the City of Sousse) - PDU of the City of Sousse PNMU (National Urban Mobility Plan)	- *long-term_national_transport_strategy_project.* - *The Ministry of Transport announced that it is developing a five-year public transportation strategy, for the years 2022 to 2027* *Transport and Mobility Master Plan for Amman/ GAM*	

(G) Social aspects			
Retrofitting intervention	**Sahloul 3: The Eco-District of all its inhabitants and passengers**	*1- Place safe and connected accessible routes for the green urban areas in the neighborhood* *2- Plan Mini-parks , playgrounds for children, communal spaces for residents.* *3- Enhance residents' mobility and walkability through rehabilitation of walkways, pavements including removing barriers, changing the planting scheme, and adding ramps and handrails for disabled.* *4- Encourage Car-free zone policies through community engagement.*	
Description	Several social inclusion and cohesion measures can be adopted by the neighborhood, such as: - Equipping green and recreational spaces with play and entertainment facilities for children of all ages will have a very positive impact on their moral and physical health, and will strengthen social inclusion and the quality of life of citizens. - Provide all public spaces receiving the public with access facilities and facilities for physically disabled people. - Facilitate travel for the visually impaired through the widespread use of Braille on public spaces, and the use of tactile walking tapes and "guide rails" throughout the entire travel chain.	*Creating green places that meet the needs of all residents, regardless of their ability, age or gender, can improve inclusion and reduce urban stress. Implementing innovative planning solutions for green open spaces within educational institutions can improve educational quality, foster social harmony, and provide significant physical and psychological health advantages.* *Expanding outdoor playgrounds in a more communal setting encourages children's mindset to alter the negative impacts of today's technology-driven world. It is critical to acknowledge that green areas designed specifically for children play an important role in their physical, mental, and emotional development. These areas provide a safe and engaging setting for children to participate in play and exploration, benefiting their general well-being and health. Furthermore, child-friendly green spaces provide a secure and fun environment.* *Furthermore, allowing community engagement in determining times/ and days for implementing car free zones/ fully pedestrianised areas help in increasing the acceptance and the possibility of exploration for this strategy.*	

Expected results	- The percentage of key public buildings accessible to people with physical disabilities would increase from 66% to 86.8% - The percentage of sidewalks and other pedestrian pathways accessible to persons with disabilities would increase from 0% to 27% - Generate the use of tactile walking strips and "guide rails" throughout the entire movement chain within the neighborhood	*1- An inclusive community, that accepts and respects residents and their rights regardless of their nationality, gender, or disability.* *2- Better physical and psychological health conditions of residents as a result of increasing the amount of open green spaces.* *3- Enhanced social cohesion and interaction through these communal spaces.* *4- Improved pedestrian infrastructure that facilitates mobility and walkability.* *5- Aesthetics: enhanced urban views as a result of re-engineering walkways, materials, vegetation.* *6- Increasing residents' sources of income through facilitating events, bazaars, placements of kiosks in the car free days/ zones.*	
Activities/works to implement the intervention	Works for the fitting out of public buildings, sidewalks and other public roads with equipment allowing access for disabled and blind people.	*1- Community awareness: spread awareness related to safe and inclusive spaces importance to health and well being of residents.* *2- Aquisition of lands/ spaces for mini parks implementation (if needed)* *3- Plan and execute a network of connected green spaces, mini parks, and children playgrounds within the neighborhood in order to serve all of the residents.* *4- Rehabilitate the neighborhood walkways and pavements, remove obstacles and construct rams for disabled. Equip the street furniture with smart advertising panels, wifi network access, chagrin spots.* *5- Organize community engagement sessions in order to create a participatory decision making environment in regards to suitable times/ days to implement car free zones.*	

Timescale	2024-2030	*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* ***for this category(F) , the short and medium term timescale are recommended.***	
Budget estimation	Approximately €283,000	*500,000*	
Financial scheme	- Budget of the municipality of Sousse Budget of the general government concerned	*Funding and grants from:* ***European Bank for Reconstruction and Development (EBRD)*** ***United Nations Development Programme (UNDP)*** *International Organization for Migration.* *Multilateral Investment Guarantee Agency.* *The Organization for Economic Co-operation and Development (OECD).* *United Nations.* *United States Agency for International Development (USAID)- Municipality Support Program (MSP)* *The World Bank* *In collaboration with the Ministry of Culture and the Ministry of Social Development, and the Ministry of Municipal Affairs (MoLA)* Local governmental funding – Greater Irbid Municipality and the Ministry of Social Development Financing solutions and loans by : - *Bank ausVerantwortung (KFW)* - *European Bank for Reconstruction and Development (EBRD)*	

		- *Cities and Villages Development Bank* - *European Investment Bank (EIB)* *International Finance Cooperation (IFC)*	
Responsible for the implementation	Directorate for Works of the Municipality of Sousse	*Greater Irbid Municipality (GIM)* *Construction Companies* *Local Community Organizations*	
Partnerships	Civil society associations working on disability issues	• *Cities and Villages Development Bank* • *Jordan Investment Community (JIC)* • *Jordan Engineers Association (JEA)* • *Ministry of Agriculture (MoAg)* • *Ministry of Health (MoH)* • *Ministry of Public Works and Housing (MPWH)* • *Ministry of Planning and International Cooperation* • *(MOPIC)* • *Municipalities (Cooperation between GAM and GIM)* *Key Donors and Development Partners:* • *Agence Française de Développement (AFD)* • *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* • *European Investment Bank (EIB)* • *European Union (EU)* • *international Finance Cooperation (IFC)* • *United Nations Development Programme (UNDP)* • *United States Agency for International Development (USAID)* • *World Bank (WB)*	
Reference stakeholders	- The municipality of Sousse - Ministry of Social Affairs - NGO	*Landowners, and local residents.* *Urban Design and landscape Expertise* *Urban planners* *Vocational Rehabilitation and Training*	

	- Associations Ministry of Education	*Center / Irbid* *Handicap International - Jordan office* *Industrial Practitioners* *Skilled Labour* *Sustainability experts* *Academics* *Shops owners and event planning companies.*	
Links with strategies, plans, programs	- SDVS (Development Strategy of the City of Sousse) PDUI	*Jordan Country Strategy 2020-2025* *The National Social Protection Strategy (NSPS) 2019-2025*	

(H) Economy			
Retrofitting intervention		- *Upgrading buildings and industrial facilities to be more energy-efficient, reducing energy costs, and improving the competitiveness of businesses. This can also create jobs in the renewable energy sector.* - *Expanding green transportation infrastructure* - *Upgrading digital infrastructure and systems within organizations and governments to enhance operational efficiency, access to markets, and competitiveness in the digital economy.* - *Retrofitting farming practices* *Small Business and Start-Up Support:*	

Description		*Digital technologies such as mobile payment systems, electronic wallets, crowdfunding platforms, alternative credit assessment methods, and cross-border remittance services hold the capacity to promote the financial inclusion of marginalized individuals and communities, lower expenses, and create fresh economic prospects and market access.*	
Expected results		- *Increase Economic Growth* - *Improve productivity and expand business opportunities* - *provide long-term employment opportunities* - *Better use of resources which can lead to cost savings and improved resource management.* - *Innovation and Technological Advancement by involving integration of advanced technologies and practices* *Improve Quality of Life for residents.*	
Activities/works to implement the intervention		*Sustainability Planning in terms of smart technology and energy efficient design solutions for the different categories to ensure that the benefits of all the introduced interventions (related to all the categories) are long-lasting and that economic development continues even after the intervention concludes.*	
Timescale		*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* *for this category(H) , the long term timescale is recommended.*	
Budget estimation		*200,000 Euro*	
Financial scheme		*Funding and grants from:* ***United Nations Development Programme (UNDP)*** ***United Nations Environment Programme (UNEP)*** ***World Bank*** ***Asian Development Bank (ADB):***	

		European Bank for Reconstruction and Development (EBRD)**:* ***Japan International Cooperation Agency (JICA) *In collaboration with the Ministry of Culture and the Ministry of Finance* Local governmental funding – Greater Irbid Municipality and the Ministry of finance Financing solutions and loans by : - *European Bank for Reconstruction and Development (EBRD)* - *Cities and Villages Development Bank* - *International Finance Cooperation (IFC)*	
Responsible for the implementation		*Greater Irbid Municipality (GIM)* *Ministry of Finance*	
Partnerships		• *Cities and Villages Development Bank* • *Jordan Investment Community (JIC)* • *Jordan Engineers Association (JEA)* • *Jordanian Green Building Council* • *Ministry of Public Works and Housing (MPWH)* • *Ministry of Planning and International Cooperation (MOPIC)* • *Municipalities (including GAM and GIM)* • *National Building Council (NBC)* • *Key Donors and Development Partners:* • *Agence Française de Développement (AFD)* • *Bank ausVerantwortung (KFW)* • *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* • *European Bank for Reconstruction and Development (EBRD)* • *European Investment Bank (EIB)* • *European Union (EU)* • *International Finance Cooperation (IFC)*	

		• United Nations Development Programme (UNDP) • United States Agency for International Development (USAID) • World Bank (WB)	
Reference stakeholders		*IT experts and AI developers* *Energy Experts* *Economiss* *Private energy companies* *Sustainability Analysts* *Industrial Practitioners* *Academics* *Urban planners* *Statistician* *Document and fast track privileges* *Assessment and Evaluation Tools*	
Links with strategies, plans, programs		- *Economic Growth Strategy* *Jordan's Economic Modernisation Vision centers on the slogan of "A Better Future", and is based on two strategic pillars: accelerated growth through unleashing Jordan's full economic potential; improved quality of life for all citizens, while sustainability is a cornerstone of this future vision.* *Government's Economic Priorities Program 2021-2023*	

(I) Climate change and mitigation			
Retrofitting intervention	**Sahloul 3: A Resilient Eco-District**	*1- Enhance Urban microclimate through vegetation and nature based solutions.* *2- Manage stormwater runoff.* *3- Enhance climate knowledge and communication through early warning systems and awareness campaigns.*	*Environmentally Friendly Moukhtara*
Description	In order to ensure the control of greenhouse gas emissions passes the scenario provides for the following	*Expanding green spaces network and implementing green and environmental friendly technologies and practices to lower urbanization impact on the environment. This will direct the neighborhoods toward*	*This retrofitting scenario will positively impact the climate change mitigation measures by reducing the green houses gas emissions and the reliance*

	measures: - The green infrastructure (green spaces and vegetation) throughout the neighborhood is able to counter many environmental problems such as global warming, the increase in greenhouse gases and urban heat islands Increase soil permeability ratios (and thus rainwater catchment and vegetation) through urban planning regulations	*resilience and adaptability to climate change.* *To achieve this goal, the government should consider implementing various incentives and regulations, such as carbon taxes, cap-and-trade programs, and subsidies for green technologies, aimed at curbing greenhouse gas emissions and mitigating climate change.*	*on fossil fuel as a source for renewable energy. The residential solar systems for generating electricity, the solar water heaters and solar streetlights will transform Moukhtara to a greener urban area in term of Energy adding a light on top of the charming village.*
Expected results	- The share of the urban area permeable to water from 7.86 to 10% - The leaf area index: ratio of total vegetation area (on soil and on roofs, including trees) divided by total site area would increase from 9.06% to 18% The carbon footprint of buildings is greatly reduced thanks to planned energy performance measures	*1- Local carbon emissions below maximum baseline* *2- Enhanced pedestrian-level thermal comfort* *3- Conservation of water resources through greywater treatment policies.* *4- Resilient, well educated community in terms of climate risks and severe events.*	➢ *Reduce the green houses gas emissions to 1.86* t/{inhabitant}/a *Reduce pollution caused by the back-up generators due to reducing its running hours to minimal.*
Activities/works to implement the intervention	- Developing eco-construction standards Encourage or require the use of certifications such as ECOBAT to certify that buildings in the neighborhood meet strict environmental standards.	*1- Development of early warning system directly connected to the residents using a mobile application that can send notifications in cases of severe events (flash floods, heat waves, snow storms)* *2- Increase the share of vegetation and green areas to enhance urban cooling and reduce the urban heat island effect using nature based solutions and green infrastructure technologies including :* *a. Green Roofs and Facades* *b. Stormwater planters*	*There are no specific activities linked to the issue of climate change and mitigation, the activities listed under the Energy table will directly affect the green house gas (GHG) emissions without requiring any tangible actions.*

		c. *Urban Trees* d. *Permeable pavements* *3- Integrating advanced technologies within existing street furniture including, Green Bus stops, PV panels shading devices.* *4- limit new construction and preserve existing urban lands for vegetation/ natural cover to minimize urban impermeability and limit stormwater runoff.* *5- Encourage in house greywater treatment policies and encourage residents to implement bioretention systems.* *6- Implement awareness campaigns for residents/ businesses explaining the risk of climate change and highlighting the significance of lowering their Carbon foot print.* *7-Establish a limit (cap) on emissions and allow companies to trade their emission permits. This market-based approach encourage businesses to lower emissions and can drive innovation in cleaner technologies.*	
Timescale	2024-2040	*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* ***for this category(F) , the short and medium term timescale are recommended.***	*This is the same timescale adopted in the Energy table since the result of reducing GHG will not account unless the testing and commissioning of the above retrofitting scenario is completed.* *Timescale: 5 months*
Budget estimation	€3,300 000	*450,000 Euro*	*This is the same budget adopted in the Energy table since the result of reducing GHG will not account unless the testing and commissioning of the above retrofitting scenario is completed.* *Budget: 313,000 Euros.*

Financial scheme	- Residents of the neighborhood ANME	*Funding and grants from:* *European Bank for Reconstruction and Development (EBRD)* *United Nations Development Programme (UNDP)* *Global Green Growth (GGGI)* *GIZ* *United States Agency for International Development (USAID)- Municipality Support Program (MSP)* *The World Bank* *In collaboration with the Ministry of Culture and the Ministry of Environment* Local governmental funding – Greater Irbid Municipality and the *Ministry of Environment* Financing solutions and loans by : - *European Bank for Reconstruction and Development (EBRD)* *Cities and Villages Development Bank*	*The* Renewable Energy for All (REFA) *retrofit scenario will need to be totally funded by the Sustainable Med Cities due to the current economic crisis which deprived the Lebanese citizens from their financial strength and kept them unable to finance and purchase a solar PV system from their own savings. The collapse of the banking system in Lebanon make it impossible to apply for any type of loans since the bank are not able to finance any loan even if it is not more than 2,500 USD.*
Responsible for the implementation	Monitoring services of the municipality of Sousse	*Ministry of Environment* *Greater Irbid Municipality (GIM)* *IRIDRA- Italy* *DenoryGreenwall- Jordan* *Praxis Architects- Urban Design*	*An EPC, Engineering, Procurement and Construction company will be responsible for implementation of the retrofitting scenario by designing and building the project. The Municipality of Moukhtara will play the role of coordination and focal point between the funded agency and the EPC company.*
Partnerships	MINISTRY OF EQUIPMENT	*Ministry of Environment* *Global Green Growth (GGGI)* *GIZ* *Jordan Green Building Council* *Cewa's Middle East* *Cities and Villages Development Bank* *Jordan Investment Community (JIC)* *Jordan Engineers Association (JEA)* *Jordanian Green Building Council* *Ministry of Public Works and Housing (MPWH)* *Ministry of Planning and International Cooperation (MOPIC)*	*The municipality of Moukhtara and the funded agency will enter into partnership in order to secure the fund and execute the project. The municipality of Moukhtara will coordinate with the resident households and represent them in coordination meetings and legal by laws with the funded agency.*

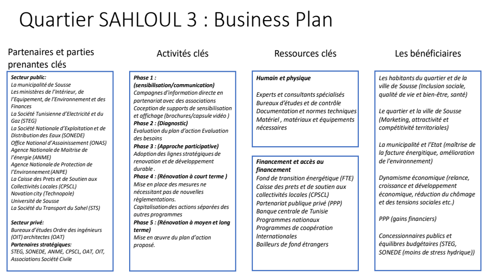
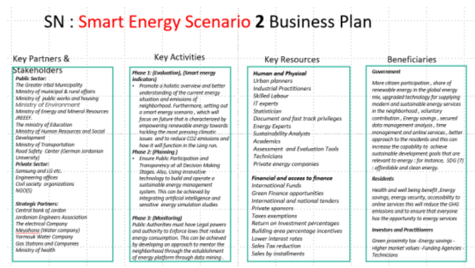
Reference stakeholders	- ANME - ANPE - Building Permits Directorate of the Municipality of Sousse - Order of Architects Order of Engineers	*Local residents and land owners* *Sustainability professionals* *academics* *Urban planners and Urban Deigners*	*The stakeholders of the retrofit scenario are:* *1. International donor who is the funding agency* *2. The Municipality of Moukhtara will play the role of the coordinator of the project and representative of the community.* *3. Residents of Moukhtara, who are the direct beneficiaries of the project.* *The EPC company will be the entity responsible for the execution and will be benefiting financially from the project and is responsible of the operation and maintenance of the project during defects liability period.*
Links with strategies, plans, programs		*The National Climate Change Adaptation Plan of Jordan 2021* *Irbid's Sustainable Energy and Climate Action Plan (SECAP)*	*This retrofitting scenario falls under the overall strategy of the Moukhtara municipality to enhance the quality of life of the residents and motivate them to continue living in their village.*

(J) Governance			
Retrofitting intervention	**Sahloul 3: The Inclusive and Participatory Eco-District**	- Smart technologies can support *social participation* in the *planning and increase the community involvement in the Nuzha neighborhood. It helps the decision makers to apply the bottom up approach and reach the largest number of residents.* *-Optimize the well-being of society within the Al Nuzha neighborhood, Social welfare systems will offer support to individuals and households through initiatives like healthcare, food assistance, unemployment benefits, housing aid, and childcare support.* *-Promote Family planning services* *-Conduct Education and training referral* *Develop Youth and adult mentoring programs*	
Description	- Involve residents in the development and development of their neighborhoods - Public authorities are the standard bearer in raising awareness and implementing sustainability approaches.	*-Utilizing participatory planning , and innovative technologies can maintain social engagement in the planning process and elevate community participation within the Nuzha neighborhood. It enables decision-makers to engage Al Nuzha neighborhood residents . Therefore, Involving the community aids local governments in advancing sustainable choices. This engagement assists governments in enhancing the effectiveness, credibility, and openness of their decision-making processes.*	
Expected results	- The level of active residents in public planning would be increased from 1 to 2 - The percentage of public buildings with recognized sustainability certifications would increase from 0% to 50% The total final energy consumption in public buildings of a city divided by the total indoor useful area would increase from 102.34 to 80 kWh/m²	*-Developing the economic sectors and encouraging innovation, and developing tools to support priority sectors* *- Encouraging development of small and medium enterprises, offering financial support and a sustainable environment in which to develop,* *-Enhancing job opportunities for youth through encouragement of the spirit of entrepreneurship and innovation.* *-Strengthen regulatory policies of the labor market,* *-Economic Benefits* *-Public Health*	

		-Direct attention towards establishing a skilled and professional workforce to facilitate the gradual replacement of migrant labor, particularly among young individuals. Additionally, promote women's integration into the labor market and enhance their involvement through designed initiatives.	
Activities/works to implement the intervention	- Continuous campaign on five years of communication and awareness raising among residents on the importance of sustainability issues. - Systematic use of eco-construction standards, existing certifications, optimization of the energy consumption of all buildings, spaces and areas under public authority in the neighborhood.	*-Governorate economic situational analysis* *-set Vision, goals and objectives* *-develop Logical Frame-work Matrix based on bottom up approach ,* *-Implement sustainable Action Plan*	
Timescale	2024-2030	*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* *for this category(J) , the long term timesace is recommended.*	
Budget estimation	47 000 US € for awareness raising	*50.000 Euro*	
Financial scheme	Municipal budget for outreach	*Funding and grants from:* ***European Bank for Reconstruction and Development (EBRD)*** ***United Nations Development Programme (UNDP)*** ***GIZ*** *International Finance Cooperation (IFC)* *United Nations Development Programme (UNDP)* *World Bank (WB)* *In collaboration with the Ministry of Culture and the Ministry of Energy and Mineral Resources and the Ministry of Environment* Local governmental funding – Greater Irbid Municipality and the *Ministry of Environment* Financing solutions and loans by :	

		- *European Bank for Reconstruction and Development (EBRD)* *Cities and Villages Development Bank*	
Responsible for the implementation	Municipality of Sousse	*Greater Irbid Municipality (GIM)* *Ministry of Energy and Mineral Resources* *Ministry of Environment* *EDAMA* *GIZ*	
Partnerships	NGO Associations (Sousse clean, Sousse tomorrow, we love Sousse, ATER ...)	· *Greater Irbid Municipality (GIM)* · *Ministry of Energy and Mineral Resources* · *Ministry of Environment* · *The Ministry of Planning and International Cooperation (MoPIC)* · *The Ministry of Public Works and Housing (MoPWH)* · *Housing and Urban Development Corporation (HUDC)* • *Cities and Villages Development Bank* • *EDAMA* • *Jordan Investment Community (JIC)* • *Jordan Engineers Association (JEA)* • *Jordanian Green Building Council* • *Ministry of Public Works and Housing (MPWH)* • *Ministry of Planning and International Cooperation (MOPIC)* • *Municipalities (including GAM and GIM)* • *National Building Council (NBC)* • *Key Donors and Development Partners* • *Agence Française de Développement (AFD)* • *Bank ausVerantwortung (KFW)* • *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* • *European Bank for Reconstruction and Development (EBRD)* • *European Investment Bank (EIB)* • *European Union (EU)* • *International Finance Cooperation (IFC)* • *United Nations Development Programme (UNDP)*	

		• *United States Agency for International Development (USAID)* • *World Bank (WB)*	
Reference stakeholders	Municipality of Sousse	*-Community* *-Management* *-Schools* *-Professional Associations* *-Health professional councils and associations* *- lenders* *-suppliers* *-Government representatives* *-local authorities* *-employees* *- The companies owners* *-Industry sector*	
Links with strategies, plans, programs	PDUI: communication strategy	*-Central bank of Jordan Annual report and statistics* *-Local Economic Development Strategy For Irbid Governorate* *-Government representatives* - *Green Growth National Action Plan 2021-2025* - *Sustainable Energy and Climate Action Plan* - *Central bank of Jordan*	

Business model and financial scheme			
Describe the business model /Financial scheme for the retrofitting activities			

Explanation about the synergies among the retrofitting solutions at building scale	Throughout the themes we have built synergies: mostly easy, energy transition and ecological transition. Then, synergy with the circular economy, comfort, health, well-being, and then with biodiversity. The dynamics of responsible building and increased building are possible but not achieved: they require special political and societal attention. Beyond addressing global warming, the environmental transition includes the non-depletion of the planet's resources and the intelligent use of scarce non-renewable resources. The circular economy applied to buildings and cities will be the answer There are synergies between efficient building (energy, carbon, resource) and health and comfort, as well as a dynamic of connected buildings, new possibilities of authorized	*-local policies and institutions should work in harmony with central government initiatives in order to enhance the sustainability of community development processes through synergistic cooperation.* *-Energy efficiency and renewable energy are very important to implement a sustainable energy policy.* *-Renewable energy resources are one of the most important issues of development and sustainable energy systems and policies. This is due to the high growth of demand and higher consumption intensity, capacity building for electricity generation, and the development of renewable energy policies that are important for increasing the economic activity within the neighborhood. Also, the residential and public synergies must be taken into consideration:*	*There is direct synergies between the Energy and Climate change since the application of Renewable Energy system for electricity and thermal energy (water heating) will directly reduce the GHG emissions and help the Moukhtara village to transform to a clean and greener initiative. The Moukhtara village as an urban area will be considered a role model for the Choufcaza since the dependance on fossil fuel will be decreased to the minimum, the energy demand will be met at different level (electrical and thermal energy four houses and lighting energy for streets) and the Moukhatra will be transformed to a cleaner and greener area in terms of energy.* *The execution of the retrofitting scenario in the urban area will feed into the IMF recommendations to Lebanon as stated in the Energy Policy, 2023 conducted by the American*

	services at the scale of the building and the city thanks to digital and artificial intelligence The augmented building makes the building a great platform of services that complement and flourish at the neighborhood and city level. Some services give us opportunities for more responsible lifestyles on energy, environmental, health and biodiversity issues.	*Using Renewable energy in building in which energy demand is significantly reduced through enhanced efficiency, and any remaining energy requirements are met by utilizing renewable energy sources. Consequently, the quantity of renewable energy necessary to meet a building's energy demands is directly contingent on its level of energy efficiency. The greater the efficiency of a building's systems, the lower its energy consumption, reducing the amount of renewable energy needed to achieve a net-zero energy equilibrium. This enhances the cost-effectiveness of such buildings by diminishing the size and capacity of the renewable energy systems required to fulfill energy needs. Several technologies have the dual capability of reducing primary energy consumption and simultaneously augmenting the utilization of renewable energy sources. Combining measures aimed at energy-saving and demand optimization yields the most powerful positive impact on energy conservation and emission reduction. In terms of cost savings, the synergy between demand optimization and energy-saving in buildings measures proves to be highly effective. Moreover, Environmental-protection measures within buildings demonstrate remarkable synergistic effects in cutting down the costs associated with health and labor losses. Using PV cells provides shading which contributes to the urban heat island effect.* *Renewable energy for buildings can be generated both within and outside the building. The former commonly entails integrated solar systems on the building (e.g., thermal collectors, PV panels), while the latter may involve importing renewable energy to the building, such as from solar power plants or wind farms.* *Additionally, combining a glazing unit with a*	*University of Beirut and the Lebanese American University:* *"In Lebanon's particular case, implementing an immediate plan to restore EDL's generation capacity and diminish the use of rolling blackouts would be of paramount importance for alleviating the energy poverty of Lebanese households. Increasing EdL's power supply would be an essential pillar for allowing households to lower the costs associated with using private diesel generators and serve to combat the environmental degradation caused by private diesel generators. Further, developing a plan to tackle the longstanding inefficiencies in the country's power sector is very much warranted. As noted by the IMF (2019), the electricity plan must be predicated on (i) increasing production capacity, (ii) reducing losses, (iii) reducing production costs and (iv) increasing tariffs.* *Even though the Moukhtara is a small village compared to other cities in Lebanon however this intervention will enable the Moukhtara to move towards reaching the net-zero emissions goal and be considered as a raw model in Lebanon and the region.*

		solar protection feature such as shades, blinds, curtains, shutters, overhangs, or awnings results in advanced glazing systems that allow for dynamic control. This integration offers the potential to significantly enhance the energy efficiency and environmental impact of buildings, leading to improved occupant comfort, lowered operating expenses, reduced energy consumption, and decreased greenhouse gas emissions. The challenge addressed by advanced glazing systems lies in optimizing heat management based on the season. During periods or in climates where heating demands are high, the focus is on maximizing solar heat gain while minimizing thermal losses. In contrast, in periods or regions where cooling is the primary concern, strategies aim to reduce solar heat gain and create opportunities for the building to shed excess heat. The energy equilibrium of the retrofitted facade relies significantly on the choice of glazing and shading. Integrating spectrally selective glazing with solar shading provides an efficient and adaptable means of regulating energy gains and losses. This combination also addresses concerns like glare, ensures visual comfort, and facilitates the entry of natural daylight. It's essential to establish intelligent selection criteria that incorporate reliable methods for assessing the energy performance of the dynamic facade, and to implement these criteria using suitable control mechanisms. Solar shading plays a strategic role in the building envelope by enabling control over the transfer of energy from the exterior to the interior or vice versa. Nevertheless, managing solar shading systems is a complex endeavor. Therefore, it is recommended to use smart control strategies within AlNuzha buildings to	

		automatically adjust the positioning of the solar shading system in response to the building's requirements is of paramount importance for the effective operation of dynamic facades. *Cool roofs* *Cool roofs, characterized by their enhanced albedo (reflectivity) in comparison to regular roofs, have the capacity to augment the reflection of solar radiation. This has the potential to lower urban temperatures, potentially curbing the escalating demand for cooling in buildings. Furthermore, the use of cool roofs can contribute to the reduction of urban smog formation. Additionally, cool roofs used to protect the thermal installation underneath. Cool roofs decrease the influence of solar heat on a building's cooling system. In numerous climates, these roofs conserve a substantial amount of energy used for cooling during the summer, and the heat they lose in the winter is often minimal. Furthermore, cool roofs can play a vital role in lowering overall energy costs in Al Nuzha due to high peak electricity loads that are used for cooling in summer. Also, cool roofs aid in mitigating the environmental impact of the urban heat island effect by reducing the warming of urban air caused by darker roof surfaces.*	

7.2 : Retrofitting interventions at building scale

	SOUSSE	IRBID	MOUKHTARA
(A) Site regeneration and development, urban design and infrastructure			
Retrofitting Intervention	**Outdoor development and planting**	*Site intervention*	
Description	The intervention consists in encouraging the users of the building to choose the mode of soft mobility to move around. The redevelopment of the surrounding outdoor areas will increase the building's attractiveness and improve the quality of the service provided. Finally, planting pruning trees will reduce the impact of direct sunlight on the exposed facades, especially on the south side in summer. On the other hand, the trees that will be planted on the north side will constitute a screen against the prevailing winds coming from the north. These interventions have the effect of reducing the energy consumption used for air conditioning in both summer and winter. The carbon footprint is then lowered dramatically.	- *Provide electric car charging stations in the parking lot of the public building, with preferred location close to the entrance(s) of the building, in addition to the handicap car parking locations.* - *Increase outdoor recreation areas around the public building, by substituting a parking area by a green or outdoor space where vegetation can be provided and shading.* - *Vegetating the green space should be by native plants or adapted plants. They require low maintenance & consume less water for irrigation.* - *Shading of parking spaces can be provided by adding Photovoltaic panels as a shading element.*	
Expected results	- Reduced fuel consumption for building users. - Increasing infrastructure for soft mobility	- *Encourage the use of electric cars and decrease GHG and CO2 emissions.* - *increase health and wellbeing of users, and lower the heat island effect of the public building.* - *Increase biodiversity*	

	- Improving outdoor air quality - Improve energy consumption balances by reducing direct exposure of building walls to direct solar radiation.	- *Decrease primary energy consumption, & lower the urban heat island effect.*	
Activities/work to implement the intervention	- Install 5 secure bicycle parking spaces to enable soft mobility. - Redevelop and equip outdoor recreational spaces near the building. - Planting trees in the back garden to shade the building's south side with high sun exposure reduces cooling requirements in summer.	- *Assign electric car charging stations in the parking lot of the public building, with preferred location close to the entrance(s) of the building, and connect to the grid.* - *Vegetate and include hardscape and softscape for some of the parking area around the building, along with sub-surface irrigation system to maintain the water consumption for the irrigation of Native and adapted plants.* - *Install Photovoltaic panels above all the outdoor parking lot, and connecting the generated electricity to storage facility for the public building to be used for electricity generation* - *Maintenance and Retrofitting plans*	
Timescale	Short term (2024)	*Short term: Up to 24 months* *Medium term: 2-5 years* *Long term: more than 5 years* ***for this category(A), the Short-term timescale is recommended.***	
Budget estimation	€18,900	*1.2 M Euro*	
Financial Scheme	Municipal budget	*Funding and grants from:* ***European Bank for Reconstruction and Development (EBRD)*** ***United Nations Development Programme (UNDP)*** ***GIZ*** *In collaboration with the Ministry of Culture and the Greater Irbid Municipality (GIM)* Local governmental funding – Greater Irbid Municipality Financing solutions and loans by : - *European Bank for Reconstruction*	

		and Development (EBRD) - *Cities and Villages Development Bank* - *European Investment Bank (EIB)*	
Responsible for implementation	Commune of Sousse (Direction of parks and public spaces)	*Greater Irbid Municipality (GIM)*	
Partnerships	- VELORUSSION Combination - Clean Sousse Association - National Institute of Agronomy - The nurseries of Sousse - Suppliers of public park equipment	- *JREEEF* - *EDAMA* - *Jordan Engineers Association (JEA)* - *Jordan Environment Society (JES)* - *Jordanian Green Building Council* - *Ministry of Agriculture (MoAg)* - *Agence Française de Développement (AFD)* - *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* - *European Investment Bank (EIB)* - *European Union (EU)* - *international Finance Cooperation (IFC)* - *United Nations Development Programme (UNDP)* - *United States Agency for International Development (USAID)* - *World Bank* - *Commercial & Islamic banks* - *Microfinance companies* - *Local funding organizations/ NGOs*	
Reference stakeholders	- MAPRO (supplier of public park equipment) - The planning department parks and public gardens of the municipality - The city's nurseries	- *Farmers* - *landowners, and local users of natural resources.* - *Landscape Design Expertise* - *Industrial Practitioners* - *Skilled Labour* - *Energy Experts* - *Technicians* - *Private energy companies*	

	- Associations		
Links to strategies, plans, programs	- Sousse Urban Development Program (PDUI) - ACT Alliance of Municipalities for the Energy Transition - Public Spaces Master Plan (PDEP)	- *Government representatives* - *Green Growth National Action Plan 2021-2025* - *Sustainable Energy and Climate Action Plan* - *Central bank of Jordan* - *Meyahona (Water company)* - *Yarmouk Water Company* - *Private sector sponsorship* - *Landscape offices* - *Taxes exemptions/ Return on Investment percentages* - *Building area percentage incentives*	

B) Energy and resource consumption			
Retrofitting Intervention	**Improving the energy efficiency of the building envelope and energy-using equipment**	*Electrical equipment and systems retrofitting*	*Moukhtara Municipality Greener (MMG)*
Description	The intervention consists in implementing the action plan resulting from the energy audit of the building carried out in 2022 by the design office approved by the National Energy Management Agency (ANME). The action plan includes several projects aimed at reducing energy consumption by taking action on the building envelope, in particular by improving the overall heat	- *Change the **Air-conditioning system** to a high-performance system with energy star label above 50%, with minimum Coefficient of Performance (COP) value according to the Energy Efficient Building code of Jordan.* - *Choose Air Conditioning systems with **refrigerants** with low Ozone depletion values, and Low Global warming values.* - *Change the **boiler** of the heating system to an efficient boiler according to the*	*The Moukhtara Municipality Green intervention have one specific purpose to provide access to clean electricity and heated water to the municipality and club buildings. Implementing this retrofitting intervention.* Shifting the electricity demand related to the municipality building from fuel-based power generated by the public utility and diesel based generated by the backup generator to clean green renewable energy generated by solar PV system to benefit the municipality and the social club. In addition to installing PV solar system, installing solar water

	exchange coefficient. This will be done by insulating the exterior walls of the building and replacing the carpentry mounted on the facades exposed by others more energy efficient. On the other hand, the action plan provides for intervention on energy-intensive equipment, in particular lighting and air-conditioning, replacing it with other more efficient equipment and improving control and regulation systems.	*energy efficient building code.* - *Change the heating system to be operated with **natural gas** instead of diesel. In order to increase efficiency and lower cost.* - *Change the **artificial lighting** to highly efficient LED lamps.* - *Change the **hot water system** used in public building to be connected to renewable solar thermal heating system* - *Install **motion detectors** and occupancy sensors to be operated after hours, to save energy, especially in corridors and non-regularly occupied spaces* - *install **heat pumps** with minimum efficiency as required by the energy efficient building code of Jordan* - *Provide **commissioning and verification** of the newly installed system* - *Plan for regular quarterly maintenance for **elevators** in the public building.* - *Connect all electricity consuming systems with the **BMS** for monitoring and verification.* - *Connect the public building with a **wheeling** of renewable energy project. This would lower primary energy consumption in public buildings.* - *Buy furniture and fixtures with **high recycled content** materials* - *Install **sensor-operated faucets**, and **sensor operated toilets**, to be operated by occupancy sensors.*	heaters for the municipality and club will also reduce the dependance of the building on thermal fuel-based energy to heat water. *IN addition to the solar system and to apply a holistic approach, class A appliances* need to be installed for the municipality and club building, such as inverter air conditions, LED lights, office equipment manufactured by new technologies to manage efficiently the energy consumption of the buildings.
Expected results	- The action plan has several objectives in terms of energy efficiency of the building - Improved thermal performance of the building envelope. - Increase the use of energy-efficient equipment and technologies in	- *Increase energy efficiency for equipment's.* - *Lower energy consumption and lower energy bill.* - *Decrease Ozone depletion, and decrease Global warming.* - *Lower GHGs in the atmosphere* - *Lower the CO2 in the environment resulted from the consumption of non-*	1. *Meeting the energy demand of the municipality and the club building* 2. Increasing the electricity generated from Renewable energy for the municipality and club building in Moukhtara to 90%. 3. *Reducing by 25% the dependance on fuel associated with the building thermal energy.*

	buildings. - Improve the equipment management method through the use of high technology and intelligent control equipment. - Reduce the annual energy bill of the building by about 30%. - Reduce GHG emissions and reduce global warming. - Deliver the highest possible performance through monitoring and verification - Reduction of drinking water consumption for the various uses of the building, mainly watering.	*renewable energy sources.* - *Increase the dependency on renewable energy in electrical generation and thermal energy generation.* - *provide the highest possible performance by monitoring and verification* - *Conserve the environment by using less resources and less raw material* - *lower the embodied energy and lower the CO2 footprint of the project.* - *Lower potable water consumption for building operations.* - *encourage the purchase of locally produced products.*	
Activities/work to implement the intervention	- The implementation of a SAS at the building entrance will improve the tightness of the reception hall and minimize thermal losses. The municipality may also consider the installation of an air curtain at the entrance door, which will improve the waterproofing but have less impact on durability. - Replace the split air conditioning system individual systems at the large service room with central air conditioning using variable volume ventilation (VAV) or variable refrigerant volume (VRV) or variable flow refrigerant (RDV) techniques, all of which have a high energy performance coefficient (EER>3.5)	- *Exchange the following systems into more efficient systems:* o *Air condition systems* o *Refrigerants* o *Boiler* o *Heating system to natural gas* o *Artificial lighting to LED* o *Sensor operated faucets and toilets* - *Install renewable systems:* o *Solar thermal heating for domestic hot water* o *Photovoltaic Cells for renewable energy* - *Install secondary systems:* o *Motion detectors* o *Heat pumps* o *BMS* - *Contract with a commissioning and verification agency, as a third party, to monitor and verify the new installed and exchanged systems* - *Contract with Energy Audit offices or*	1. *Conducting a site visit to prepare an assessment to evaluate the conditions of the municipality and club roofs such as structural condition, space availability, shading conditions, flat and tiled areas.* 2. *Preparation of a design for a minimum of 13 KWp of solar PV system including drafting the technical specifications and calculation as follow:* ➢ *Design of the streel structure taking into consideration wind and snow load.* ➢ *Calculation design for the sizing of PV panels, inverter, Lithium batteries, cables, panel board and accessories.* ➢ *Calculation design for the earthing system to protect the system and*

	- At the office level, the existing air conditioners will be replaced by new units of the INVERTER type with better energy performance. - Installing microwiches on windows to cut air conditioning when windows are open. - Add a time timescale on the electrical control of air conditioners to avoid night operation. - Verify and maintain the boiler by adjusting the burner combustion parameters and cleaning the exchanger. Support this action with a periodic maintenance contract with a specialized company. - To control lighting to ambient light quality by means of photometric sensors which only allow lighting to be switched on in case of insufficient natural lighting. - Implement third-generation motion detectors in offices and presence sensors in common spaces and premises. - Install solar thermal water heaters for domestic hot water (CHW) production - Improve building intelligence by installing centralized technical management (GTC/HOME AUTOMATION) - Appoint an energy manager and involve him/her in the energy management system	*programs* - *Plan for regular and quarterly maintenance for electricity consumption systems* - *Facilitating a land for wheeling and generating renewable energy to be used in the public building*	*municipality appliances from lightning strike.* 3. *Installation of solar system for the municipality building, consisting of minimum:* ➢ *24 solar PV panels monocrystalline of minimum 550Wp as per EU standards* ➢ *4 Life PO4 storage batteries with minimum storage capacity of 10KWh Watt each as per EU standards* ➢ *2 hybrid inverters of 8KW each* ➢ *24 galvanized steel structure for mounting the panels.* ➢ *Cables, panels, and accessories* ➢ *Installation of earthing rods and surge arrestor.* 4. *Installation of solar water heaters, consisting of minimum:* ➢ *3 solar water heaters of 250 Liters solar each* ➢ *3 Booster pumps of 1.5 horsepower and/or* ➢ *3 Cold Storage tank of 500 Liters* ➢ *Cables, panels and accessories* 5. *Training for the municipality members and operators on the operation and maintenance of the systems*

	- Thanks to the Energy Management Dashboard available and functional at the municipality (TBGE). This will allow better monitoring of energy consumption and rigorous monitoring of the energy performance of the building. - Implement a solar photovoltaic self-generation system on the roof of the building for partial or full coverage of needs. - Set up a rainwater harvesting device to supply water points used for garden watering. - Equip water points and flushes with appropriate economizers to bring water consumption back to normal. - To provide for an evaluation of the impact of the energy audit carried out by the municipality on the building and to put in place the human and financial resources for the implementation of the proposed action plan.		
Timescale	Medium term 2024-203	*Short term: Up to 24 months* *Medium term: 2-5 years* *Long term: more than 5 years* ***for this category(B), the Medium-term timescale is recommended.***	▪ *The assessment phase, including a drafting of a site visit report with recommendation of system installation methodology will require 2 weeks.* ▪ *The design phase will last 2 weeks with the required time to conduct data collection and verification.* ▪ *The installation of the solar system and solar water heaters will be assumed to span over a period of 2 weeks.* ▪ *O&M training will take up to 2 days.* ▪ *Testing and commissioning will take around 3*

			days. *The overall timeline to execute the retrofitting scenario will be approximately 7 weeks assuming that the project will be executed during wet season.*
Budget estimation	€47,200	*70,000 Euro*	*The budget estimation is based on the current w/$ cost in the Lebanese market for RE systems at household levels.* *1. The assumed budget for the design and installation of the solar PV system is estimated to be around USD equal to 26,000 Euros approximately.* *2. The assumed budget for the design and installation of 3 solar water heaters is equal to 2,500 Euros approximately.* *The overall budget of the retrofit scenario is equal to 28,500 Euros.*
Financial Scheme	- ANME: €14,200 (Energy Transition Fund) - Municipality of Sousse: 33 000 €	*Funding and grants from:* ***AgenceFrançaise de Développement (AFD)*** ***Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)*** *European Investment Bank (EIB)* *European Union (EU)* *International Finance Cooperation (IFC)* *In collaboration with the Greater Irbid Municipality (GIM), Ministry of Energy and Mineral Resources, and the JREEEF* Local governmental funding – Greater Irbid Municipality Financing solutions and loans by : - *Central Bank of Jordan* - *Cities and Villages Development Bank* - *European Investment Bank (EIB)* - *Commercial banks in Jordan which have loan programs for supporting the green and sustainable solutions*	*The possible financing of this retrofitting intervention is through a grant funding to the municipality of Moukhtara. The current economic situation and the devaluation of the Lira compared to the USD make it impossible for the municipality of Moukhtara to finance even small to medium projects from the municipal fund since the Lebanese ministry of interior is not being able to pay the share of the municipalities due to the failing state situation.*

Responsible for implementation	Municipality of Sousse	- *Greater Irbid Municipality (GIM)* - *Ministry of Energy and Mineral Resources* - *JREEEF*	*An EPC, Engineering, Procurement and Construction company will be responsible for implementation of the retrofitting scenario by designing and building the project. The Municipality of Moukhtara will play the role of coordination and focal point between the funded agency and the EPC company. The municipality engineers will be responsible for inspection and monitoring of works execution during site works implementation.*
Partnerships	- ANME - CPSCL - ILO - Local vendors - Authorized auditors	- *JREEEF* - *Jordan Engineers Association (JEA)* - *Jordanian Green Building Council* - *Agence Française de Développement (AFD)* - *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* - *European Investment Bank (EIB)* - *European Union (EU)* - *international Finance Cooperation (IFC)* - *United Nations Development Programme (UNDP)* - *United States Agency for International Development (USAID)* - *World Bank* - *Commercial & Islamic banks* - *Microfinance companies* - *Local funding organizations/ NGOs*	*The municipality of Moukhtara and the funded agency will enter into partnership in order to secure the fund and execute the project. The municipality of Moukhtara is the final beneficiary of this intervention and the legal by laws and partnership documents will be signed between the funded agency and the municipality represented by it mayor and council members.*
Reference stakeholders	- Commune - Listener - CPSCL - ANME	- *Energy Experts* - *Private energy companies* - *Sustainability Analysts* - *Industrial Practitioners* - *Skilled Labour* - *Assessment and Evaluation Tools* - *Technicians* - *Energy Audit offices*	*The stakeholders of the retrofit scenario are:* *1. International donor who is the funding agency* *2. The Municipality of Moukhtara will play the role of the coordinator of the project and the direct beneficiary.* *3. Residents of Moukhtara, who are the indirect beneficiaries of the project benefitting the services of a well operating municipality.* *The EPC company will be the entity responsible for the execution and will be benefiting financially from the project and is responsible of the operation and maintenance of the project during defects liability period.*

Links to strategies, plans, programs	- ACT: Alliance of Municipalities for the Energy Transition - PDUI: integrated urban development program of the city - TEEP: Tunisian energy efficiency project - Promo-isol: National Building Insulation Project - RTMB: thermal regulation of buildings	- *Government representatives* - *Green Growth National Action Plan 2021-2025* - *Sustainable Energy and Climate Action Plan* - *Central bank of Jordan* - *Private sector sponsorship*	*This retrofitting scenario falls under the overall strategy of the Moukhtara municipality to enhance the quality of life of the residents and motivate them to continue living in their village.*
(C) Environmental charges			
Retrofitting Intervention	**Selective sorting and efficient waste management**	*Providing proper access for improvement and increase of efficiency*	*GHG Emissions Reduction*
Description	Selective waste sorting in a building has several environmental and economic benefits. Firstly, it reduces the amount of waste sent to landfills, thus contributing to environmental preservation. By sorting the waste, recycling is also promoted, allowing the reuse of certain materials and reducing the demand for natural resources. This intervention also aims to raise the awareness of building occupants of responsible waste management, thus promoting a more ecological and sustainable attitude. This is a positive contribution to the overall effort to protect the environment.	- *providing energy efficiency measures through **active systems*** - *providing proper access to and from a **solid waste** collectable zone*	*This retrofitting scenario will positively impact the climate change mitigation measures by reducing the green houses gas emissions and the reliance on fossil fuel as a source for renewable energy for the municipality and club building. There will be no specific intervention in terms of infrastructure activities to implement this retrofitting intervention. This intervention will be the result of successfully implementing the retrofitting intervention under the Energy issue.*

Expected results	- Reduction of waste discharged to landfills - Reduction of greenhouse gas emissions from waste incineration. - Increase in the recycling rate of environmentally harmful waste. - Reduction of consumption of natural resources. - Economically, selective sorting can lead to cost savings, as some recyclable materials can be resold. In addition, the reduction of waste destined for the landfill can lead to savings in waste disposal costs.	- *Lower the GHG footprint of the public building.* - *Encourage the recycling of resources and materials* - *Conserve the environment by using less resources and less raw material* - *lower the embodied energy and lower the CO_2 footprint of the project.* - *encourage the purchase of locally produced products.*	1. *Reduction of Green House Gases emissions by lowering the CO_2 equivalent emissions per useful internal floor area per year to 17 kg{CO_2-eq}/m².* 2. *Reducing the pollution associated with burning heaving fuel oils for thermal heating of the municipality building by 25%.*
Activities/work to implement the intervention	- Set up a selective sorting device inside the building in coordination with the device that will be upgraded to neighborhood level. - The building's carbon footprint is significantly reduced thanks to planned energy performance measurements - Implementation of recycling and waste management programs to minimize the amount of waste sent to landfills. - Awareness campaign with design of necessary materials and displays. - Specific training	- *provide infrastructure for the solid waste collection bins* - *Develop a capacity building program for the practitioners in the field of planning and energy efficiency, bridging the gap between academia and industrial energy management systems.* - *Recycling Critical minerals from old products, which can help to reduce demand for new minerals.* - *increase the production of critical minerals, both domestically and internationally.* - *Develop New technologies to reduce the demand for critical minerals in some applications.*	*There are no specific activities linked to the issue of environmental loadings, the activities listed under the Energy table will directly affect the greenhouse gas (GHG) emissions without requiring any tangible actions.*
Timescale	Short term: 2024	*Short term: Up to 24 months* *Medium term: 2-5 years* *Long term: more than 5 years* ***for this category(C), the Medium-term timescale is recommended.***	*This is the same timescale adopted in the Energy table since the result of reducing GHG will not account unless the testing and commissioning of the above retrofitting scenario is completed.* *Timescale: 7 weeks (approx. less than 2 months)*

Budget estimation	€9,400	*60,000 Euro*	*This is the same budget adopted in the Energy table since the result of reducing GHG will not account unless the testing and commissioning of the above retrofitting scenario is completed.* *Budget: 28,500 Euros.*
Financial Scheme	Own resources / UN-Habitat Cooperation Fund	*Funding and grants from:* ***Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)*** ***United Nations Development Programme (UNDP)*** ***United States Agency for International Development (USAID) – Recycling in Jordan (RIJ)*** ***Oxfam*** *In collaboration with the Greater Irbid Municipality (GIM), Ministry of Energy and Mineral Resources, and the JREEEF* Local governmental funding – Greater Irbid Municipality, Local funding organizations/ NGOs Financing solutions and loans by : - *Central Bank of Jordan* - *European Investment Bank (EIB)* - *Commercial banks in Jordan which have loan programs for supporting the green and sustainable solutions*	*The possible financing of this retrofitting intervention is through a grant funding to the municipality of Moukhtara. The current economic situation and the devaluation of the Lira compared to the USD make it impossible for the municipality of Moukhtara to finance even small to medium projects from the municipal fund since the Lebanese ministry of interior is not being able to pay the share of the municipalities due to the failing state situation.*
Responsible for implementation	- Municipal Health Service	- *Greater Irbid Municipality (GIM)* - *Ministry of Energy and Mineral Resources* - *JREEEF*	*An EPC, Engineering, Procurement and Construction company will be responsible for implementation of the retrofitting scenario by designing and building the project. The Municipality of Moukhtara will play the role of coordination and focal point between the funded agency and the EPC company. The municipality engineers will be responsible for inspection and monitoring of works execution during site works implementation.*

Partnerships	- ANGED: National Waste Management Agency - Associations: Clean foam ... - ANPE: National Environmental Protection Agency. - Municipality of Sfax (experience in selective sorting)	- *Jordan Engineers Association (JEA)* - *Jordanian Green Building Council* - *international Finance Cooperation (IFC)* - *United Nations Development Programme (UNDP)* - *United States Agency for International Development (USAID)* - *World Bank* - *Commercial & Islamic banks* - *Microfinance companies* - *Local funding organizations/ NGOs*	*The municipality of Moukhtara and the funded agency will enter into partnership in order to secure the fund and execute the project. The municipality of Moukhtara is the final beneficiary of this intervention and the legal by laws and partnership documents will be signed between the funded agency and the municipality represented by its mayor and council members.*
Reference stakeholders	- Commune of Sousse / Association Sousse clean	- *Energy Experts* - *Private energy companies* - *Sustainability Analysts* - *Industrial Practitioners* - *Skilled Labour* - *Assessment and Evaluation Tools* - *Technicians* - *Energy Audit offices*	*The same stakeholders of the Energy issue are applicable for the environmental issue as follow:* *1. International donor who is the funding agency* *2. The Municipality of Moukhtara will play the role of the coordinator of the project and the direct beneficiary.* *3. Residents of Moukhtara, who are the indirect beneficiaries of the project benefitting the services of a well operating municipality.* *The EPC company will be the entity responsible for the execution and will be benefiting financially from the project and is responsible of the operation and maintenance of the project during defects liability period.*
Links to strategies, plans, programs	- PGCD: Municipal Waste Management Plan - National Solid Waste Management Program (NDMP)	- *Government representatives* - *Green Growth National Action Plan 2021-2025* - *Sustainable Energy and Climate Action Plan*	*This retrofitting scenario falls under the overall strategy of the Moukhtara municipality to enhance the quality of life of the residents and motivate them to continue living in their village.*

(D) Quality of the indoor environment			
Retrofitting Intervention	**Improved air quality and comfort inside the building.**	*Indoor sensors and environment*	
Description	Air filtration and the use of sunshades in buildings can have a significant impact on the quality of the indoor environment because: A- Air filtration reduces allergenic particles: Effective air filtration can help remove allergenic particles such as pollen, dust and mold, thus improving indoor air quality and reducing health risks to occupants. On the other hand it eliminates contaminants: Filtration systems can also eliminate chemical contaminants and air pollutants, creating a healthier indoor environment. B- Sunshades control the natural light inside, they can be adjusted to control the amount of natural light entering the building. This helps reduce glare and create more comfortable lighting, while minimizing reliance on artificial lighting. They also reduce heat input by blocking some of the excessive solar radiation inside the building, thus contributing to optimal thermal comfort. By combining air filtration and the use of sunshades, a healthier, more comfortable and energy-efficient indoor environment can be created. It can also have benefits on the productivity and well-being of the occupants, creating a more pleasant living or working space.	- *Provide **task lighting** for each office and user* - *Provide **thermostat** control in each office to offset the central heating, or cooling whenever needed* - *Exchange all **CFL with LED**, with a sufficient lumen index* - *Locate **CO2 and VOC sensors** in all occupied spaces, and link them to a central monitoring system*	
Expected results	Sunshades bring several benefits to buildings, both aesthetically and functionally: 1- Light control: Sunshades offer the possibility to regulate the amount of natural light entering the building. This helps create a more comfortable indoor environment by reducing glare, avoiding excessive brightness contrasts, and optimizing natural lighting. 2- Heat reduction: Sunshades play an essential role in the thermal management of buildings. By blocking some of the solar radiation, they help reduce excessive heat inside, which can lead to energy	- *increase controllability of lighting.* - *increase comfort and wellbeing for the occupant.* - *Increase productivity* - *save energy without compromising the quality of illumination indoors.* - *Increase indoor environmental quality* - *Increase indoor quality* - *Energy saving*	

	savings by limiting the use of air conditioning. 3- Temperature control: By regulating the amount of light and heat that enters a building, sunshades help maintain more stable indoor temperatures, creating a more pleasant environment. 4- Architectural aesthetics: Sunshades can be designed aesthetically to improve the appearance of the facades of buildings. They offer creative possibilities to architects while serving a practical function. 5- Energy sustainability: By reducing dependence on air conditioning and optimizing the use of natural light, sunshades contribute to the energy sustainability of buildings, promoting more environmentally friendly building practices. 6- Protection of interior spaces: By filtering direct sunlight, sunshades protect interior spaces, furniture and equipment from the harmful effects of excessive exposure to UV rays. Air filtration inside the premises of a building offers several significant benefits for the health, comfort and productivity of the occupants. 1- Reduction of suspended particles: Air filtration systems remove suspended particles such as dust, pollen, molds, bacteria and viruses. This helps maintain cleaner indoor air and reduces the risk of allergies and respiratory diseases. 2- Improving indoor air quality: By filtering air contaminants, the overall indoor air quality improves. This is particularly crucial in accommodating the building similar to a closed space where the concentration of pollutants can be higher. 3- Odor reduction: Air filters can help eliminate unwanted odors, thus improving the olfactory comfort of the occupants. 4- Health protection: By reducing the presence of harmful particles in the air, filtration helps to protect the health of the occupants by minimizing the risks of respiratory problems and infections. 5- Optimization of the heating, ventilation and air conditioning (HVAC) system: Clean filters allow the HVAC system to operate more efficiently, thus reducing energy consumption and associated costs. 6- Promotion of well-being: Clean and healthy indoor air is often associated with improved overall well-being, thus promoting concentration, productivity and comfort of people working or visiting the building.		

Activities/work to implement the intervention	- Placing sunshine on windows will reduce heat input from direct sunlight while maintaining diffuse radiation to allow for natural lighting. - The installation of selective stop-ground reflective film will reduce the risk of direct exposure to solar radiation in the reception hall with a glazed facade on the North-West side. - Implement an air-conditioning system with an adequate filtration system to ensure good air quality at the building. The system will be equipped with a humidity control and regulation device that will significantly reduce the percentage of dissatisfied people inside the premises. - The installation of SAS at the entrance will also reduce the noise coming from the main track in front of the building characterized by a high road traffic, resulting in better sound insulation.	- *Change electric wiring in offices to include the task lighting for all offices* - *Install thermal, air and light sensors in the building's corridors, staircases, and non-regularly occupied spaces for energy saving.* - *Exchange all CFL with LED, with a sufficient lumen index* - *Prepare a monthly, quarterly and yearly maintenance plan for Air conditioning filter cleaning and changing, this would lead to better indoor air quality.*	
Timescale	Medium term: 2024-2028	***Short term: Up to 24 months*** ***Medium term: 2-5 years*** ***Long term: more than 5 years*** ***for this category(D), the Short-term timescale is recommended.***	
Budget estimation	€14,800	*60,000 Euro*	
Financial Scheme	€4,900 FTE (energy transition fund) €9 900 the municipality's own funds	*Funding and grants from:* ***United States Agency for International Development (USAID) – Recycling in Jordan (RIJ)*** ***Oxfam*** *In collaboration with the Greater Irbid Municipality (GIM), Ministry of Energy and Mineral Resources.* Local governmental funding – Greater Irbid Municipality, Local funding organizations/ NGOs Financing solutions and loans by : - *Central Bank of Jordan* - *Commercial banks in Jordan which have loan programs for supporting the green and*	

		sustainable solutions	
Responsible for implementation	The head of the building department of the municipality	- *Greater Irbid Municipality (GIM)* - *Ministry of Energy and Mineral Resources*	
Partnerships	ANME UTICA ILO: Order of Tunisian Engineers OAT: Order of Tunisian Architects	- *Jordan Engineers Association (JEA)* - *Jordanian Green Building Council* - *United Nations Development Programme (UNDP)* - *United States Agency for International Development (USAID)* - *Commercial & Islamic banks* - *Microfinance companies* - *Local funding organizations/ NGOs*	
Reference stakeholders	Municipality / ANME / OAT	- *Energy Experts* - *Private energy companies* - *Sustainability Analysts* - *Skilled Labour* - *Assessment and Evaluation Tools* - *Technicians* - *Energy Audit offices*	
Links to strategies, plans, programs	ACT TEEP PDUI	- *Government representatives* - *Green Growth National Action Plan 2021-2025* - *Sustainable Energy and Climate Action Plan* - *Central bank of Jordan* - *Private sector sponsorship*	

(E) Service Quality			
Retrofitting Intervention	**Improvement of the monitoring and control system of the energy consumption in the building.**	*Energy Efficiency and Monitoring for Public Buildings*	*Effectiveness of Electrical Equipment*
Description	Efficient energy management minimizes energy consumption, resulting in lower operating costs. Savings can be reinvested in improving public services, such as health, education and infrastructure. On the other hand, initiatives to improve energy efficiency often encourage the adoption of new technologies. This can spur innovation in public services, by introducing smarter and more sustainable solutions.	- ***Submetering*** *of the public building, by providing submetering for each floor at least, and for 2 individual electrical uses to monitor and verify electrical consumption inside the building.* - *Install a* ***Building Management System (BMS)*** *that connects all building operation systems and monitors them.* - *The BMS could contribute to* ***data collection systems****, smart recording of data, and availability of detailed energy consumption levels, leading to creating the base of local and national database platforms.* - *Perform annual* ***energy audits****.* - *Establish and* ***document energy goal****s and expectations and apply appropriate modeling techniques to assess achievement of the goals.*	*This retrofitting intervention is based on replacing the electrical equipment installed at the municipality and club building by smart technology such as installing air conditions with inverter system, installing printers of new technology equipped with smart sensors that able the electrical equipment to switch to saving modes when not in use. These measures will reduce the amperage consumption by approximately the half.*
Expected results	Effective energy management through TBGE will have a significant impact on various aspects of service delivery: <u>Reduced operational costs:</u> Efficient energy management reduces energy consumption, resulting in lower operational costs for utilities. This frees up financial resources that can be reinvested to improve other aspects of public services. <u>Environmental sustainability:</u> More efficient use of energy contributes to reducing the carbon footprint and environmental sustainability. This responds to growing concerns about social and environmental responsibility, thereby enhancing the credibility and legitimacy of public services. <u>Reliable Services:</u> A well-managed energy infrastructure ensures a stable power supply. Reliable energy helps maintain business continuity. <u>Technological innovation:</u> Finding solutions for more efficient energy management encourages technological innovation. Adopting energy-efficient technologies can improve operational	- *significant increase in energy efficiency within the public building.* - *lead to more precise control and optimization of energy usage, ultimately reducing energy waste.* - *Gathered data will serve as the foundation for creating local and national database platforms, facilitating informed decision-making and long-term planning for energy management*	➢ *Optimizing energy performance* ➢ *Better interacting with energy grids by installing smart readers* ➢ *Operation and maintenance manual for the electrical and electronic system*

	efficiency, introduce new approaches to service delivery, and drive infrastructure modernization. Reputation and trust: Responsible energy management strengthens the reputation of public services. Citizens are increasingly sensitive to environmental issues, and sustainable practices strengthen public confidence in government institutions and public services.		
Activities/work to implement the intervention	- The use of the Energy Management Dashboard will optimize the operating costs of the building by means of the system for generating performance indicators, a project monitoring and planning tool and finally the warning device enabling preventive maintenance operations to be started on time and also reducing corrective maintenance delays, thus improving the quality of the service provided. - Centralized Technical Management (GTC) makes use of the best control, regulation and monitoring technologies leading to better energy performance combined with better quality of service.	- *Install sub meters as per the designated locations on each floor and for the specific electrical uses.* - *Select a suitable BMS that can integrate with various building operation systems* - *Integrate the BMS with data collection systems and Develop a user-friendly interface for easy access to real-time and historical energy consumption data.* - *Schedule and conduct annual energy audits performed by certified professionals.*	1. *Replacing the electrical devices to class A to reduce the electricity consumption in specific during load peak hours.*
Timescale	Medium term: 2024	*Short term: Up to 24 months* *Medium term: 2-5 years* *Long term: more than 5 years* ***For this category(C), the Medium-term timescale is recommended.***	1. *The assessment phase, including a drafting of a site visit report with recommendation for the appliances to be changed and specifications for the new equipment with installation methodology will require 1 week.* 2. *Purchase and installation of the new appliances will require up to 1 week depending on availability of the equipment and the need for civil and mechanical works.* *Timescale: 2 weeks, noting that these 2 weeks can be assumed to be in parallel with the retrofitting scenario of the Energy issue.*
Budget estimation	€26,500	*30,000 Euro*	*The assumed budget for the purchasing, delivery and installation of electrical appliances is equal to 2,500 Euros approximately.*

Financial Scheme	€7,600 FTE €18,900 (own funds / CPSCL credit)	Local governmental funding – Greater Irbid Municipality, Local funding organizations/ NGOs Financing solutions and loans by : - *Central Bank of Jordan* - *Commercial banks in Jordan which have loan programs for supporting the green and sustainable solutions*	*The same financial scheme described under the Energy and environmental loadings are applicable for this issue adding up that even with low budget associated with this retrofitting intervention the Moukhtara municipality will not be able to finance this intervention since the minimal budget shared by the ministry of interior is allocated to barely cover the daily needs of the municipality in terms of potable water, cleaning services and stationeryin addition to cover the human resources expenses such as salaries of the employees and transportation fees. While considering that the Moukhtara municipality resides in the Chouf district with around 2800 registered citizens, and based on the available data of 2010, the share of the Moukhtara municipality will be around 1,500$ per year.*
Responsible for implementation	Manager of the building department of the municipality of Sousse	- *Greater Irbid Municipality (GIM)* - *Ministry of Energy and Mineral Resources*	*The Municipality will need to get quotations from local suppliers to purchase the electrical devices and Air conditions. The Municipality of Moukhtara will play the role of coordination and focal point between the funded agency and the EPC company. The municipality engineers will be responsible for inspection and monitoring of works execution during site works implementation.*
Partnerships	ANME CPSCL ILO	- *Ministry of Energy and Mineral Resources* - *Ministry of Public Works and Housing (MPWH)* - *Ministry of Municipal Affairs* - *Global Green Growth (GGGI)* - *Jordan Environment Society (JES)* - *Jordanian Green Building Council* - *National Building Council (NBC)*	*The municipality of Moukhtara and the funded agency will enter into partnership in order to secure the fund and execute the project. The municipality of Moukhtara is the final beneficiary of this intervention and the legal by laws and partnership documents will be signed between the funded agency and the municipality represented by its mayor and council members*
Reference stakeholders	Municipality / ANME	- *Local residents and land owners* - *Sustainability professionals* - *academics* - *Energy Experts* - *Private energy companies*	*The same stakeholders of the Energy issue are applicable for the service quality issue as follow:* *1. International donor who is the funding agency.* *2. The Municipality of*

		- *Industrial Practitioners* - *Skilled Labour* - *Technicians* - *Energy Audit offices*	*Moukhtara will play the role of the coordinator of the project and the direct beneficiary.* *3. Residents of Moukhtara, who are the indirect beneficiaries of the project benefitting the services of a well operating municipality.* *The supplier will be the entity responsible for the execution and will be benefiting financially from the project and is responsible of the operation and maintenance of the project during defects liability period.*
Links to strategies, plans, programs	PDUI ACT Smart City Project	- *Government representatives* - *Green Growth National Action Plan 2021-2025* - *Sustainable Energy and Climate Action Plan* - *Central bank of Jordan*	*This retrofitting scenario falls under the overall strategy of the Moukhtara municipality to enhance the quality of life of the residents and motivate them to continue living in their village.*

(F) Social, cultural and perceptual aspects			
Retrofitting Intervention	**Develop the exemplarity of the building as a reference building in terms of energy performance and quality of service at PRMs**	*Enhance building accessibility, efficiency, and community inclusion*	
Description	Promoting the inclusion of persons with reduced mobility (PRMs) in municipal services is a crucial aspect of building a more equitable and accessible society. To achieve this goal, the municipality will consider the following: Physical amenities: The building is wheelchair accessible. This includes the installation of ramps, elevators and adapted washrooms. Inclusive communication: Ensuring that information is available in accessible formats, such as braille, audio formats, and on electronic media compatible with assistive technologies. Awareness: Educate building staff about the importance of inclusive communication and how to provide an effective and respectful service to people with different needs. Online platforms: Ensuring municipal online services are accessible to people with sensory or motor limitations. Websites and applications must comply with accessibility standards. Awareness and training: Train municipal staff to understand the specific needs of PRMs and how to provide an inclusive and respectful service.	– *Install **daylight sensors**, where artificial lighting is controlled according to availability of daylight and level of illumination.* – *Provide **door sensors** to open automatically for wheelchair users within entrance(s) and exits.* – *Encourage the use of **outdoor gathering space** for all members of the community, by connecting the area with the outside boundary of the location.*	
Expected results	Promoting the inclusion of persons with reduced mobility (PRMs) in municipal services has a significant impact on several aspects of daily life and society: Equitable access to services: By promoting the inclusion of PRMs, municipal services become more accessible to all citizens, ensuring equitable access to facilities, programs and resources. Increased citizen participation: The inclusion of PRMs in municipal decision-making	– ***Daylight sensors** optimize artificial lighting, creating a welcoming ambiance, boosting space utilization, and fostering community engagement.* – *Automatic **door sensors** enable easy access for people with disabilities, promoting social inclusion.* – ***Outdoor gathering spaces** encourage community members of all backgrounds to come together and interact.*	

	processes encourages broader and diverse citizen participation. This allows a variety of perspectives to be gathered, thereby strengthening local democracy. Improving quality of life: Increased accessibility of public spaces, transport and services contributes directly to improving the quality of life of people with reduced mobility. This promotes greater autonomy and independence. Positive image of the municipality: Efforts to promote the inclusion of PRMs strengthen the image of the municipality as progressive, caring and diversity-conscious. This can boost citizens' confidence in their local government. Equal opportunities: By removing physical and social barriers, promoting inclusion creates an environment where PRMs have equal opportunities to participate in community life, access education, employment and other opportunities. Positive economic impact: The inclusion of PRMs can have a positive impact on the local economy. By facilitating access to businesses, businesses and jobs, people with reduced mobility can make a more significant contribution to the economic life of the community. Respect for human rights: Promoting the inclusion of PRMs aligns with human rights principles, in particular the right to non-discrimination and equal participation in all aspects of life. Innovation and Creativity: A focus on inclusion drives innovation in the design of public spaces, services and municipal policies. This can lead to creative solutions that benefit the entire populatio		
Activities/work to implement the intervention	- Take the entrance ramp for the disabled and make it more adapted to people with reduced mobility. - Develop a more accessible service counter for PRMs. - Put in place a mechanism to prioritize their service. - Obtain certifications such as ECOBAT to certify the building's compliance with strict environmental standards and serve as a model of energy efficiency for occupants and visitors.	- *Identify suitable locations for daylight and door sensors.* - *Procure the necessary sensor equipment.* - *Install and calibrate both daylight and door sensors.* - *Configure sensors to optimize lighting and provide automatic door access.* - *Assess and execute architectural and landscaping changes to enhance outdoor gathering spaces.* - *Promote the use of these improved outdoor spaces*	-

		within the community.	
Timescale	Medium term: 2024 - 2028	*Short term: Up to 24 months* *Medium term: 2-5 years* *Long term: more than 5 years* ***For this category(C), the long term timescale is recommended.***	
Budget estimation	€37,800	*10,000 Euro*	
Financial Scheme	€9,800 FTE € 28 000 (own funds + CPSCL credits)	Local governmental funding – Greater Irbid Municipality, Local funding organizations/ NGOs Financing solutions and loans by : - *Central Bank of Jordan* - *Commercial banks in Jordan which have loan programs for supporting the green and sustainable solutions*	
Responsible for implementation	Municipal building service	– *Greater Irbid Municipality (GIM)* – *Local Community Organizations* – *Construction and electrical services companies*	
Partnerships	Associations / ANME	- *Jordan Investment Community (JIC)* - *Jordan Engineers Association (JEA)* - *Ministry of Agriculture (MoAg)* - *Ministry of Planning and International Cooperation (MOPIC)* *Key Donors and Development Partners:*	

		- *Agence Française de Développement (AFD)* - *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* - *European Investment Bank (EIB)* - *European Union (EU)* - *International Finance Cooperation (IFC)* - *United Nations Development Programme (UNDP)* - *United States Agency for International Development (USAID)* - *World Bank (WB)*	
Reference stakeholders	Commune of Sousse / Associations / ANME / Energy experts	- *- Vocational Rehabilitation and Training Center / Irbid* - *- Handicap International - Jordan office* - *- events planning companies*	
Links to strategies, plans, programs	PDUI ACT	- *Jordan Country Strategy 2020-2025* - *The National Social Protection Strategy (NSPS) 2019-2025*	

(G) Cost and economic aspects			
Retrofitting Intervention	**Implementation of the Energy Management Dashboard**	*Energy Efficiency Optimization and Cost Reduction*	*Bills Reduction*
Description	The Energy Management Dashboard offers a proactive approach to identifying, analyzing and solving energy consumption problems in a building. By optimizing energy use, costs can be significantly	*By choosing **optimized energy efficient systems**, equipment and appliances, with high COPs and by adopting energy star ratings, energy saving will be achieved, and operational costs will be lowered.*	*The protracted economic crisis has greatly limited Lebanese public entities purchasing power and ability to afford private alternatives for electricity generation.* *The execution of the retrofitting interventions listed*

	reduced, contributing to more efficient and sustainable management.	*This should be monitored and gradually adjusted to ensure feasibility of return of investment vs. estimated savings*	*under the Energy, Environmental loading and service quality will have a direct impact on the cost and economic capacity of the municipality. It will also free the municipality from the burden of paying the highest electricity bills, while suffering from the most unreliable and lowest quality service in the region.*
Expected results	An energy management dashboard in a building contributes significantly to reducing expenditure by providing improved visibility and control over energy consumption: Real-time monitoring: Energy management dashboards allow you to monitor energy consumption in real time. This gives building managers the ability to quickly detect abnormal fluctuations in consumption, which can indicate potential problems, such as faulty equipment or energy waste. Identifying inefficiencies: By visualizing power consumption data on the dashboard, it becomes easier to identify equipment or processes that are particularly energy-intensive. This identification allows targeted remedial actions to be taken to improve energy efficiency. Trend Analysis: Energy management dashboards allow you to analyze consumption trends over a period of time. This analysis can reveal seasonal patterns, peak consumption times, and other useful information to optimize energy management and reduce costs. Peak demand management: By anticipating and responding to peak demand, building managers can implement strategies to reduce peak consumption costs, such as variable energy pricing. Automated control: Some energy management dashboards are integrated with automated control systems that can automatically adjust equipment settings to optimize energy efficiency. For example, the regulation	*- Implementation of energy-efficient systems and equipment will lead to a substantial reduction in operational costs.* *- The intervention will result in lower energy consumption, leading to significant energy savings.* *- A focus on energy efficiency will contribute to sustainable cost management and long-term financial benefits.* *- Regular monitoring and adjustments will ensure that the return on investment (ROI) remains feasible and aligns with estimated savings.*	*The expected results are mainly related to reducing the energy bills of the municipality at different levels as follow:* ➢ *Reducing the electricity bills paid to the back-up generators.* ➢ *Reducing the electricity bills paid to the public grid provider Electricite Du Liban (EDL)* ➢ *Reducing the fuel cost related to the thermal energy needed for water heating and municipality heating.*

	of lighting, heating, and air conditioning can be automated based on actual needs. <u>Energy Performance Measurement:</u> The Scoreboards provide key energy performance indicators (KPIs) to assess the effectiveness of the initiatives implemented. This helps to identify best practices and adjust strategies accordingly. <u>Occupant awareness:</u> Some dashboards also allow sharing information on energy consumption with occupants of the building. This can promote a more conscious use of energy, thus contributing to cost reduction.		
Activities/work to implement the intervention	The energy management dashboard that will be put in place is a powerful tool to monitor both energy and water spending. It makes it possible to monitor and monitor expenditure relating to the consumption and maintenance of energy-intensive equipment. The TBGE also has a project simulator for estimating the costs and calculating the economic profitability of the actions to be implemented.	- *Conduct an energy audit to identify areas for improvement and calculate potential savings.* - *Research, select, and buy energy-efficient systems, equipment, and appliances with high COP and Energy Star ratings.* - *Install the chosen energy-efficient systems and equipment, ensuring proper calibration and functionality.* - *Implement a system for monitoring energy consumption and operational costs to measure actual savings.* - *Gradually fine-tune systems to maximize energy efficiency, align with ROI goals.* - *Establish a reporting system to track the ongoing performance of the system.*	*There are no specific activities in terms of infrastructure works for purchasing equipment associated with this retrofitting intervention, however the result of this intervention will not be reached until the interventions listed under the Energy, Environmental loading and service quality are executed and operational*
Timescale	Very short term: 2024	*Short term: Up to 24 months* *Medium term: 2-5 years* *Long term: more than 5 years* ***for this category(B), the Medium-term timescale is recommended.***	*This is the same timescale adopted in the Energy table since the result of reducing the economic cost will not account unless the testing and commissioning of the above retrofitting scenario is completed.* *Timescale: 7 weeks (approx. less than 2 months)*
Budget estimation	No budget to be provided since the application is acquired by the municipality	*30,000 Euro*	*This is the same budget adopted in the Energy table since the result of reducing the economic cost will not account unless the testing and commissioning of the above retrofitting scenario is completed.*

			Budget: 28,500 Euros.
Financial Scheme	RAS	Local governmental funding – Greater Irbid Municipality, Local funding organizations/ NGOs Financing solutions and loans by : - *Central Bank of Jordan* - *Commercial banks in Jordan which have loan programs for supporting the green and sustainable solutions*	*The possible financing of this retrofitting intervention is through a grant funding to the municipality of Moukhtara. The current economic situation and the devaluation of the Lira compared to the USD make it impossible for the municipality of Moukhtara to finance even small to medium projects from the municipal fund since the Lebanese ministry of interior is not being able to pay the share of the municipalities due to the failing state situation.*
Responsible for implementation	Energy manager of the municipality	- *Greater Irbid Municipality (GIM)* - *Ministry of Energy and Mineral Resources* - *JREEEF*	*An EPC, Engineering, Procurement and Construction company will be responsible for implementation of the retrofitting scenario by designing and building the project. The Municipality of Moukhtara will play the role of coordination and focal point between the funded agency and the EPC company. The municipality engineers will be responsible for inspection and monitoring of works execution during site works implementation.*
Partnerships	ANME / Whitecape (computer developer)	- *Jordan Engineers Association (JEA)* - *Jordanian Green Building Council* - *Agence Française de Développement (AFD)* - *Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ)* - *European Investment Bank (EIB)* - *European Union (EU)* - *International Finance Cooperation (IFC)* - *United Nations Development Programme (UNDP)* - *United States Agency for International Development (USAID)* - *World Bank* - *Commercial & Islamic banks* - *Microfinance companies* - *Local funding organizations/ NGOs*	*The municipality of Moukhtara and the funded agency will enter into partnership in order to secure the fund and execute the project. The municipality of Moukhtara is the final beneficiary of this intervention and the legal by laws and partnership documents will be signed between the funded agency and the municipality represented by its mayor and council members.*
Reference stakeholders	Municipality of Sousse	- *Energy Experts* - *Private energy companies* - *Sustainability Analysts* - *Industrial Practitioners* - *Skilled Labour*	*The same stakeholders of the Energy issue are applicable for the economic issue as follow:* *1. International donor who is the funding agency* *2. The Municipality of Moukhtara will play the role of the coordinator of*

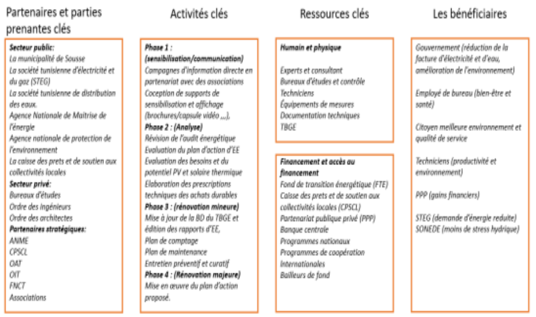
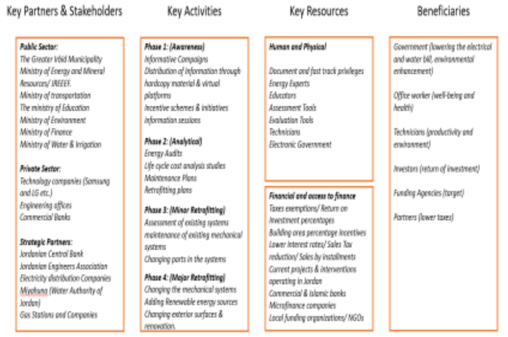
		- *Assessment and Evaluation Tools* - *Technicians* - *Energy Audit offices*	*the project and the direct beneficiary.* *3. Residents of Moukhtara, who are the indirect beneficiaries of the project benefitting the services of a well operating municipality.* *The EPC company will be the entity responsible for the execution and will be benefiting financially from the project, while the long-term financial beneficiary of the project is the municipality of Moukhtara.*
Links to strategies, plans, programs	PDUI ACT	- *Government representative* - *Green Growth National Action Plan 2021-2025* - *Sustainable Energy and Climate Action Plan* - *Central bank of Jordan* - *Private sector sponsorship*	*The savings associated to reducing the fuel cost for the primary energy needs of the municipality falls within the broader strategy of the Moukhtara municipality to efficiently use the limited income of the municipality to fund sustainable interventions with limited operation and maintenance cost such as a solar PV system to generate green power for the municipality building.*

(H) Adaptation to climate change			
Retrofitting Intervention	**Action limiting the climate impact of buildings**	*Climate-Resilient Building Renovation and Sustainability Enhancement*	
Description	By combining tree planting with rainwater harvesting, we can create more resilient and sustainable systems that help mitigate the effects of climate change. These practices are not only environmentally beneficial, but can also improve the quality of life of local communities by creating green spaces, reducing water risks, and promoting biodiversity.	*Utilizing the* ***external top roof*** *of the public building for* ***Photovoltaic Panels****, that would insure renewable energy, lower dependence on fuel, lower CO_2 and GHG emissions, and lower the heat island effect of the public building footprint by providing shading for the roof.* *- Add a local* ***rain water reservoir*** *on site that would collect rainwater from the non-permeable roof, and connect it with the rainwater collected by pathways around the building on site. This would decrease the dependence on potable water used for irrigation, and lower stormwater run-offs.*	

Expected results	Tree planting and rainwater harvesting are two important strategies that can significantly help limit the impact of climate change. Here's how each of these practices can play a positive role: **Tree planting:** <u>Carbon sequestration:</u> Trees absorb carbon dioxide (CO_2) from the atmosphere during photosynthesis, helping to reduce the concentration of greenhouse gases that cause global warming. <u>Create shade and coolness:</u> Trees provide shade, reducing urban heat and heat islands. This helps to mitigate local temperatures and make urban areas more comfortable. <u>Water Conservation:</u> Trees help retain water in the soil, reducing runoff and erosion. This helps maintain water quality and prevent flooding. <u>Biodiversity:</u> Tree planting promotes biodiversity by providing habitat and a source of food for many species. Robust biodiversity can enhance the resilience of ecosystems to climate change. **Rainwater recovery:** <u>Water conservation:</u> The collection and storage of rainwater reduces dependence on traditional water resources, contributing to freshwater conservation. <u>Reducing runoff:</u> Recovering rainwater reduces urban runoff, minimizing flood risks and preserving surface water quality. <u>Sustainable use of water resources:</u> Rainwater harvesting provides an alternative source of	- *Installation of photovoltaic panels on the roof will generate renewable energy, reducing dependence on fossil fuels and lowering carbon dioxide (CO_2) and greenhouse gas (GHG) emissions.* *- The rainwater reservoir and collection system will decrease the dependence on potable water for irrigation, contributing to water resource conservation, and reducing stormwater runoff.*	

	water for garden irrigation, flushing, and other non-potable needs, reducing pressure on drinking water sources.		
Activities/work to implement the intervention	- The tree planting on the SOUTH side improves the shade of the Façades exposed to direct solar radiation. - The main façade side tree plantation protects the building from prevailing winds from the north. - The installation of a storm water recovery system will reduce water consumption and reduce the amount of runoff that can lead to flooding in the event of heavy rains.	- *Conduct a roof assessment to determine the feasibility and suitability of installing photovoltaic panels.* - *Install photovoltaic panels on the building's external top roof, ensuring they are securely in place and properly wired for energy generation.* - *Establish a system to collect rainwater from pathways around the building on-site and connect it to the reservoir.* *- Develop a water management plan for utilizing the collected rainwater for irrigation purposes.*	-
Timescale	Medium term: 2024-2028	*Short term : Up to 24 months* *Medium term : 2-5 years* *Long term :more than 5 years* ***for this category(F) , the long term timescale are recommended.***	
Budget estimation	€12,500	*150,000 Euro*	
Financial Scheme	Self-financing 100%	Local governmental funding – Greater Irbid Municipality, Local funding organizations/ NGOs	

		Financing solutions and loans by : - *Central Bank of Jordan* *Commercial banks in Jordan which have loan programs for supporting the green and sustainable solutions*	
Responsible for implementation	Building service / Parks and green areas services	*Greater Irbid Municipality*	
Partnerships	SONEDE (National Water Distribution Company) Regional Directorate for Agriculture	- *Government representatives* - *Central bank of Jordan* - *Meyahona (Water company)* - *Yarmouk Water Company* - *Private sector sponsorship*	
Reference stakeholders	Commune of Sousse / ILO / DREH	- *Energy Experts* - *Private energy companies* - *Sustainability Analysts* - *Private Water companies*	
Links to strategies, plans, programs	PDUI City Flood Protection Project ACT	– *Green Growth National Action Plan 2021-2025* – *Ministry Of Water And Irrigation reports* – *Jordan Economic Growth Plan* – *National Green Growth Plan*	

<table>
<tr><th colspan="4">Business model and financial scheme</th></tr>
<tr><td></td><td>SOUSSE
SAHLOUL 3 building</td><td>IRBID</td><td>MOUKHTARA</td></tr>
<tr><td></td><td>
</td><td>
</td><td>Assuming the retrofitting scenario is funded by the Sustainable Med Cities project, the execution of the scenario will cost around 31,000 Euros. As a business model, this sustainable scenario will reach the return on investment in approximately 10 years since the municipality spending on electricity and thermal energy is around 240$ per month equal to approximately 220 Euros (this is as per the current electricity billing ratio, this ratio is expected to be increased with the worldwide increase of heavy foil oil and the increase of taxes and tariffs imposed by the Lebanese government on the basic services as its seen as the only income of the state to balance the economic crisis. This business model is feasible taking into consideration the lifetime of the solar panels up to 20 years, the LifePO4 batteries life up to 12 years and the inverters lifetime up to 10 years. The municipality savings will increase the economic capabilities of the municipalities by being able to respond to the citizens' needs and collecting fees in return.</td></tr>
<tr><td>Explanation about the synergies among the</td><td>Cool roofs, characterized by their enhanced albedo (reflectivity) in comparison to regular roofs, have the capacity to augment the reflection of solar radiation. This has the potential to lower urban temperatures, potentially curbing the escalating demand for cooling in buildings.</td><td></td><td>This retrofitting scenario falls under the overall strategy of the Moukhtara municipality to enhance the quality of life of the residents and motivate them to continue living in their village in addition to</td></tr>
</table>

retrofitting solutions at building scale	*Furthermore, the use of cool roofs can contribute to the reduction of urban smog formation. Additionally, cool roofs used to protect the thermal installation underneath. Cool roofs decrease the influence of solar heat on a building's cooling system. In numerous climates, these roofs conserve a substantial amount of energy used for cooling during the summer, and the heat they lose in the winter is often minimal. Furthermore, cool roofs can play a vital role in lowering overall energy costs in Al Nuzha due to high peak electricity loads that are used for cooling in summer. Also, cool roofs aid in mitigating the environmental impact of the urban heat island effect by reducing the warming of urban air caused by darker roof surfaces.* *Additionally, combining a glazing unit with a solar protection feature such as shades, blinds, curtains, shutters, overhangs, or awnings results in advanced glazing systems that allow for dynamic control. This integration offers the potential to significantly enhance the energy efficiency and environmental impact of buildings, leading to improved occupant comfort, lowered operating expenses, reduced energy consumption, and decreased greenhouse gas emissions. The challenge addressed by advanced glazing systems lies in optimizing heat management based on the season. During periods or in climates where heating demands are high, the focus is on maximizing solar heat gain while minimizing thermal losses. In contrast, in periods or regions where cooling is the primary concern, strategies aim to reduce solar heat gain and create opportunities for the building to shed excess heat.*		*capture for the electricity sector enhancement by reducing the energy demand from the public grid related to the needs of the municipality building.*