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Sustainable MED Cities

Integrated tools and methodologies for sustainable Mediterranean cities

D3.1.2 - Sustainable Cities Tool

This project has received funding from the European Union's ENI CBC Med Programme under Grant Contract C_B.4.3_0063

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Executive Summary

Cities need indicators standardised, consistent and comparable over time to measure their performance. The Sustainable City Tool (SCTool) is a completely new framework, developed for the first-time within the Sustainable MED Cities project context, useful to assess the level of sustainability at city scale.

SCTool will enhance the capacity of public administration in delivering, implementing and monitoring efficient measures, plans and strategies to improve the sustainability of cities. In the CESBA MED project it has been developed a first set of indicators at city scale but not organised in an assessment tool as SBTool or SNTool. Nevertheless, the set of indicators at cuty scale prepared by iiSBE Italia in CESBA MED has been adopted by UNEP/MAP for updating the application form of the 2nd and 3rd edition of the Istanbul Friendly Cities Award. Funded by the Government of Turkey, the Istanbul Environment Friendly City Award was created in the framework of the Mediterranean Strategy for Sustainable Development (MSSD) to recognize efforts of local authorities in promoting sustainable development in Mediterranean coastal cities. The collaboration between CESBA MED and UNEP/MAP has been one of the more important achievements in the capitalisation of the project. In Sustainable MED Cities, the set of CESBA MED city scale indicators has been updated and organised in a new tool, the SCTool.

ACRONYMS	
SBTool	Sustainable Building Tool
SNTool	Sustainable Neighborhood Tool
SCTool	Sustainable City Tool
IEFCA	Istanbul Environment Friendly City Award
MED	Mediterranean
DX.X.X	Deliverable X.X.X
LPC	Local Project Committee
PPs	Project Partners
S.MED.Cities	Sustainable MED Cities project
KPIs	Key Performance Indicators
TL	Task Leader
LP	Lead Partner
GF	Generic Framework

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1. Introduction

1.1. Purpose of the document

The deliverable describes the process to the set-up of SCTool (Sustainable Cities Tool), the new Generic Framework based on SBMethod usable to assess the sustainability of cities in the Mediterranean region.

In the previous CESBA MED project, a first set of city scale indicators has been developed by iiSBE Italia to support UNEP/MAP in the updating and upgrading of the Application Form of the Istanbul Friendly Cities Award. Funded by the Government of Turkey, the Istanbul Environment Friendly City Award was created in the framework of the Mediterranean Strategy for Sustainable Development (MSSD) to recognize efforts of local authorities in promoting sustainable development in Mediterranean coastal cities. The CESBA MED city scale indicators have been already used in the 2nd and 3rd edition of the Award and applied by several Mediterranean cities.

In Sustainable MED Cities, the original set of CESBA MED city scale indicators has been expanded, upgraded, and organised in a new assessment tool based on the SBE Method: SCTool. Indicators taken for the new SCTool have be used to update the Application Form and set of indicators (see Annexes) of the 4th edition (2022-23) of the Istanbul Friendly Cities Award through the collaboration with UNEP/MAP that is an associated partner of Sustainable MED Cities.

To ensure a comprehensive content to the SCTool and a strong added value to the final result, different kind of suggestions have been taken into account, always adopting a bottom-up approach, starting from technical recommendations, checking several local hints collected through the Local Project Committee activities, practical suggestions acquired during the internal consultations among PPs involved in the activity and, above all, taking into consideration the added value represented by the IEFCA experience. Indeed, the content of the previous edition of the IEFCA has been considered as the starting point of the SCTool, together with the content included in other key documents addressing the development of indicators for evaluating the sustainability at city level

(such as the *ISO 37120 - Sustainable cities and communities*, the *UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities*, etc.).

In the following chapters of this document, all the steps and the process followed during the implementation activity are entirely described, until reaching the final version of the S.MED.Cities SCTool.

2. Process to reach the result

2.1. Baseline study: frameworks of indicators at city scale

To expand and upgrade the set of indicators developed in CESBA MED, a survey about the most relevant frameworks of indicators at city scale has been carried out.

The main documents considered for the development of the SCTool are:

- *The International Standard **ISO 37120:2018** - Sustainable cities and communities- Indicators for city services and quality of life*, a document focused on city services and quality of life as a contribution to the sustainability of the city. The ISO has developed standardised and consistent indicators, comparable over time and across cities. These indicators can be used to track and monitor progress on city performance and to support policy development and priority setting.
- ***U4SSC** - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities*, a publication developed within the framework of the United for Smart Sustainable Cities (U4SSC) initiative which provides cities with a methodology on how to collect data or information from key performance indicators (KPIs) for smart sustainable cities. This set of KPIs were developed to establish the criteria to evaluate ICT´s contributions in making cities smarter and more sustainable, and to provide cities with the means for self-assessments.
- The "***Sustainable Development in the Mediterranean Report 2020** - Transformations to achieve the Sustainable Development Goals*[1]", developed by a team of experts of the University of Siena – Santa Chiara Lab, as the hosting institution of the Sustainable Development Solutions Network for the Mediterranean Area (SDSN-Mediterranean). The scope of the report is to facilitate the reading of the Sustainable Development Report 2020 through the optic of Mediterranean countries in order to share knowledge on current trends

[1] Riccaboni, A., Sachs, J., Cresti, S., Gigliotti, M., Pulselli, R.M. (2020): Sustainable Development in the Mediterranean. Report 2020. Transformations to achieve the Sustainable Development Goals. Siena: Sustainable Development Solutions Network Mediterranean (SDSN Mediterranean).

towards SDGs and drive common action, perfectly in line with the objective of the S.MED.Cities project.

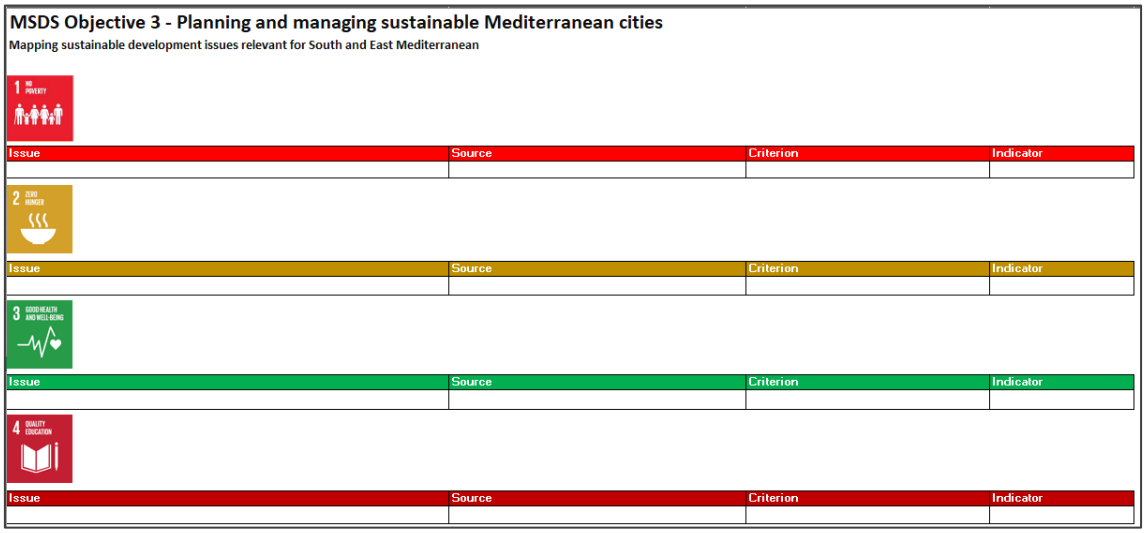
Figure 1: Key aspects to be considered for the MED area.

- The **RFSC - *Reference Framework for Sustainable Cities*** (http://rfsc.eu/), a web application to guide cities on their own path towards sustainability. RFSC offers the choice between several European and global sustainability frameworks in favour of integrated and sustainable urban development to describe city ambitions, assess the project and monitor the progress.
- The "***Istanbul Environment Friendly City Award*** - *Framework of Assessment Indicators at City Level*[2]", mainly focused on city scale, was fundamental for the development of the SCTool. It was funded by the Government of Turkey and created in the framework of the Mediterranean Strategy for Sustainable Development (MSSD) to recognize efforts of local authorities in promoting sustainable development in Mediterranean coastal cities. The *Quantitative Indicators Assessment Guide - Calculation Guideline*, developed as well in the framework of the IEFCA, has been of great help in formulating the assessment methodology for several criteria included in the SCTool.

The documents mentioned above are the ones consulted to proceed in developing the framework at city scale. This technical investigation has been carried out by PPs mainly

[2] https://www.unep.org/unepmap/istanbul-environment-friendly-city-award

involved in the activity; the three cities involved in the S.MED.Cities project were asked to contribute to this searching activity by providing key input for the MED area, including them in an excel file organised per SDGs priority, as showed in the image below.



MSDS Objective 3 - Planning and managing sustainable Mediterranean cities

Mapping sustainable development issues relevant for South and East Mediterranean

Issue	Source	Criterion	Indicator

Issue	Source	Criterion	Indicator

Issue	Source	Criterion	Indicator

Issue	Source	Criterion	Indicator

Figure 2: The excel file shared with PPs to collect input for the SCTool.

All the issues considered very relevant to be included in the SCTool were taken into account and later expressed in form of criteria. The technical contribution provided by the key documents mentioned above, has been fundamental for the structuring of the SCTool, including those criteria able to measure the performance of a city. Indicators can be selected according to city objectives.

2.2. Capitalisation of the Istanbul Environment Friendly Cities Award

The main document around which the whole SCTool was developed and articulated, has been the *Istanbul Environment Friendly Cities Award*, 2nd and 3rd fourth edition. In parallel with the preparation of the new SCTool, it has been updated the "Indicators' Assessment Guide" for the 4th edition (2022-20).

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Figure 3: Screenshot of the presentation performed by Julien Le Tellier on July 20th, 2022, during the workshop of UNEP/MAP organised with iiSBE Italia.

The strong cooperation between the Sustainable MED Cities project and UNEP/MAP, activated since the beginning of the updating process of the documents for the new edition of the IEFCA, was an added value for the drafting of the S.MED.Cities SCTool. The IEFCA set of indicators is a sub-set of the SCTool indicators.

For a better understanding of the content included in the IEFCA forth edition 2022-2023, the "Framework of Sustainability Indicators and Calculation Guideline" and the "Application Form" are included in Annex of this document.

2.3. LPCs contribution

The technical recognition carried out by PPs through the investigation of the key documents mentioned in paragraph 2.1 of this deliverable, addressing the development of city indicators, has been complemented by the LPC activity.

As mentioned also in D3.1.1, LPCs are the primary strategy for actively engaging target groups in the Sustainable MED Cities project and local members involved, represent the different stakeholders interested in the project outcomes.

The significant support represented by the LPCs lies precisely in the provision of relevant local criteria to be included in the SCTool. Indeed, the 1st LPC has been organised to identify and highlight the main key aspect to be addressed at city scale in relation to the Mediterranean local priorities. Stakeholders involved in the activity came from both technical and not technical fields, as for example: professionals in the construction sector, local, regional and national authorities, academic, Small & Medium Enterprises Association, etc.

Figure 4: Some pictures taken during the 1st LPC performed by the Greater Irbid Municipality.

During the drafting of the S.MED.Cities SCTool many of the specific inputs coming from the LPCs have been included in the framework but was not easy to consider the ones expressed not in a technical language. For that reason, exactly has described in D3.1.1 for the SBTool and the SNTool, during the later steps of the project it is possible that other indicators may be integrated into the SCTool.

2.4. Validation of the results: joint workshops

The final list of the criteria belonging to the SCTool has been achieved through several internal workshops, performed with the three municipalities providing inputs from their LPCs, with the technical partners involved in the project and also with the main developer of the IEFCA, on which the SCTool is built.

Thanks to this exchange of views, the SCTool has been validated and aligned with the final version of the IEFCA 2022-2023.

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As mentioned above, these joint workshops were numerous, always organised by iiSBE on Zoom platform, and they were mainly of three different types:

- Clarification workshops, aimed primarily the three cities involved in the project, requiring information and clarification on the suggested proposals for the inclusion of specific and contextualised indicators, based on local needs;
- Technical workshop, performed together with NOA and UNEP/MAP, based on technical issues discussions, the structure of the frameworks and organisational features;
- Operational workshop, mainly performed together with the LP, addressing the activities time scheduling and any kind of specific problems that could have occurred (delays, difficulties in reception of the material from other PPs, etc.).

This productive synergistic activity made it possible to arrive at defining a quite comprehensive list of criteria addressing the City scale of the Mediterranean area. As mentioned in the previous paragraph, the list is not static; according to the needs that will arise during the testing activity, other specific indicators can be integrated if deemed useful for the purpose.

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3. Sustainability assessment method for the MED built environment

3.1. The SBE Method

The Sustainable MED Cities assessment system is composed by tools that allows to evaluate the sustainability of the built environment at different spatial scales (SBTool, SNTool and SCTool). The assessment system is based on the SBEMethod of iiSBE International. SBTool, SNTool and SCTool are transnational generic multicriteria assessment systems, named Generic Frameworks, useful to evaluate the sustainability of the Mediterranean built environment. To be used, a Generic Framework needs to be contextualised to local conditions. SBTool, SNTool and SCTool can't be used in their transnational versions. The contextualisation process consists in the adaptation of SBTool, SNTool and SCTool to regional priorities and practices. The contextualization takes place through the selection from the Generic Framework of the assessment criteria that will compose the local version of the tool and in the assignment of weights and benchmarks to them. The final result of the contextualisation process is a local version of SBTool SNTool and SCTool ready to be used for assessing buildings, urban areas and cities.

The contextualisation principle is the fundament of the Sustainable MED Cites assessment system. The basic assumption is that it isn't correct to use a unique common sustainability assessment tool the foresees the use of the same criteria, performance thresholds, weights everywhere, independently for the context. In reality, each local context has different priorities, history, climatic conditions, social-economic conditions, and advancement state in relation to sustainability issues that must be reflected in an assessment tool. The contextualisation process of the Generic Frameworks allows to obtain an operational sustainability assessment tool that fits the local needs and useful to measure the level of sustainability of buildings, urban areas and cities with regards to local priorities, practice, regulations, standards, etc.

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The principle of contextualisation is showed in the Figure below:

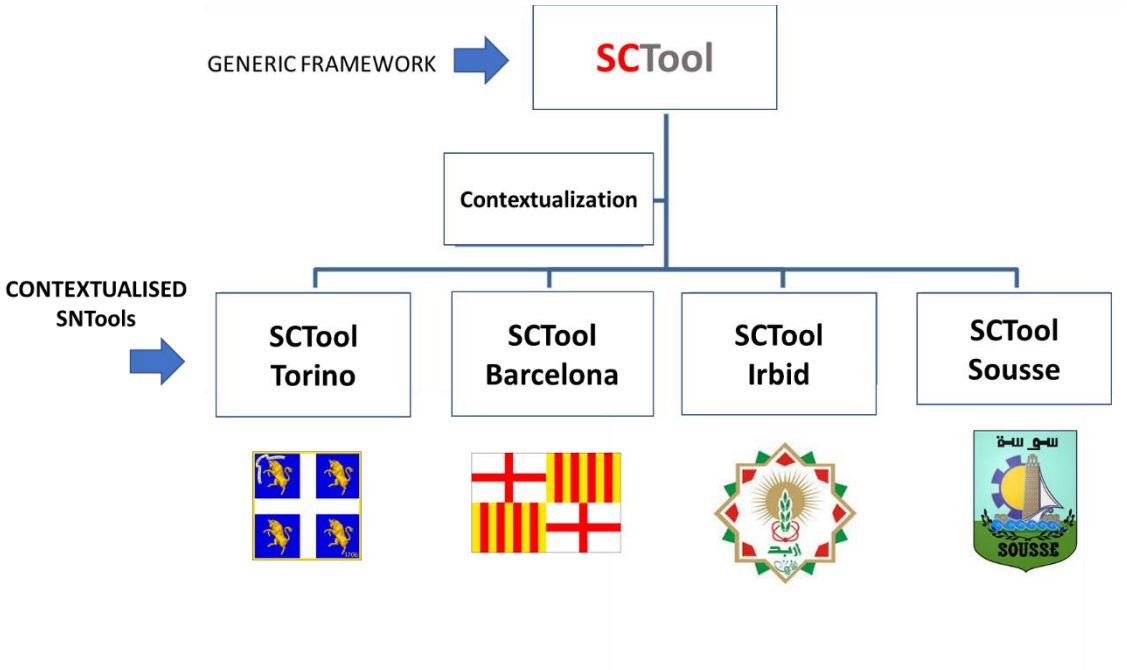

Figure 5: Contextualisation of the SCTool Generic Framework in local versions

Conventionally, the local systems derived from the Sustainable MED Cities GF are named "SMC STool/SBTool/SCTool + municipality/region/country name" (e.g. SCTool Sousse, SCTool Irbid, SCTool Barcelona).

Despite the different criteria, weights and benchmarks, deriving from the Generic Frameworks, the results produced by the contextualised versions of SBTool, SNTool and SCTool are compatible because based on the same transnational methodology. The assessments' results have the same meaning: the score represents how well a building or a neighbourhood or a city is performing in relation to the minimum local acceptable sustainability performance. Thus, the Generic Frameworks represent a common transnational language in sustainable built environment assessment, facilitating the transnational cooperation and share of best practices.

The transnational direct comparability of assessment results is assured using common Key Performance Indicators (KPIs), always included in all the local versions SBTool,

SNTool and SCTool. The value of the KPIs is displayed and communicated through the Sustainable MED Cities Passport (D3.1.4)

KPIs are a set of assessment criteria that during the contextualisation process must be included in the local versions of SBTool, SNTool and SCTool. They are the Key Performance Indicators. This principle is showed in the Figure below:

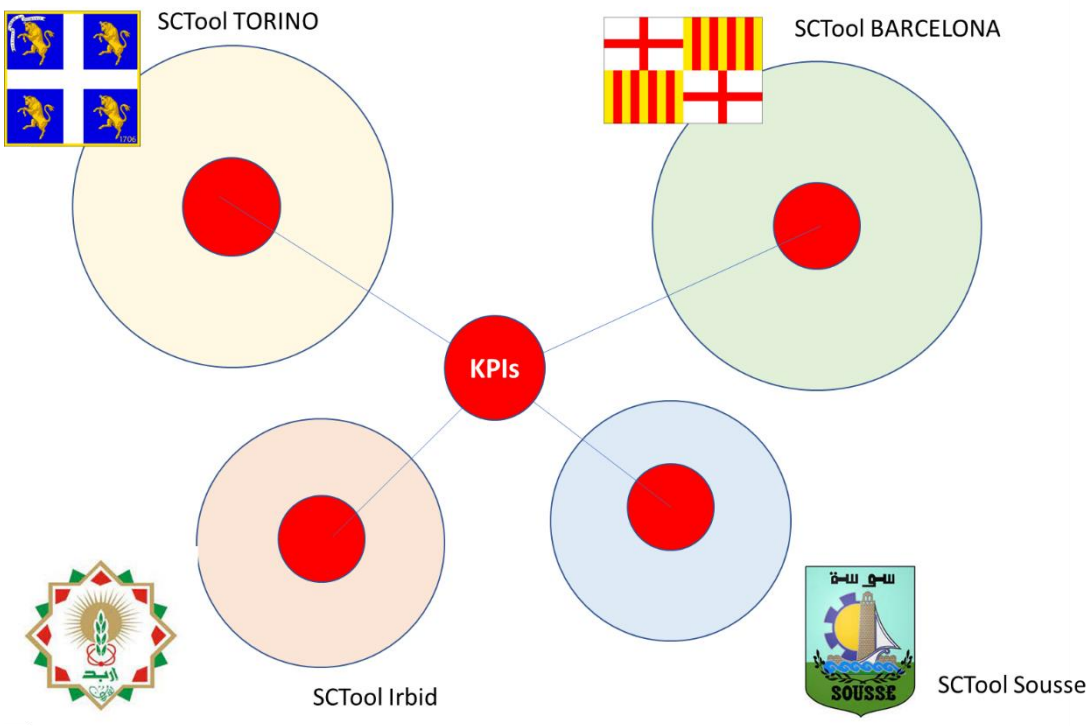

Figure 6: KPIs as a core set of common indicators in the local versions of SCTool

3.2. Description of the *SBEMethod*

The assessment method adopted in Sustainable MED Cities assessment system is the "*SBEMethod*" (Sustainable Built Environment Method) developed by iiSBE (international initiative for a Sustainable Built Environment). In general, the *SBEMethod* is a generic multi-criteria analysis methodology for assessing the sustainability of the built environment. Starting from a set of criteria the *SBEMethod* provides a final score about a building, urban area or territory overall performance. Using this methodology, it is possible to give a sustainability rating to a building or to a neighbourhood.

The sustainability score of the neighbourhood/building under assessment is computed through a mathematical procedure (called "assessment procedure") which is articulated in three main steps:

- characterization: building's/neighbourhood's performances are quantified through indicators in regard of each criterion;
- normalization: indicator values are adimensionalised and rescaled in a suitable interval, called normalization interval. The normalization consists in the assignment of a score to the indicator's value;
- aggregation: normalized scores are combined through weighted sums to produce the final concise score.

The main elements of the *SBEMethod* can be summarized as follows:

1. a set of assessment criteria
2. a set of indicators, which allow to quantify the building's/neighbourhood's performances with respect to each criterion
3. a normalization method (scoring system)
4. an aggregation method
5. a panel of experts who establish and define criteria and indicators

The *SBEMethod* is organized in issues, categories and criteria:

- **Issues:** describe general themes, recognized as relevant for assessing the sustainability of a building/neighbourhood. For instance, the issues of the building scale are: A-Site Regeneration and Development, Urban Design and

Infrastructure, B-Energy and Resources Consumption, C-Environmental Loadings, D-Indoor Environmental Quality, E-Service Quality, F-Social, Cultural and Perceptual Aspects, G-Cost and Economic Aspects, H-Adaptation to Climate Change.

The issues of the neighbourhood scale are: A-Use of land and biodiversity, B-Energy, C-Water, D-Solid Waste, E-Environmental quality, F-Transportation and mobility, G-Social Aspects, H-Economy, I-Climate Change: mitigation and adaptation, L-Governance.

- **Categories:** concern particular aspects of issues. For instance, in the SBTool, the issue A-Site Regeneration and Development, Urban Design and Infrastructure contains two categories: A1-Site Selection and A2-Site development.
- **Criteria:** detail specific aspects of categories. They represent the basic assessment entries used to characterize each area since the very beginning of the assessment process. For instance, the category A1-Site Selection includes 4 criteria: A1.1-Ecological value of land, A1.2-Proximity of site to public transportation, A1.3-Adjacency to existing service infrastructures and A1.4-Proximity to key services.

Issues, categories and criteria are linked in the following sense: each issue includes a variable number of categories (depending on issue to issue), each of them describing a particular aspect of the issue. Categories include different *criteria*, each of them describing a particular aspect of the corresponding category.

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A - Use of land and biodiversity	B - Energy	C - Water	D - Solid Waste	E - Environmental quality	F - Transportation and mobility	G - Social Aspects	H - Economy	I - Climate Change: mitigation and adaptation	L - Governance
A1 - Use of land	B1 - Energy infrastructure	C1 - Water infrastructure	D1 - Solid waste collection infrastructure	E1 - Air quality	F1 - Performance of mobility service	G1 - Accessibility (disabled persons)	H1 - Economic performance	I1 - Climate change mitigation	L1 - Urban Planning
A2 - Green urban areas	B2 - Energy consumptions	C2 - Water consumption	D2 - Solid waste management	E2 - Noise	F2 - Green mobility	G2 - Housing	H2 - Employment	I2 - Adaptation to the climatic action: heatwaves and increase of temperature	L2 - Management and community involvement
A3 - Biodiversity and ecosystems	B3 - Renewable energy	C3 - Effluents management		E3 - EMF exposure	F3 - Safety in mobility	G3 - Availability of public and private facilities and services	H3 - Innovation	I3 - Adaptation to the climatic action: pluvial flood	L3 - Public buildings operation
						G4 - Education	H4 - ICT infrastructure	I4 - Adaptation to the climatic action: fluvial and coastal flood	L4-Equity
						G5 - Social inclusion		I5 - Adaptation to the climatic action: drought	
						G6 - Safety		I6 - Adaptation to the climatic hazard: wildfire	
						G7 - Health			
						G8 - Food security			

Figure 7: Structure of the SCTool: Issues and Categories.

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Each criterion is combined with a (some) physical quantity(ies). These allow to quantify building/neighbourhood's performances with regard to each criterion. In the *SBEMethod*, such quantities are called "indicators". An indicator is a methodology which allows to characterize (not necessarily in numerical terms) the building/neighbourhood's performance with respect to the corresponding criterion.

In the *SBEMethod*, qualitative criteria are also present, for which the building/neighbourhood's performance is provided in terms of a comparison with a certain number of reference scenarios defined within the corresponding indicator. In the SBTool SNTool and SCTool, qualitative criteria are present in minimum quantity.

In the *SBEMethod* each criterion is associated with a single indicator.

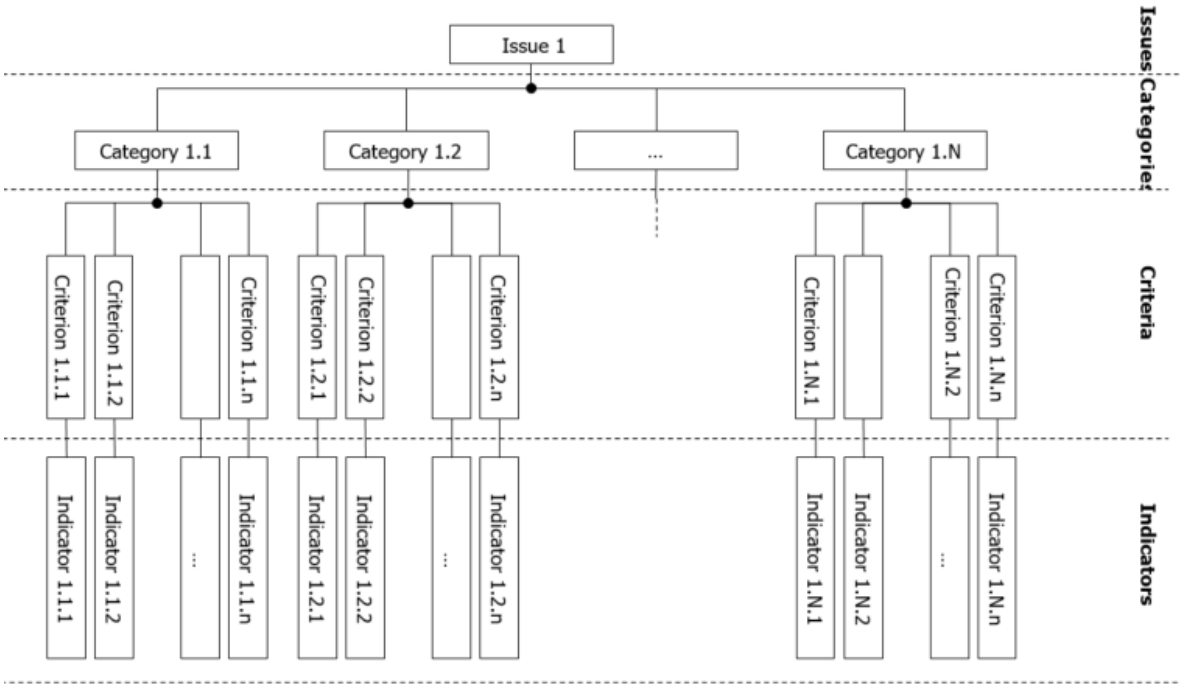

Figure 8: Schematic representation of a generic Issue's structure in the SBEMethod.

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3.2.1. Assessment procedure in the *SBEMethod*

The main goal of the *SBEMethod* is to provide a final concise score, which summarizes the overall performance of the building and neighborhood with respect to all criteria. Such a score is called “final score” and is computed starting from indicator values.

The mathematical procedure used to compute the final score is called **assessment procedure**, and is articulated in three main steps:

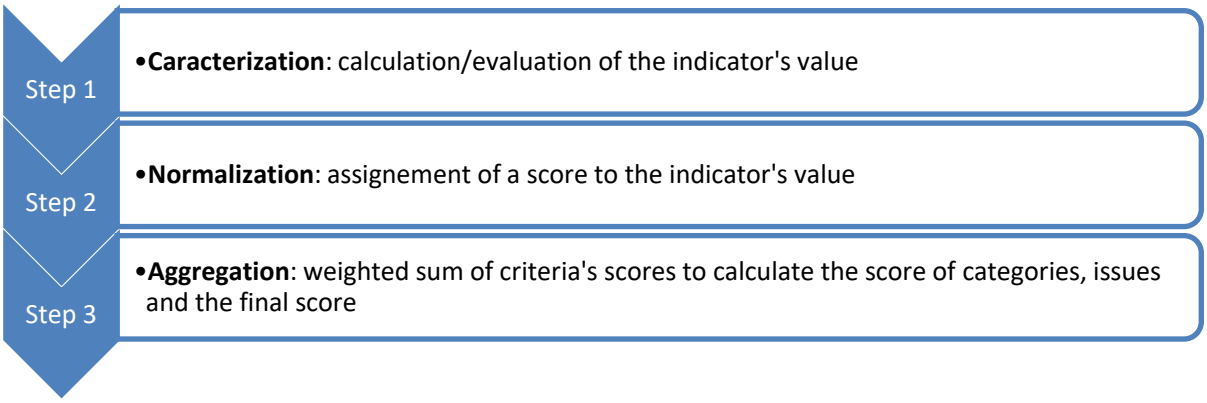

Figure 9: Schematic representation of the SBEMethod assessment process.

Characterization step. Building/Neighbourhood’s performances on each criterion are characterized either by means of a numerical value (if the corresponding indicator represents some physical quantity), or by means of a comparison with some reference scenarios defined by the associated indicator (in the case of qualitative criteria). The output of the characterization step is composed by a set of numerical values (the indicators’ values), each of them representing the neighbourhood’s performances in regard to each criterion. The numerical value could for instance correspond to an energy consumption (i.e. kWh/inhabitant).

Normalization step. Indicators’ values are made non-dimensional and rescaled in a suitable interval called *normalization interval*. The output of the normalization step is represented by a set of normalized scores, each of them is associated with a criterion. The normalization interval used in Sustainable MED Cities GF is from -1 to +5.

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The meaning of scores is:

Score	Meaning
-1	The score corresponds to a value of the indicator that is under the minimum acceptable performance.
0	The score corresponds to a value of the indicator that represents the minimum acceptable performance. It is usually defined on the base of regulations and standards.
1	The score corresponds to a value of the indicator that represents a minimum increase of performance with regards to the minimum acceptable performance.
2	The score corresponds to a value of the indicator that represents a substantial increase of performance with to the minimum acceptable performance.
3	The score corresponds to a value of the indicator that represents a best practice.
4	The score corresponds to a value of the indicator that represents an improvement towards the best practice level.
5	The score corresponds to a value of the indicator that represents an excellent and ideal performance.

Table 1: performance scale of the SBEMethod.

Aggregation step. Normalized scores are combined together (or *aggregated)* in order to compute the overall performance score. The aggregation step consists in a series of weighted sum.

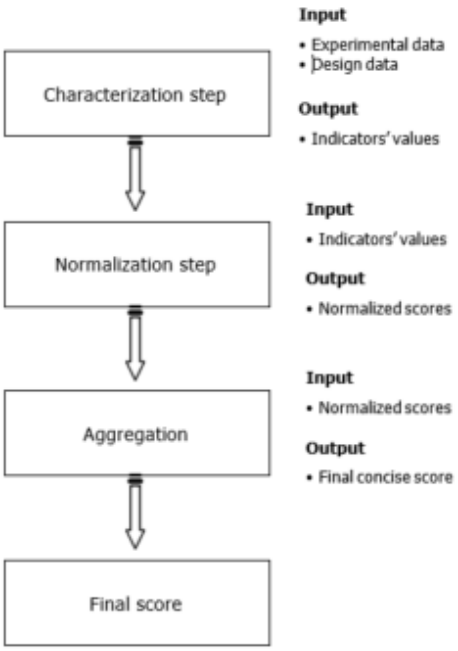

Figure 10: Input / Outputs of the SBEMethod assessment process.

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To describe the assessment method in mathematical terms, in the following, these symbols will be used to denote:

- Ai, the i-th issue, i = 1,….., NA, and NA is the total number of issues included in the SBEMethod. E.g: the third issue will be denoted with the symbol A3.
- Ci,j, the j-th category in Ai, j = 1,……,$N_C^{(i)}$, where $N_C^{(i)}$is the number of categories included in the i-th issue. E.g: if the third issue contains 5 categories, $N_C^{(3)}$= 5, and the second category is denoted with the symbol C3,2.
- ci,j,k, the k-th criterion in the j-th category of the i-th issue, k = 1,…….. , $N_c^{(i,j)}$, and $N_c^{(i,j)}$is the number of criteria included in Ci,j. E.g: if the second category includes 7 criteria, $N_C^{(3,2)}$= 7, and the fifth criterion in C3,2 is denoted with $c_{3,2,5}$.
- Ii,j,k, the indicator associated with $c_{i,j,k}$, k = 1,….., $N_c^{(i,j)}$. E.g: the indicator associated with the criterion $c_{3,2,5}$ is denoted with the symbol $I_{3,2,5}$
- sˆi,j,k, the numerical values of Ii,j,k. E.g: the numerical values of the indicator $I_{3,2,5}$ associated with $c_{3,2,5}$ is denoted with $s\hat{}_{3,2,5}$

Note: the symbols above indicated are valid for the mathematical description of the multicriteria assessment system. To improve the understandability of the generic framework, in Sustainable MED Cities GF the issues are indicated with a letter in substitution of the number, where 1=A, 2=B, 3=C, 4=D, 5=E, etc. The consequence is that categories are identified by a letter and a number (i.e. A1, C2, D4) and criteria by a letter and two numbers (i.e. A1.3, C2.4, D4.5).

Characterization step

The first step of the analysis is the characterization step. Characterization is performed by assigning a numerical value to each indicator. Such values are determined starting from design data, experimental measures, and through comparison with reference scenarios (in the case of qualitative criteria).

In the Sustainable MED Cities SBTool, SNTool and SCTool, for each indicator a specific assessment method has been defined to calculate/evaluate its value.

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The output of the characterization step is represented by the set of data: $s\hat{}_{i,j,k}$, k = 1…$N_c^{(i,j)}$, j = 1,…, $N_C^{(i)}$, i = 1,…., N_A, each of them is associated with a criterion, and represents the numerical values of the corresponding indicator.

Normalization step

The normalization steps consist basically in the assignment of a score to the indicators' value. Due to the diverse nature of criteria, indicator values are characterized by different units of measure and different orders of magnitude. Moreover, indicator values associated with qualitative criteria do not possess any unit of measure as they do not represent any physical quantity. For this reason, indicator values are adimensionalised and rescaled in an interval from -1 to +5 before the aggregation phase. The normalization method fulfills two basic requirements:

1. indicator values are normalized in the interval [-1, +5], where -1 and +5 are integers, called "normalization interval";
2. the better the performance, the higher the normalized score.

Normalized scores are computed by applying suitable functions, called "normalization functions" to indicator values. These modify indicator values and provide normalized scores which fulfill both the previous requirements.

In the following, these symbols will be used to denote:

- *φi,j,k,* the normalization function associated with the indicator *Ii,j,k;*
- *si,j,k,* the normalized score associated with the criterion *ci,j,k.*

Each normalization function is defined in different ways depending on the criterion which it is associated with. In the *SBEMethod* three main kinds of criteria can be distinguished:

- H.I.B. criteria (*Higher is Better*);
- L.I.B. criteria (*Lower is Better*);
- Qualitative criteria.

H.I.B. Criteria (*Higher Is Better*). All criteria such that the higher the numerical value of the corresponding indicator, the higher the performance level. Since the normalized score must fulfil the requirement "the better the performance, the higher the

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normalized score", *normalization functions associated with H.I.B. criteria must be increasing functions*.

L.I.B. Criteria (*Lower Is Better*). All criteria such that the lower the numerical value of the corresponding indicator, the higher the performance level. N*ormalization functions associated with L.I.B. criteria must be decreasing functions*.

Qualitative criteria. All criteria such that the normalized score can only attain discrete values in the normalization interval, each of them corresponding to a reference scenario defined by the corresponding indicator. Roughly speaking, the normalized score is computed by comparing the neighborhood's performance with some reference scenarios which are defined by the indicator associated with the criterion.

Normalization functions for H.I.B. criteria.

In the *SBEMethod*, normalization functions for H.I.B. criteria are piecewise linear functions defined as follows:

$$\phi_{i,j,k}\left(\hat{s}_{i,j,k}\right) = \begin{cases} n, & \hat{s}_{i,j,k} \leq \xi^{(1)}_{i,j,k} \\ n + (m-n)\,\dfrac{\hat{s}_{i,j,k} - \xi^{(1)}_{i,j,k}}{\xi^{(2)}_{i,j,k} - \xi^{(1)}_{i,j,k}}, & \xi^{(1)}_{i,j,k} < \hat{s}_{i,j,k} \leq \xi^{(2)}_{i,j,k} \\ m, & \hat{s}_{i,j,k} > \xi^{(2)}_{i,j,k} \end{cases}$$

Normalization function of this kind are such that:

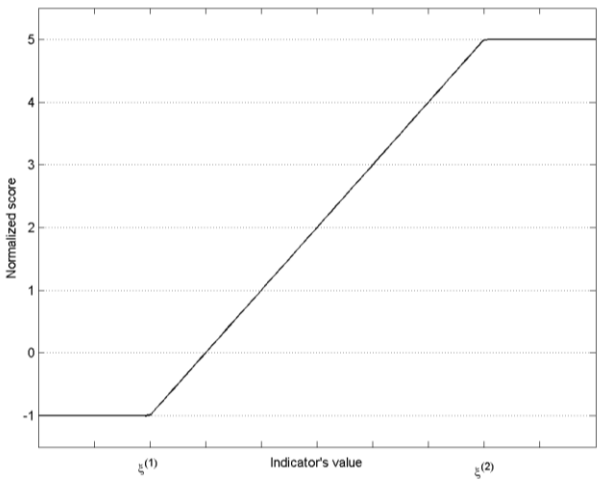

Figure 11: Normalization function for a H.I.B. criterion for the case n = −1 and m = 5.

- the normalized score is 'n', if the indicator value lies below the threshold $\xi^{(1)}_{i,j,k}$;
- the normalized score is 'm', if the indicator value lies above the threshold $\xi^{(2)}_{i,j,k}$;
- otherwise the normalized score linearly varies in the interval $\left[\xi^{(1)}_{i,j,k}, \xi^{(2)}_{i,j,k}\right]$.

Remark: Note that the normalization function defined for a general H.I.B criterion is an increasing function.

The normalization function depends on two parameters: $\xi^{(1)}_{i,j,k}$ and $\xi^{(2)}_{i,j,k}$ which vary from criterion to criterion. Such parameters are called benchmarks in the sense that they respectively represent the threshold for the worst (-1) and the best (+5) performance.

If the numerical values of benchmarks are not available, they are computed starting from some reference values, i.e. two normalized scores (y' and y'') are associated with two values (x' and x'') of the corresponding indicator, and benchmarks are recovered by linear extrapolation:

$$\begin{cases} \dfrac{\xi^{(1)}_{i,j,k} - x'}{x'' - x'} = \dfrac{n - y'}{y'' - y'} \\ \dfrac{\xi^{(2)}_{i,j,k} - x'}{x'' - x'} = \dfrac{m - y'}{y'' - y'} \end{cases}$$

Normalization functions for L.I.B. criteria.

The same analysis of the previous section can be repeated in the case of normalization function associated with L.I.B. criteria, with the only exception that in this case, the normalization function must be a decreasing function.

$$\phi_{i,j,k}\left(\hat{s}_{i,j,k}\right) = \begin{cases} m, & \hat{s}_{i,j,k} \leq \xi^{(1)}_{i,j,k} \\ m - (m-n)\,\dfrac{\hat{s}_{i,j,k} - \xi^{(1)}_{i,j,k}}{\xi^{(2)}_{i,j,k} - \xi^{(1)}_{i,j,k}}, & \xi^{(1)}_{i,j,k} < \hat{s}_{i,j,k} \leq \xi^{(2)}_{i,j,k} \\ n, & \hat{s}_{i,j,k} > \xi^{(2)}_{i,j,k} \end{cases}$$

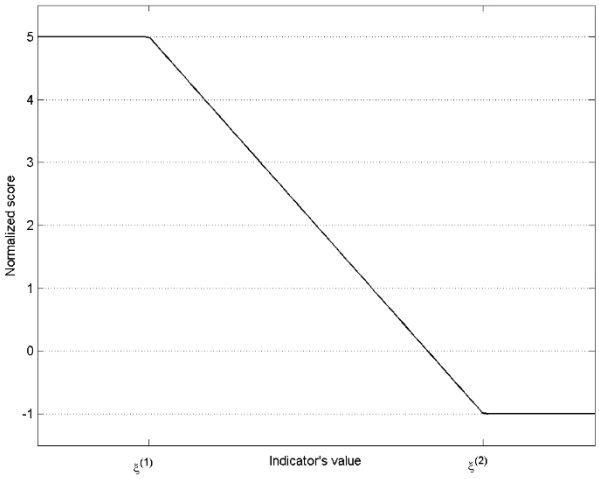

Figure 12: Normalization function for a L.I.B. criterion in the case n = −1 and m= 5.

Normalization functions of this kind are such that:

- the normalized score is 'm', if the indicator value lies below the threshold $\xi^{(1)}_{i,j,k}$;
- the normalized score is 'n', if the indicator value lies above the threshold $\xi^{(2)}_{i,j,k}$;
- otherwise, the normalized score linearly varies in the interval $\left[\xi^{(1)}_{i,j,k}, \xi^{(2)}_{i,j,k}\right]$.

Remark 2. Note that the normalization function defined is a decreasing function.

The normalization function depends on two parameters: $\xi^{(1)}_{i,j,k}$ and $\xi^{(2)}_{i,j,k}$ which vary from criterion to criterion. Such parameters are called benchmarks in the sense that they respectively represent the threshold for the best (+5) and worst performance (-1). Also in the present case, if the benchmarks are not available, they are computed by linear extrapolation:

$$\begin{cases} \dfrac{\xi^{(1)}_{i,j,k} - x'}{x'' - x'} = \dfrac{m - y'}{y'' - y'} \\ \dfrac{\xi^{(2)}_{i,j,k} - x'}{x'' - x'} = \dfrac{n - y'}{y'' - y'} \end{cases}$$

Normalization functions for qualitative criteria.

Normalization functions associated with qualitative criteria are defined as follows:

$$\phi\left(\hat{s}_{i,j,k}\right) = \begin{cases} s_0, & x = \xi_{i,j,k}^{(0)} \\ s_1, & x = \xi_{i,j,k}^{(1)} \\ s_2, & x = \xi_{i,j,k}^{(2)} \\ \ldots, & \\ s_n, & x = \xi_{i,j,k}^{(n)} \end{cases}$$

$$s_0, s_1, \ldots, s_n \in [n, m]$$

The normalized score can only attain discrete values in the normalization interval, each of them associated with a reference *scenario*.

After *n* + 1 scenarios are defined:

- the normalized score *s*0 is associated with the 0-th scenario;
- the normalized score *s*1 is associated with the 1-st scenario;

• ...

- the normalized score *sn* is associated with the *n*-th scenario;

Then the neighborhood's performance is compared with all reference scenarios and the normalized score is assigned depending on the result of such a comparison.

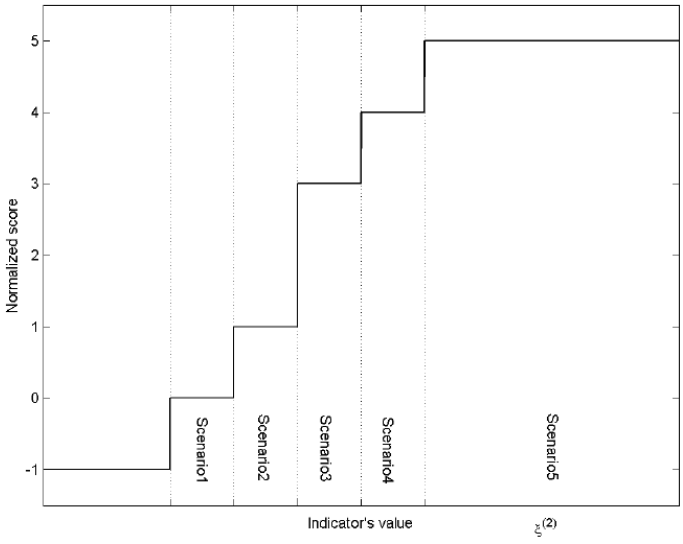

Figure 13: Example of a normalization function for a qualitative criterion in the case n = −1, m = 5.

Once all scenarios are defined, normalization functions associated with qualitative criteria only depend on *n* + 1 tunable parameters, which are the normalized score associated with each scenario (*s*0*, . . . , sn*).

Example:

Criterion "GHG gas emissions during operation"

Normalization of the indicator's value:

- CO_2 equivalent emissions per useful internal floor area per year = 2,24 kg CO_2 eq./m^2/yr

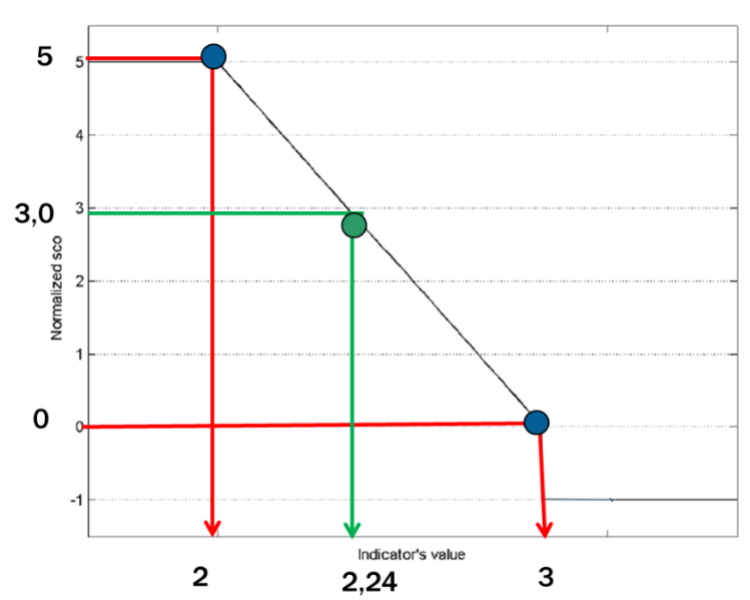

Figure 14: Example of normalisation of a indicator's value

Blue dots: represents the minimum acceptable performance (score zero) and the excellent performance (score +5).

Green dot: represents the value of the indicator on the linear performance scale.

The results of the normalization for a value of the indicator of 2,24 kg CO_2 eq./m^2/yr is a score of 3,0.

Aggregation step

At the end of the normalization step, a new set of data is available, composed of the normalized scores associated with each criterion. Normalized scores are then combined through a series of weighted sums to produce the final score, and this is done in three steps:

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- *Aggregation through criteria*: normalized scores associated with all criteria in the same category are aggregated to produce a single score for each category.
- *Aggregation through categories:* normalized score associated with categories in the same issue (these resulting from aggregation through criteria) are further aggregated to produce a single score for each issue.
- *Aggregation through issues*: normalized scores associated with issues (these resulting from aggregation through categories) are aggregated to produce the final concise score.

Aggregation through criteria.

The main goal of aggregation through criteria is to provide a single normalized score for each category. This is computed for each category aggregating the normalized score of all criteria included in that category.

Aggregation is performed by linear aggregation of data through some coefficients, called *weighting factors*. These quantify the relative weight of each criterion with respect to all criteria in the same category.

In the following, these symbols will be used to denote:

- *ωi,j,k:* the weighting factor associated with the criterion *ci,j,k* in the category *Ci,j;*
- *Si,j:* the normalized score resulting from aggregation of criteria included in the category *Ci,j.*

The score *Si,j* is computed as follows:

$$S_{i,j} = \sum_{k=1}^{N_c^{(i,j)}} \omega_{i,j,k}\, s_{i,j,k}$$

Note that the weighting factors defined by fulfill the following properties:

- each weighting factor lies in the interval [0, 1];

$$\sum_{k=1}^{N_c^{(i,j)}} \omega_{i,j,k} = 1$$

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It can be interpreted as a weighted sum of the performance score obtained by the neighbourhood in regard of each criterion, i.e. the performance score computed for a given category represents the building/neighborhood's average performance with respect to all criteria included in that category.

The result of aggregation through criteria is a set of normalized scores, each of them corresponding to a category.

Example: calculation of the score for the SCTool category A2 Green urban areas:

Code	Criterion	Score	Weight
A2.1	Availability of Green Urban Areas	3,1	34%
A2.2	Green areas in relation to the city population	2,2	20%
A2.3	Green Area Accessibility	1,3	16%
A2.4	Distribution of Green Urban Areas	0,5	16%
A2.5	Green zones and ecosystemic services	0,5	24%

Calculation of the category's score as weighted sum:

Code	Criterion	Score x Weight	Weighted score
A2.1	Availability of Green Urban Areas	3,1x0,34 =	1,0
A2.2	Green areas in relation to the city population	2,2x0,2 =	0,4
A2.3	Green Area Accessibility	1,3x0,16 =	0,2
A2.4	Distribution of Green Urban Areas	0,5x0,16 =	0,1
A2.5	Green zones and ecosystemic services	0,5x0,24 =	0,1
		TOTAL	**1,8**

Category score = sum of the weighted scores = 1,8

$$S_{i,j} = \sum_{k=1}^{N_c^{(i,j)}} \omega_{i,j,k}\, s_{i,j,k}$$

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Aggregation through categories

Scores obtained in the previous step are further aggregated to produce a single score for each issue.

In the following, these symbols will be used to denote:

- *wi,j:* the weighting factors for each category included in the issue *Ai;*
- *Sij:* the performance score associated with the *Ai.*

Aggregation through categories is performed for each issue, combining the performance scores of all categories in that issue as follows:

$$\mathcal{S}_i = \sum_{j=1}^{N_C^{(i)}} w_{i,j}\, S_{i,j}$$

wi,j are the '*categories weighting factors*' which quantify the relative weight of each category with respect to the others in the same issue.

Weighting factors for categories are established by a panel of experts, and fulfill the following properties:

1. each weighting factor lies in the interval [0, 1];
2. $\sum_{j=1}^{N_C^{(i)}} w_{i,j} = 1$

Therefore, also the aggregation through categories performed for each issue, can be interpreted as a weighted sum, i.e., the final score obtained for each issue represents the average performance of the neighbourhood with respect to all categories included in that issue.

Example: calculation of the score for SCTool issue A-Use of land and biodiversity

Code	Category	Score	Weight
A1	Use of land	1,6	30%
A2	Green urban areas	2,6	30%
A3	Biodiversity and ecosystems	2,2	40%

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Calculation of the issue's score as weighted sum:

Code	Category	Score x Weight	Weighted score
A1	Use of land	1,6 x 0,3 =	0,5
A2	Green urban areas	2,6 x 0,3 =	0,8
A3	Biodiversity and ecosystems	2,2 x 0,4 =	0,9
		TOTAL	**2,2**

$$\mathcal{S}_i = \sum_{j=1}^{N_C^{(i)}} w_{i,j}\, S_{i,j}$$

Issue score = sum of the weighted scores = 2,2

Aggregation through issues.

Finally, scores provided by aggregation through categories are further aggregated to produce the final concise score representing the neighborhood overall performance.

The final score is computed as follows:

$$\Sigma = \sum_{i=1}^{N_{\mathcal{A}}} W_i\, \mathcal{S}_i$$

where *Wi* represent the *"weighting factors for all issues"* and express the relative influence of each issue on the final score.

The weighting factor for each issue is established by a panel of experts and fulfills the following properties:

Each weighting factor lies in the interval [0, 1];

$$\sum_{i=1}^{N_{\mathcal{A}}} W_i = 1$$

Therefore, the final score can also be interpreted as the average performance of the neighborhood with respect to all issues.

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Example: calculation of the overall score for a city:

Code	Issue	Score	Weight
A	Use of land and biodiversity	2,2	8%
B	Energy	1,9	13%
C	Water	2,3	10%
D	Solid Waste	0,9	10%
E	Environmental quality	2,1	10%
F	Transportation and mobility	2,0	8%
G	Social Aspects	1,1	11%
H	Economy	1,3	9%
I	Climate Change: mitigation and adaptation	3,0	13%
L	Governance	2,1	8%

Calculation of the issue's score as weighted sum:

Code	Issue	Score x Weight	Weighted score
A	Use of land and biodiversity	2,2 x 0,08 =	0,2
B	Energy	1,9 x 0,13 =	0,2
C	Water	2,3 x 0,1 =	0,2
D	Solid Waste	0,9 x 0,1 =	0,0
E	Environmental quality	2,1 x 0,1 =	0,2
F	Transportation and mobility	2,0 x 0,08 =	0,2
G	Social Aspects	2,1 x 0,11 =	0,2
H	Economy	1,3 x 0,09 =	0,2
I	Climate Change: mitigation and adaptation	3,0 x 0,13 =	0,4
L	Governance	2,1 x 0,08 =	0,2
		TOTAL	**2,0**

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$$\Sigma = \sum_{i=1}^{N_A} W_i S_i$$

Neighborhood score = sum of the weighted scores = 2,0.

3.3. Contextualisation Process of a Generic Framework

From the Sustainable MED Cities MED Generic Frameworks, it is possible to develop contextualised local assessment tools through a process articulated in three steps:

- Selection of the active criteria
- Benchmarking
- Weighting

3.3.1. Selection of the active criteria

The first step consists in the selection of the criteria that will compose the local vision of the tool. The criteria are selected from the whole list of the Generic Framework (SBTool, SNTool, SCTool). There isn't a fixed number of criteria to be selected. The local systems can widely vary from this point of view. Only a core set of criteria, the Key Performance Indicators (KPIs), are mandatory for all. The KPIs represent the priority sustainability transnational issues and they allow to compare the key performances in the Mediterranean areas through the Sustainable MED Cities Passport.

The rationale behind the selection could depend on regional policies, targets, specific characteristics of the territory (e.g. touristic area, agricultural area, etc.…). The selection of criteria can be documented and justified, using the following tables:

A- USE OF LAND AND BIODIVERSITY		
AX	**Name of the Category**	***Justification***
AX.X	*Name of the Criterion*	*Text*
AX.X	*Name of the Criterion*	*Text*

B- ENERGY		
BX	**Name of the Category**	***Justification***
BX.X	*Name of the Criterion*	*Text*
BX.X	*Name of the Criterion*	*Text*

C- WATER		
CX	**Name of the Category**	***Justification***
CX.X	*Name of the Criterion*	*Text*
CX.X	*Name of the Criterion*	*Text*

D- SOLID WASTE		
DX	**Name of the Category**	***Justification***
DX.X	*Name of the Criterion*	*Text*
DX.X	*Name of the Criterion*	*Text*

E- ENVIRONMENTAL QUALITY		
EX	**Name of the Category**	***Justification***
EX.X	*Name of the Criterion*	*Text*
EX.X	*Name of the Criterion*	*Text*

F- TRANSPORTATION AND MOBILITY		
FX	**Name of the Category**	***Justification***
FX.X	*Name of the Criterion*	*Text*
FX.X	*Name of the Criterion*	*Text*

G- SOCIAL ASPECTS		
GX	**Name of the Category**	***Justification***
GX.X	*Name of the Criterion*	*Text*
GX.X	*Name of the Criterion*	*Text*

H- ECONOMY		
HX	**Name of the Category**	***Justification***
HX.X	*Name of the Criterion*	*Text*

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HX.X	*Name of the Criterion*	*Text*

I- CLIMATE CHANGE		
IX	**Name of the Category**	***Justification***
IX.X	*Name of the Criterion*	*Text*
IX.X	*Name of the Criterion*	*Text*

L- GOVERNANCE		
LX	**Name of the Category**	***Justification***
LX.X	*Name of the Criterion*	*Text*
LX.X	*Name of the Criterion*	*Text*

3.3.1. Benchmarking

The second step consists in the definition of the scoring scale for each selected criterion. The benchmark is a quantification of the indicator's value corresponding to the minimum acceptable performance (score zero) and the one that is considered the best at local level (score 5). To set the benchmarks, it is possible to refer to (listed in a priority order):

- national, regional laws
- national, regional, municipal regulations
- technical standards (national or international9
- statistical data
- scientific literature
- local reference values
- simulations

The selection of benchmarks shall be and justified using the tables like the following one per each issue.

A- USE OF LAND AND BIODIVERSITY				
CRITERION	INDICATOR	UNIT OF MEASURE	BENCHMARK	RATIONALE
Ax.x	*(text)*		*0: value*	*Insert your comment here*
			5: value	*Insert your comment here*

Table 2: example of table to document and justify the selection of benchmarks

3.3.2. Weighting

The third step consists in the definition of the weight at criterion, category and issue level through the assignment of priorities. The weighting process takes place in 3 steps:

1. Assignment of priority values to issues and weights calculation
2. Assignment of priority values to categories and weights calculation
3. Assignment of impact factors to criteria and weights calculation.

3.3.2.1. Weighting of issues

To set the weight s at issue level, it is necessary to define a priority factor for each of them. The priority level indicates the relevance of the issue in relation to the context. A value of 1 means a low priority, a level 5 represents the higher priority.
The weight of each issue is then calculated as:

$$w_i = \frac{P_i}{\sum_{i=1}^{N} P_i} \times 100$$

Where:

- w_i = weight of the issue A_i
- Pi = priority level of the A_i issue

For instance, the table below shows a simulation of priority level assigned to SCTool issues:

ISSUE	Priority Factor (1 to 5)
A- USE OF LAND AND BIODIVERSITY	2
B- ENERGY	5
C- WATER	4
D- SOLID WASTE	2
E- ENVIRONMENTAL QUALITY	2
F- TRANSPORTATION AND MOBILITY	2
G- SOCIAL ASPECTS	4
H - ECONOMY	4
I – CLIMATE CHANGE	5

Table 3: simulation of priority factors assigned to SCTool issues

The weight of issue A will be:

$$w_A = \sum \frac{2}{28} = 4\%$$

The weight of issue B will be:

$$w_B = \sum \frac{5}{28} \times 100 = 18\%$$

The table below shows the weight for all issues (SCTool):

ISSUE	Priority Factor (1 to 5)	Weight
A- USE OF LAND AND BIODIVERSITY	2	4%
B- ENERGY	5	18%
C- WATER	4	11%
D- SOLID WASTE	2	7%
E- ENVIRONMENTAL QUALITY	2	7%
F- TRANSPORTATION AND MOBILITY	2	7%
G- SOCIAL ASPECTS	4	14%
H - ECONOMY	4	14%
I – CLIMATE CHANGE	5	18%

Table 4: simulation of weights assigned to SCTool issues

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3.3.2.2. *Weighting of categories*

To set the weight s at issue category level, it is necessary to define a priority factor for each of them. The priority level indicates the relevance of the issue in relation to the context. A value of 1 means a low priority, a level 5 represents the higher priority.

The weight of each issue is then calculated as:

$$w_{i,j} = \frac{L_j}{\sum_{j=1}^{N_c^{(i)}} L_j} \quad \text{X } 100$$

Where:

$W_{i,j}$= weight of category $C_{j,k}$ included in issue A_i

L_j = priority factor of category $C_{j,k}$ included in issue A_i

The priority factors must be assigned to all the categories in the local assessment tool. For istance, the table below shows the priorities assigned to the categories belonging to issue G of a local SCTool:

G	Social Aspects	Priority Factor (1 to 5)
G1	Accessibility (disabled persons)	2
G2	Housing	2
G3	Availability of public and private facilities and services	3
G4	Education	3
G5	Social inclusion	5
G6	Safety	3
G7	Health	5
G8	Food security	1

Table 5: simulation of priority factors assigned to SCTool categories in Issue G

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The resulting weights will be:

G	Social Aspects	Priority Factor (1 to 5)	Weight
G1	Accessibility (disabled persons)	2	8%
G2	Housing	2	8%
G3	Availability of public and private facilities and services	3	13%
G4	Education	3	13%
G5	Social inclusion	5	21%
G6	Safety	3	13%
G7	Health	5	21%
G8	Food security	1	4%

Table 6: simulation of weights assigned to SCTool categories in Issue G

3.3.2.3. Weighting of criteria

To weight the criteria is necessary to assign priority factors to each assessment criterion. The priority factors are the following:

I= Intensity of the potential Effect (1-3)

E= Extent of potential effect (1-5)

D= Duration of potential effect (1-5)

A= Adjustment factor in relation to local priorities (1-3)

Impact of the potential effect (I_k)

It can get from 1 to 3 points depending on the intensity of the extent of an effect. The impact is considered very relevant for all the energy criteria whose effect is very strong on the territory, but also economical and air quality criteria may have a big impact in that sense.

Extent of potential effect (E_k)

It can get from 1 to 5 points; this factor examines the extent of the effect of the criterion, for example, the road connectivity is an aspect that could strongly affect the larger scale

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in terms of extent and also the pollutant emissions whose effect is perceived on a large scale.

Duration of potential effect (D_k)

It can get from 1 to 5 points; it measures the durability of the effect evaluated by the criterion. Land consumption criterion confirms that an urbanized soil will remain as it is over time, also other aspects related to the urban planning have a strongly duration impact like for example, green areas provision, street connections, pedestrian areas, etc.

A = Adjustment factor in relation to local priorities (1-3) (Ak)

It can get from 1 to 3 points; it is a factor that can be used if there is the need to adjust the priority factor of the criterion in relation to specific local priorities. Maybe in a region a particular sustainability issue has a dramatic importance in relation to other issues. In this case the adjustment factor can be used to take in account the local context.

EXTENT of potential effect	
Block	1
Neighborhood	2
Cluster	3
Urban/Region	4
Global	5
DURATION of potential effect	
from 1 to 3 years	1
from 3 to 10 years	2
From 10 - 30 years	3
30 - 75 years	4
>75 years	5
IMPACT of the Potential Effect	
Minimum	1
Moderate	2
High	3

Figure 14: Priority factors useful to establish the hierarchy relevance of the criteria

The weight of a criterion in its category is calculated applying the following steps.

- Calculation of the impact level P_k as:

  $Pk = D_k \times E_k \times I_{k\,x} \times A_k$

- Calculation of the weight of the criterion in its category

$$\omega_{i,j,k} = \frac{P_k}{\sum_{k=1}^{N_c^{(i,j)}} P_k}$$

For instance, considering the criteria in the SCTool category C1 Water infrastructure, possible priority factors are:

C- WATER					
C1 - Water infrastructure					
CRITERION	**Impact P_k *(IxExDxA)***	**I Intensity**	**E Extent**	**D Duration**	**A Adjustment**
C1.1 Availability of a public municipal water supply	60	5	*4*	*3*	*1*
C1.2 Access to wastewater collection	48	*4*	*4*	*3*	*1*

Table 7: Priority factors and impact of the criteria in the category C1

Consequently, the resulting weights are:

C- WATER	
C1 - Water infrastructure	
CRITERION	**Weight**
C1.1 Availability of a public municipal water supply	56%
C1.2 Availability of wastewater treatment systems	44%

Table 8: weights of the criteria in the category C1

4. Sustainable MED Cities SCTool

4.1. Sustainable MED Cities SCTool: specifications

To follow, the complete list of the criteria which make up the Sustainable MED Cities SCTool. In the table below are also included, for each criterion, the information related to the name of the indicator and the unit of measure. Furthermore, KPIs are marked in the list with a "X" and fully described in "D3.1.4 - MED Passport and KPIs".

Sustainable MED Cities - SCTool Criteria List

A	**Use of land and biodiversity**			
A1	**Use of Land**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
A1.1	Population density	Population density in built-up areas (city area minus green and blue)	Inhabitants per km^2	
A2	**Green urban areas**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
A2.1	Availability of Green Urban Areas	Total amount of Green Urban Areas in the city's boundaries divided by the total area of the city	%	**X**
A2.2	Green areas in relation to the city population	Total extension of green areas in the city divided by city's total population	m^2/inhabitant	
A2.3	Green Area Accessibility	Percentage of inhabitants with accessibility to green areas	%	
A2.4	Distribution of Green Urban Areas	Total length of green area boundaries (edges) divided by the city's urban area	%	
A2.5	Green zones and ecosystemic services	Share of natural green areas on total green areas	%	
A3	**Biodiversity and ecosystems**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
A3.1	Variation of the number of bird species	Percentage change in the number of bird species	%	
A3.2	Native biodiversity in built up area	This indicator is the number of bird species that is listed in the urban area (natural protected area excluded)	n	
A3.3	Connectivity measures for natural areas	Amount of natural connected areas in the city divided by the total amount of natural areas in the city	%	

B	Energy			
B1	**Energy infrastructure**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
B1.1	Access to authorized electrical service	Number of people in the city with authorized electrical service divided by the total population of the city	%	
B1.2	Electrical service interruptions	Total sum of hours of interruption multiplied by the number of households impacted divided by the total number of households	hrs/household	
B2	**Energy consumptions**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
B2.1	Final energy consumption	Total final energy consumed by a city divided by the total population of the city	MWh/inhabitant/yr	**X**
B2.2	Residential final thermal energy consumption	Total consumption of final thermal energy divided by the total number of city inhabitants	MWh/inhabitant/yr	
B2.3	Public street lighting	Total electricity consumption of public street lighting divided by the total distance of streets where streetlights are present	kWh/km yr	
B3	**Renewable energy**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
B3.1	Final energy derived from renewable sources	Share of renewable energies in final energy demand	%	**X**
B3.2	Renewable energy locally produced	Share of locally produced renewable energies of final energy demand	%	
C	**Water**			
C1	**Water infrastructure**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
C1.1	Availability of a public municipal water supply	Total number of people with potable water supply service divided by total city population	%	
C1.2	Access to wastewater collection	Number of people within the city that are served by wastewater collection divided by the city population	%	
C2	**Water consumption**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
C2.1	Total water consumption	Total amount of the city's daily water consumption divided by the total city population	L/day/person	**X**
C2.2	Efficiency in water use	Volume of water supplied minus the volume of utilized	%	

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		water divided by the total volume of water supplied		
C2.3	Sufficiency of domestic water provision	Volume of the water supplied for domestic uses divided by the overall domestic water demand	%	
C3	**Effluents management**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
C3.1	Centralized wastewater treatment	Total volume of city wastewater collected for primary, secondary and tertiary treatment in centralized wastewater treatment facilities divided by the total volume of wastewater produced in the city	%	
C3.2	Household sanitation	Percentage of households with access to basic sanitation facilities	%	
D	**Solid Waste**			
D1	**Solid waste collection infrastructure**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
D1.1	Availability of solid waste collection	Percentage of population with regular solid waste collection	%	
D2	**Solid waste management**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
D2.1	Solid waste generation	Total amount of solid waste generated divided by the total city population	tonnes/inhabitant/yr	
D2.2	Solid waste recycling	Total amount of solid waste that is recycled divided by the total amount of solid waste produced in the city	%	**X**
E	**Environmental quality**			
E1	**Air quality**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
E1.1	Fine particulate matter ($PM_{2.5}$) concentration	Annual average fine particulate matter ($PM_{2.5}$) concentration	$\mu g/m^3$	
E1.2	Particulate matter (PM_{10}) concentration	Annual average fine particulate matter (PM_{10}) concentration	$\mu g/m^3$	**X**
E1.3	Nitrogen Dioxide concentration (NO2)	Sum of daily concentrations for the whole year divided by 365 days	$\mu g/m^3$	
E1.4	Sulfur Dioxide concentration (SO2)	Sum of daily concentrations for the whole year divided by 365 days	$\mu g/m^3$	
E1.5	Ozone concentration (O3)	Sum of daily concentrations for the whole year divided by 365 days	$\mu g/m^3$	
E2	**Noise**			

CODE	CRITERION	INDICATOR	UNIT	KPIs
E2.1	Noise pollution	Population exposed to noise pollution divided by the total population of the city	%	
E3	**EMF exposure**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
E3.1	Exposure to high frequency electromagnetic fields	Percentage of mobile network antenna sites in compliance with EMF exposure guidelines	%	
E3.2	Percentage of buildings exposed to ELF magnetic fields	Percentage of buildings in the area located not respecting the safety distance from high voltage lines	%	
F	**Transportation and mobility**			
F1	**Performance of mobility services**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
F1.1	Public transport network	Length of public transport system per 1000 population	km/1000 inhabitants	**X**
F1.2	Accessibility of public transportation service	Percentage of inhabitants that are within 500 meters walking distance of at public transportation service stop running at least every 20 minutes during peak periods	%	
F1.3	Usage of public transportation by population	Total annual number of public transport trips originating in the city divided by the total city population	trips/inhabitant	
F2	**Green mobility**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
F2.1	Shared vehicles	Number of shared vehicles per 1.000 inhabitants	n/1000 inhabitants	
F2.2	Electric-vehicle infrastructure (charging stations)	Electric vehicle charging stations per inhabitant	n/inhabitant	
F2.3	Low-Carbon Emission Passenger Vehicles	Percentage of low-carbon emission passenger vehicles	%	
F2.4	Bicycle network	Total length of bicycle paths and lanes divided by the city's total population	m/inhabitant	**X**
F2.5	Shared bicycles	Number of shared bicycles per 1.000 inhabitants	n/1000 inhabitants	
F2.6	Green public vehicles	Total number of low emission public vehicles divided by total number of public vehicles	%	
F3	**Safety in mobility**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
F3.1	Pedestrian infrastructure	Total area of pedestrian streets and walkways divided by the total area of streets and roads in the city	%	

F3.2	Availability of sidewalks	Percentage of roads' length that has dedicated sidewalks	%	
F3.3	Safety of bicycle lines	Percentage of bicycle paths physically separated from traffic roads	%	
F3.4	Traffic fatalities	Traffic fatalities divided by 1000th of the city's population	n/1000 inhabitants	
F3.5	Private transportation services	Number of taxi licenses divided by 1000th of the city's population	n/1000 inhabitants	
G	**Transportation and mobility**			
G1	**Performance of mobility services**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
G1.1	Accessibility of public buildings	Total number of public buildings accessible by disabled persons divided by the total number of public buildings	%	
G1.2	Barrier-free accessibility in local outdoor public areas	Percentage of accessible public outdoor areas that are barrier-free compared to the total public area	%	
G1.3	Accessibility of public transport network	Percentage of public transport vehicles that are accessible disabled persons	%	
G2	**Housing**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
G2.1	Affordability of housing property	Housing properties in the city that are financially accessible to the lowest quintile of area population	%	
G2.2	Affordability of housing rental	Percentage of the average salary of the lowest quintile of the population used for rental payments	%	
G2.3	Vacant residential units	Percentage of vacant residential units	%	
G2.4	Informal settlements	Area of informal settlements within the city boundary divided by the city area	%	
G3	**Availability of public and private facilities and services**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
G3.1	Basic service proximity	Number of inhabitants who live near at least one basic service divided by the total population of the city	%	
G3.2	Open space for public use	Average share of the built-up area of the city that is open space for public use	%	
G3.3	Accessibility of shores/beaches	Total area of shores/beaches in the city area that are accessible by inhabitants	%	

		divided by the total area of shores/beaches in the city's urban area		
G4	**Education**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
G4.1	Primary enrolment rate	Net primary enrolment rate	%	
G4.2	Female school-aged population enrolled in schools	Number of city's female school-aged population enrolled at primary and secondary levels in public and private schools divided by the total number of a city's female school-aged population	%	
G4.3	Secondary school enrolment	Lower secondary completion rate	%	
G4.4	Tertiary education	Population age 25-34 with tertiary educational attainment	%	
G5	**Social inclusion**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
G5.1	Gender pay gap	Difference between average gross hourly earnings of male and female paid employees as a percentage of average gross hourly earnings of male paid employees	%	
G5.2	Energy poverty of households	Percentage of households unable to afford the most basic levels of energy (more than 10% of the income spent on energy bills)	%	
G5.3	Population living below poverty line	Number of people living below the national poverty line set at country level divided by the total current population of the city	%	
G5.4	Inequality	Gini coefficient of inequality	n	
G5.5	Voter participation	Percentage of the eligible population that voted during the last municipal election	%	
G6	**Safety**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
G6.1	Police service	Number of police officers per 1.000 inhabitants	n/1000 inhabitants	
G6.2	Fire service	Number of firefighters per 1.000 inhabitants	n/1000 inhabitants	
G6.3	Population living in disaster prone areas	Percentage of inhabitants living in a zone subject to natural hazards	%	

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G7	Health			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
G7.1	Life expectancy	Average number of years that a new-born is expected to live if current mortality rates continue to apply	years	
G7.2	Physicians	Number of physicians per 1.000 inhabitants	n/1000 inhabitant	
G7.3	In-Patient Hospital Beds	Number of in-patient public hospital beds per 1,000 inhabitants	n/1000 inhabitant	
G8	**Food security**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
G8.1	Local production of food	Percentage of local food supplied from within 100 km of the urban area	%	
G8.2	Urban agricultural land	Total urban agricultural area used for food production located within city boundaries divided by one 1000 th of the city's total population	he/1000 inhabitants	
H	**Economy**			
H1	**Economic performance**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
H1.1	Average annual per-capita income of residents	Average per-capita income of residents in the local area relative to that of the urban region as a whole	%	
H1.2	Economic contribution from tourism activity	Sum of overnight visitor stays divided by the area's total population	stays/resident	
H2	**Employment**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
H2.1	Unemployment rate	Total number of working-age primary residents not in paid employment or self-employment, but available for work and seeking work divided by the total labour force	%	
H2.2	Youth unemployment rate	Total number of a city's unemployed youth divided by the city's youth labour force	%	
H2.3	Female employment	Total number of working age women in employment divided by the total female labour force	%	
H3	**Innovation**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
H1.3	New business registration rate	The proportion of business registrations per 10.000 inhabitants aged 16 and above	n	

H4	ICT infrastructure			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
H4.1	Fixed Broadband Subscriptions	Percentage of households with fixed (wired) broadband	%	
H4.2	Wireless Broadband Coverage	Percentage of the city served by wireless broadband (3G, 4G, 5G)	%	
H4.3	Availability of WIFI in Public Areas	Number of public WIFI hotspots in the city per 1000 inhabitants	n/1000 inhabitants	
H4.4	Mobile phone subscriptions	Total number of mobile phone subscriptions in the area divided by one 1000th of the area's total population	n/1000 inhabitants	
I	**Climate change: mitigation and adaptation**			
I1	**Climate change mitigation**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
I1.1	Greenhouse gas emissions	Total amount of greenhouse gases (equivalent carbon dioxide units) generated over a calendar year for all sectors, divided by the current city population	t CO_2 eq. / inhabitant/yr	**X**
I1.2	CO_2 sequestration	Potential CO_2 sequestration in the city per he	tepCO_2/he	
I2	**Adaptation to the climatic action: heatwaves and increase of temperature**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
I2.1	Albedo	Mean Solar Reflectance Index of paved surfaces and roofs in the area	SRI	
I3	**Adaptation to the climatic action: pluvial flood**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
I3.1	Permeability of land	Percentage of weighted ground permeability	%	X
I4	**Adaptation to the climatic action: fluvial and coastal flood**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
I4.1	Flood risk	Percentage of population exposed to flood risk	%	
I5	**Adaptation to the climatic action: drought**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
I5.1	Rainwater collection and storage from buildings for non-potable uses	Share of buildings in the city with a rainwater collection system	%	
I5.2	Local vegetation	Share of landscape (green areas) plated with local vegetation	%	
I6	**Adaptation to the climatic hazard: wildfire**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
I6.1	Wildfire risk	Percentage of population exposed to wildfire risk	%	

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L	Governance			
L1	**Urban Planning**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
L1.1	Community involvement in urban planning activities	Percentage of residents active in public urban planning	Level	
L2	**Management and community involvement**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
L2.1	Involvement of residents in community affairs	Percentage of resident population above 16 years having an involvement in community affairs	%	
L3	**Public buildings operation**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
L3.1	Public buildings sustainability	Percentage area of public buildings with recognized sustainability certifications for ongoing operations	%	
L3.2	Operating energy costs for public buildings	Aggregated annual operating energy cost per aggregated indoor useful floor area	€/m^2/yr	
L3.3	Energy consumption of public buildings	Total end use of energy in public buildings within a city divided by total indoor useful area of these buildings	kWh/m^2	
L4	**Equity**			
CODE	**CRITERION**	**INDICATOR**	**UNIT**	**KPIs**
L4.1	Women elected to city level office	Total number of elected city-level positions held by women divided by the total number of elected city-level positions	%	

After the list of the SCTool criteria, for each of them it is provided a table with all the relevant information, as showed below in the example.

A	Area	
A1	**Category**	
A1.1	**Criterion**	
	Intent:	Description of the objective of the criterion
	Indicator:	Indicate the indicator name
	Unit of measure:	Include the unit of measure of the indicator
	Assessment method:	Describe the calculation methodology, step by step, to achieve the indicator result
	Standard:	Indicate, if any, the calculation standard for the criterion
	References:	Indicate the acquiring source

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Sustainable MED Cities - SCTool Tables

A	Use of land and biodiversity	
A1	**Use of land**	
A1.1	**Population density**	
	Intent:	To evaluate the increase of the proximity between residents and local goods and services
	Indicator:	City population in relation to the city's land area
	Unit of measure:	Inhabitants/km^2
	Assessment method:	Calculation steps: - Calculate the total city population (A) - numerator - Calculate the total land area of the city (B) - denominator - Calculate the value of the indicator as A/B The result shall be expressed as number of persons per square kilometre.
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

A2	Green urban areas	
A2.1	**Availability of Green Urban Areas**	
KPI	*Intent:*	To facilitate climate change adaptation and mitigation, to improve health and quality of life, favoring biodiversity conservation
	Indicator:	Proportion of all vegetated areas within the city boundaries in relation to the total area
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate total amount of Green Urban Areas in the city's boundaries (A) - numerator - Calculate the total area of the city (B) - denominator - Calculate the value of the indicator as A/B (%) Note: A Green Urban Area is defined as an urban land covered by vegetation of any kind, for instance natural zones, parks, public and private garden.
	Standard:	-
	References:	IEFCA – Calculation Guideline

A2.2	Green areas in relation to the city population	
	Intent:	To improve the urban environment helping regulate air quality and climate, recharging groundwater supplies and protecting lakes and streams from polluted runoff.
	Indicator:	Total extension of green areas in the city divided by city's total population
	Unit of measure:	m^2/inhabitant

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	Assessment method:	Calculation steps: - Calculate the total amount of vegetated areas in the city's boundaries (A) - numerator - Calculate the city's total population (B) - denominator - Calculate the value of the indicator as A/B (m^2/inhabitants)
	Standard:	-
	References:	IEFCA – Calculation Guideline

A2.3	**Green Area Accessibility**	
	Intent:	To go towards a higher quality of life for the city's inhabitants and to reduce negative effects of urbanisation
	Indicator:	Percentage of inhabitants with accessibility to green areas
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of inhabitants living with 300m of a publicly accessible green space of at least 0.5ha (A) - numerator - Calculate the city's total population (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

A2.4	**Distribution of Green Urban Areas**	
	Intent:	Evaluate the distribution of green urban area to promote the equal distribution
	Indicator:	Total length of green area boundaries (edges) divided by the city's urban area
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total length of green area boundaries (A) - numerator - Calculate the total area of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	IEFCA – Calculation Guideline

A2.5	**Green zones and ecosystemic services**	
	Intent:	To improve the benefits from green zones availability (capturing pollutants, reducing the "heat island" effect, providing recreational spaces, etc.)
	Indicator:	Share of natural green areas on total green areas
	Unit of measure:	%

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	Assessment method:	Calculation steps: - Calculate the amount of natural green areas (in hectares) in the city (A) - numerator - Calculate the total green area of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	-

A3	**Biodiversity and ecosystems**	
A3.1	**Variation of the number of bird species**	
	Intent:	To preserve biodiversity of bird species
	Indicator:	Percentage change in the number of bird species
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total net change in species (A) - numerator - Calculate the total number of species from most recent survey (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	Reference Framework for Sustainable Cities - RFSC

A3.2	**Native biodiversity in built up area**	
	Intent:	To protect native species to maintain biodiversity
	Indicator:	This indicator is the number of bird species that is listed in the urban area (natural protected area excluded)
	Unit of measure:	n
	Assessment method:	Calculation steps: - Calculate the number of bird species that is listed in the urban area (natural protected area excluded)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

A3.3	**Connectivity measures for natural areas**	
	Intent:	To maximise the connectivity measures for natural areas
	Indicator:	Amount of natural connected areas in the city divided by the total amount of natural areas in the city
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the amount of natural connected areas (in hectares) in the city (A) - numerator - Calculate the total amount of natural area in the city (B) - denominator - Calculate the value of the indicator as A/B (%)

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		Note: To be connected, Green Urban Areas shall be less than 100 meters apart.
	Standard:	-
	References:	Reference Framework for Sustainable Cities - RFSC

B	**Energy**	
B1	**Energy infrastructure**	
B1.1	**Access to authorized electrical service**	
	Intent:	To evaluate electrical service as a contributing indicator of sustainability, resilience and economic productivity
	Indicator:	Number of people in the city with authorized electrical service divided by the total population of the city
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of people in the city with authorized electrical service in residential buildings (A) - numerator - Calculate the total population of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

B1.2	**Electrical service interruptions**	
	Intent:	To track and benchmark reliability performance in electric utility services and resource constraints
	Indicator:	Total sum of hours of interruption multiplied by the number of households impacted divided by the total number of households
	Unit of measure:	hours/household
	Assessment method:	Calculation steps: - Calculate the total sum of hours of interruption multiplied by the number of households impacted (A) - numerator - Calculate the total number of households in the city (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

B2	**Energy consumptions**	
B2.1	**Final energy consumption**	
KPI	*Intent:*	To estimate the final energy consumption for all energy sectors

	Indicator:	Total final energy consumed by a city divided by the total population of the city
	Unit of measure:	MWh/inhabitant/yr
	Assessment method:	Calculation steps: - Calculate the final energy consumption for all energy sectors in MWh (A) - numerator - Calculate the total population of the city (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

B2.2	**Residential final thermal energy consumption**	
	Intent:	To estimate city thermal energy consumption for building operations
	Indicator:	Total consumption of final thermal energy divided by the total number of city inhabitants
	Unit of measure:	MWh/inhabitant/yr
	Assessment method:	Calculation steps: - Calculate the final thermal energy consumption for building operations in MWh (A) - numerator - Calculate the total population of the city (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	EN ISO 13790 - Energy performance of buildings
	References:	CESBA MED Project – SNTool assessment system

B2.3	**Public street lighting**	
	Intent:	To improve the efficiency of street lighting for cost-effective steps and energy efficiency
	Indicator:	Total electricity consumption of public street lighting divided by the total distance of streets where streetlights are present
	Unit of measure:	kWh/km yr
	Assessment method:	Calculation steps: - Calculate the total electricity consumption of public street lighting kWh (A) - numerator - Calculate the length of streets where streetlights are present in the city (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

B3	**Renewable energy**

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B3.1	Final energy derived from renewable sources	
KPI	*Intent:*	To incentive the consumption and production of renewable energy
	Indicator:	Share of renewable energies in final energy demand
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total consumption of end-use energy generated from renewable sources for all energy sectors MWh (A) - numerator - Calculate the total final energy demand MWh (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

B3.2	Renewable energy locally produced	
	Intent:	To incentive the production of renewable energy
	Indicator:	Share of locally produced renewable energies of final energy demand
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total locally production of energy generated from renewable sources MWh (A) - numerator - Calculate the total final energy demand MWh (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	-

C	Water	
C1	Water infrastructure	
C1.1	Availability of a public municipal water supply	
	Intent:	To evaluate city health and quality of life
	Indicator:	Total number of people with potable water supply service divided by total city population
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total number of people with potable water supply service (A) - numerator - Calculate the total city population (B) - denominator - Calculate the value of the indicator as A/B (%) Note: The total number of people with potable water supply service shall be calculated as the total number of households in the city connected to a potable water supply service multiplied by the current average household size for the city.

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		A house shall not be considered to have access to potable water when an individual house or group is served by a conduit system built with, for example, wood, bamboo, or rubber hose, connected directly to a river, well or another house.
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

C1.2	**Access to wastewater collection**	
	Intent:	To evaluate city health, cleanliness and quality of life
	Indicator:	Number of people within the city that are served by wastewater collection divided by the city population
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of people within the city who are served by wastewater collection (A) - numerator - Calculate the total city population (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

C2	**Water consumption**	
C2.1	**Total water consumption**	
KPI	*Intent:*	To evaluate water resources in the city
	Indicator:	Total amount of the city's daily water consumption divided by the total city population
	Unit of measure:	L/day/person
	Assessment method:	Calculation steps: - Calculate the total amount of the city's water consumption in litres per day (A) - numerator - Calculate the total city population (B) - denominator - Calculate the value of the indicator as A/B Note: the scope of the indicator includes the use of potable water for: •drinking •bathing •washing •gardening •commercial •industrial •agricultural
	Standard:	-

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	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

C2.2	**Efficiency in water use**	
	Intent:	To make efficient use of water resources
	Indicator:	Volume of water supplied minus the volume of utilized water divided by the total volume of water supplied
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the volume of water supplied minus the volume of utilized water (A) - numerator - Calculate the total volume of water supplied (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	IEFCA – Calculation Guideline

C2.3	**Sufficiency of domestic water provision**	
	Intent:	To make efficient use of water resources
	Indicator:	Volume of the water supplied for domestic uses divided by the overall domestic water demand
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the volume of water supplied for domestic uses (A) - numerator - Calculate the total volume of domestic water demand (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

C3	**Effluents management**	
C3.1	**Centralized wastewater treatment**	
	Intent:	To reduce the incidence of a variety of waterborne diseases
	Indicator:	Total volume of city wastewater collected for primary, secondary and tertiary treatment in centralized wastewater treatment facilities divided by the total volume of wastewater produced in the city
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total volume of city wastewater collected for primary, secondary and tertiary treatment in centralized wastewater treatment facilities (A) - numerator

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		- Calculate the total volume of wastewater produced in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

C3.2	**Household sanitation**	
	Intent:	To maintain certain levels of hygiene
	Indicator:	Percentage of households with access to basic sanitation facilities
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total number of city households with access to basic sanitation and facilities (A) - numerator - Calculate the total number of city households (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

D	**Solid waste**	
D1	**Solid waste collection infrastructure**	
D1.1	**Availability of solid waste collection**	
	Intent:	To evaluate city health, cleanliness and quality of life
	Indicator:	Percentage of population with regular solid waste collection
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of city households that are served by solid waste collection (A) - numerator - Calculate the total number of city households (B) - denominator - Calculate the value of the indicator as A/B (%) Note: Regular solid waste collection shall be defined as having the solid waste picked up from collection points, transported and dropped at a proper treatment facility (recycling or landfill sites) on at least a weekly basis or every two weeks. If the solid waste is collected in any moving vehicle by persons who have not constituted a legally established entity, the house shall not be considered as a household serviced with a solid waste collection service.
	Standard:	-

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	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

D2	**Solid waste management**	
D2.1	**Solid waste generation**	
	Intent:	To assess the production of waste in the city
	Indicator:	Total amount of solid waste generated divided by the total city population
	Unit of measure:	tonnes/inhabitant/yr
	Assessment method:	Calculation steps: - Calculate total amount of solid waste (household and commercial) generated in tonnes per year (A) - numerator - Calculate the total city population (B) - denominator - Calculate the value of the indicator as A/B Note: Municipal waste shall include waste originating from: ▪ households; ▪ commerce and trade, small businesses, office buildings and institutions (e.g. schools, hospitals, government buildings). Municipal waste also includes: ▪ bulky waste (e.g. white goods, old furniture, mattresses); ▪ garden waste, leaves, grass clippings, street sweepings, the content of litter containers, and market cleansing waste, if managed as waste; ▪ waste from selected municipal services, i.e. waste from park and garden maintenance, waste from street cleaning services (e.g. street sweepings, the content of litter containers, market cleansing waste), if managed as waste. Not to include in the calculation: ▪ waste from municipal sewage network and treatment; municipal construction and demolition waste.
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

D2.2	**Solid waste recycling**	
KPI	*Intent:*	To improve separate collection disposal, avoiding burning waste
	Indicator:	Total amount of solid waste that is recycled divided by the total amount of solid waste produced in the city

	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total amount of the city's solid waste that is recycled in tonnes (A) - numerator - Calculate the total amount of solid waste produced in the city in tonnes in the city (B) - denominator - Calculate the value of the indicator as A/B (%) Note: Recycled materials shall refer to those materials diverted from the waste stream, recovered and processed into new products following local government permits and regulations.
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

E	**Environmental quality**	
E1	**Air quality**	
E1.1	**Fine particulate matter ($PM_{2.5}$) concentration**	
	Intent:	To evaluate the quality of the air through the exceeded daily limits of pollutants ($PM_{2.5}$)
	Indicator:	Annual average fine particulate matter ($PM_{2.5}$) concentration
	Unit of measure:	µg/m^3
	Assessment method:	Calculation steps: - Collect the annual mean of $PM_{2.5}$ concentration values measured over one year by each monitoring station installed in the city's boundaries - Calculate the average of the values collected in the previous step as the sum of the annual mean $PM_{2.5}$ concentration values (A) - numerator - Calculate the number of monitoring stations (B) - denominator - The result shall be expressed as the concentration of $PM_{2.5}$ in micrograms per standard cubic metre (µg/m3)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

E1.2	**Particulate matter (PM_{10}) concentration**	
KPI	*Intent:*	To evaluate the quality of the air through the exceeded daily limits of pollutants (PM_{10})
	Indicator:	Annual average fine particulate matter (PM_{10}) concentration
	Unit of measure:	µg/m^3
	Assessment method:	Calculation steps:

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		- Collect the annual mean of PM_{10} concentration values measured over one year by each monitoring station installed in the city's boundaries - Calculate the average of the values collected in the previous step as the sum of the annual mean PM_{10} concentration values (A) - numerator - Calculate the number of monitoring stations (B) - denominator - The result shall be expressed as the concentration of PM_{10} in micrograms per standard cubic metre (µg/m3) - The result shall be expressed as the concentration of PM_{10} in micrograms per standard cubic metre (µg/m^3)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

E1.3	**Nitrogen Dioxide concentration (NO2)**	
	Intent:	To evaluate the quality of the air through the exceeded daily limits of pollutants (NO2)
	Indicator:	Sum of daily concentrations for the whole year divided by 365 days
	Unit of measure:	µg/m^3
	Assessment method:	Calculation steps: - Calculate the mass of pollutant collected NO2 (µg) (A) - numerator - Calculate the volume of air sampled in standard cubic metres (µg/m3) (B) - denominator - The result shall be expressed as the concentration of NO2 in micrograms per standard cubic metre (µg/m3)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

E1.4	**Sulfur Dioxide concentration (SO2)**	
	Intent:	To evaluate the quality of the air through the exceeded daily limits of pollutants (SO2)
	Indicator:	Sum of daily concentrations for the whole year divided by 365 days
	Unit of measure:	µg/m^3
	Assessment method:	Calculation steps: - Calculate the mass of pollutant collected SO2 (µg) (A) - numerator - Calculate the volume of air sampled in standard cubic metres (µg/m3) (B) - denominator

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		- The result shall be expressed as the concentration of SO2 in micrograms per standard cubic metre (µg/m3)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

E1.5	**Ozone concentration (O3)**	
	Intent:	To evaluate the quality of the air through the exceeded daily limits of pollutants (O3)
	Indicator:	Sum of daily concentrations for the whole year divided by 365 days
	Unit of measure:	µg/m^3
	Assessment method:	Calculation steps: - Calculate the mass of pollutant collected O3 (µg) (A) - numerator - Calculate the volume of air sampled in standard cubic metres (µg/m3) (B) - denominator - The result shall be expressed as the concentration of O3 in micrograms per standard cubic metre (µg/m3)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

E2	**Noise**	
E2.1	**Noise pollution**	
	Intent:	To promote acoustic comfort, for a healthy and safe environment
	Indicator:	Population exposed to noise pollution divided by the total population of the city
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the population exposed to noise pollution (A) - numerator - Calculate the total population of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

E3	**EMF exposure**	
E3.1	**Exposure to high frequency electromagnetic fields**	
	Intent:	To evaluate the exposure to high frequency electromagnetic fields

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	Indicator:	Percentage of mobile network antenna sites in compliance with EMF exposure
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of mobile network antenna sites in compliance with EMF exposure (A) - numerator - Calculate the total number mobile network antenna sites in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

E3.2	**Percentage of buildings exposed to ELF magnetic fields**	
	Intent:	To assess the quantity of buildings exposed to ELF magnetic fields
	Indicator:	Percentage of buildings in the area located not respecting the safety distance from high voltage lines
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the buildings located in the city not respecting the safety distance from high voltage lines (A) - numerator - Calculate the total number of buildings in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

F	**Transportation and mobility**	
F1	**Performance of mobility services**	
F1.1	**Public transport network**	
KPI	*Intent:*	To assess city's transportation network availability
	Indicator:	Length of public transport system per 1000 population
	Unit of measure:	km/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the total length (in kilometres) of the public transport systems operating within the city (A) - numerator - Calculate the one 1.000th of the city's total population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

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F1.2	Accessibility of public transportation service	
	Intent:	To evaluate the proximity and connectivity of public transportation service
	Indicator:	Percentage of inhabitants that are within 500 meters walking distance of at public transportation service stop running at least every 20 minutes during peak periods
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total number of inhabitants living within 0,5 km of public transit running at least every 20 min during peak periods (A) - numerator - Calculate the total city population (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

F1.3	Usage of public transportation by population	
	Intent:	To evaluate the usage of public transport
	Indicator:	Total annual number of public transport trips originating in the city divided by the total city population
	Unit of measure:	trips/inhabitant
	Assessment method:	Calculation steps: - Calculate the total annual number of public transport trips originating in the city (A) - numerator - Calculate the total city population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

F2	Green mobility	
F2.1	**Shared vehicles**	
	Intent:	To promote an alternative form of transportation
	Indicator:	Number of shared vehicles per 1000 inhabitants
	Unit of measure:	n/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the number of shared vehicles (A) - numerator - Calculate the one 1.000th of the city's population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

F2.2	Electric-vehicle infrastructure (charging stations)

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	Intent:	To promote the use of electric vehicles
	Indicator:	Electric vehicle charging stations per inhabitant
	Unit of measure:	n/inhabitant
	Assessment method:	Calculation steps: - Calculate the number of charging stations for electric vehicles (A) - numerator - Calculate the city's population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	-

F2.3	**Low-Carbon Emission Passenger Vehicles**	
	Intent:	To reduce fossil fuel consumption
	Indicator:	Percentage of low-carbon emission passenger vehicles
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of low emission vehicles registered (PHEV & EV) (A) - numerator - Calculate the number of total vehicles (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

F2.4	**Bicycle network**	
KPI	*Intent:*	To emphasise the use of bicycles as method to reduce traffic congestion and pollution
	Indicator:	Total length of bicycle paths and lanes divided by the city's total population
	Unit of measure:	m/inhabitant
	Assessment method:	Calculation steps: - Calculate total length of bicycle paths/lanes in the city (A) - numerator - Estimate/Calculate the total city's population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

F2.5	**Shared bicycles**	
	Intent:	To emphasise the use of bicycles as method to reduce traffic congestion and pollution
	Indicator:	Number of shared bicycles per 1.000 inhabitants
	Unit of measure:	n/1000 inhabitants
	Assessment method:	Calculation steps:

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		- Calculate the number of shared bicycles available (A) - numerator - Calculate the one 1.000 of the city's population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

F2.6	**Green public vehicles**	
	Intent:	To reduce fossil fuel consumption
	Indicator:	Total number of low emission public vehicles divided by total number of public vehicles
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of low emission public vehicles ((A) - numerator - Calculate the city's total number of public vehicles (B) - denominator - Calculate the value of the indicator as A/B (%) Note: Low emission vehicles are: - Electric Vehicles (EVs) - Plug-in Hybrid-Electric Vehicles (PHEVs)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

F3	**Safety in mobility**	
F3.1	**Pedestrian infrastructure**	
	Intent:	To improve the city in terms of liveability and safety for pedestrians
	Indicator:	Total area of pedestrian streets and walkways divided by the total area of streets and roads in the city
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total of pedestrian streets and walkways (A) - numerator - Calculate the total area of streets and roads in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

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F3.2	Availability of sidewalks	
	Intent:	To promote road connectivity, as a key element of spatial accessibility
	Indicator:	Percentage of roads' length that has dedicated sidewalks
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the roads' length that has dedicated sidewalks (A) - numerator - Calculate the total length of the roads in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

F3.3	Safety of bicycle lines	
	Intent:	To promote bicycle as alternative vehicle from car
	Indicator:	Percentage of bicycle paths physically separated from traffic roads
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the length of bicycle paths physically separated from traffic roads (A) - numerator - Calculate the total length of bicycle paths in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

F3.4	Traffic fatalities	
	Intent:	To assess road safety
	Indicator:	Traffic fatalities divided by 1000th of the city's population
	Unit of measure:	n/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the number of traffic fatalities (A) - numerator - Calculate one 1.000 of the city's population (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

F3.5	Traffic fatalities	
	Intent:	To reduce the need to use private cars
	Indicator:	Number of taxi licenses divided by 1000th of the city's population
	Unit of measure:	n/1000 inhabitants

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	Assessment method:	Calculation steps: - Calculate the number of taxi licenses (A) - numerator - Calculate one 1.000 of the city's population (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

G	**Social Aspects**	
G1	**Accessibility (disabled persons)**	
G1.1	**Accessibility of public buildings**	
	Intent:	To assess the ability of residents, workers or visitors with physical disabilities to be able to have physical access to key buildings
	Indicator:	Total number of public buildings accessible by disabled persons divided by the total number of public buildings
	Unit of measure:	%
	Assessment method:	Calculation steps: - The indicator shall be calculated as the total number of public buildings accessible by disabled persons divided by the total number of public buildings. Note: An accessible building is a building where a person with a disability is afforded the opportunity to acquire the same information, engage in the same interactions, and enjoy the same services as a person without a disability in an equally effective and equally integrated manner, with substantially equivalent ease of use. A disability refers to a physical, sensory or mental limitation that interferes with a person's ability to move, see, hear or learn.
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

G1.2	**Barrier-free accessibility in local outdoor public areas**	
	Intent:	To evaluate the accessibility of various urban resources using spatial data analysis
	Indicator:	Percentage of accessible public outdoor areas that are barrier-free compared to the total public area
	Unit of measure:	%
	Assessment method:	Calculation steps: -Identify key outdoor public facilities that may be frequently used by persons with physical disabilities. - Assess the accessibility of pedestrian routes, considering all major disability types

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		- Establish the percent of public outdoor facilities that may be considered accessible.
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

G1.3	**Accessibility of public transport network**	
	Intent:	To facilitate the access to public transport by physically disabled persons
	Indicator:	Total number of public vehicles accessible to disabled persons divided by total number of public vehicles
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of public transport vehicles that are accessible disabled persons (A) - numerator - Calculate the total number of public transport vehicles in the city (B) - denominator - Calculate the value of the indicator as A/B (%) Note: An accessible vehicle is barrier-free and can be used by people who have disabilities, including those who use wheelchairs.
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

G2	**Housing**	
G2.1	**Affordability of housing property**	
	Intent:	To assess the affordability of housing property in the city
	Indicator:	Housing properties in the city that are financially accessible to the lowest quintile of area population
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of housing properties in the city that are financially accessible to the lowest quintile of area population (A) - numerator - Calculate the total number of housing properties in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

G2.2	**Affordability of housing rental**	
	Intent:	To assess the affordability of housing rental property for low-income residents in the city
	Indicator:	Percentage of the average salary of the lowest quintile of the population used for rental payments
	Unit of measure:	%

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	Assessment method:	Calculation steps: - Calculate the number of housing rental property in the city that are financially accessible to low-income residents (A) - numerator - Calculate the total number of housing rental property in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

G2.3	**Vacant residential units**	
	Intent:	To understand the current and future housing needs in the city
	Indicator:	Percentage of vacant residential units
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of unoccupied dwellings (A) - numerator - Calculate the total number of dwellings in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

G2.4	**Informal settlements**	
	Intent:	To evaluate the extent of the challenges for the reporting city in meeting shelter needs and demand
	Indicator:	Area of informal settlements within the city boundary divided by the city area
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the area of informal settlements within the city boundary (in square kilometres) (A) - numerator - Calculate the city area in square kilometres (B) - denominator - Calculate the value of the indicator as A/B (%) Note: The UN Statistics Division has developed the following definitions of informal settlements: a) Areas where groups of housing units have been constructed on land that the occupants have no formal legal claim to. b) Unplanned settlements and areas where housing is not in compliance with current planning and building regulations (unauthorized housing).

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		While many informal settlements also meet the definition of slum, the terms are not synonymous. Slums might exist in areas that do not meet the definition of informal settlements. Some informal settlements might have improved such that they do not meet the definition of slum.
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

G3	**Availability of public and private facilities and services**	
G3.1	**Basic service proximity**	
	Intent:	To assess the overall liveability and quality of life
	Indicator:	Number of inhabitants who live near at least one basic service divided by the total population of the city
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of inhabitants who live near at least one basic service (A) - numerator - Calculate the total population of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

G3.2	**Open space for public use**	
	Intent:	To ensure that public open space compatible with local cultural values is provided in large projects
	Indicator:	Average share of the built-up area of the city that is open space for public use
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the share of the built-up area of the city that is open space for public use (A) - numerator - Calculate the total area of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

G3.3	**Open space for public use**	
	Intent:	To provide important recreation opportunities accessible by inhabitants

	Indicator:	Total area of shores/beaches in the city area that are accessible by inhabitants divided by the total area of shores/beaches in the city's urban area
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total area of shores/beaches in the city area that are accessible by inhabitants (A) - numerator - Calculate the total area of shores/beaches in the city's urban area (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	IEFCA – Calculation Guideline

G4	**Education**	
G4.1	**Primary enrollment rate**	
	Intent:	To expand and transform the educational systems of countries achieving universal standards of learning outcomes, reducing inequalities
	Indicator:	Net primary enrolment rate
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the net primary enrolment rate of people in the city (A) - numerator - Calculate the total number of people of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	Sustainable Development in the Mediterranean Report 2020

G4.2	**Female school-aged population enrolled in schools**	
	Intent:	To monitor woman rights
	Indicator:	Number of city's female school-aged population enrolled at primary and secondary levels in public and private schools divided by the total number of a city's female school-aged population
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of city's female school-aged population enrolled at primary and secondary levels in public and private schools (A) - numerator - Calculate the total number of a city's female school-aged population (B) - denominator - Calculate the value of the indicator as A/B (%) Note: Part-time enrolment of a half-day or more shall be counted as a full-time enrolment.

	Standard:	-
	References:	Sustainable Development in the Mediterranean Report

G4.3	**Secondary school enrollment**	
	Intent:	To expand and transform the educational systems of countries achieving universal standards of learning outcomes, reducing inequalities
	Indicator:	Lower secondary completion rate
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the secondary enrolment rate of people in the city (A) - numerator - Calculate the total number of people of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	Sustainable Development in the Mediterranean Report

G4.4	**Tertiary education**	
	Intent:	To expand and transform the educational systems of countries achieving universal standards of learning outcomes, reducing inequalities
	Indicator:	Population age 25-34 with tertiary educational attainment
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the population age 25-34 with tertiary educational attainment in the city (A) - numerator - Calculate the total number of population age 25-34 of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	Sustainable Development in the Mediterranean Report

G5	**Social inclusion**	
G5.1	**Gender pay gap**	
	Intent:	To assess an overall picture of gender discrimination and the inequalities in the labour market that explain gender differences in pay
	Indicator:	Difference between average gross hourly earnings of male and female paid employees as a percentage of average gross hourly earnings of male paid employees
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the average hourly earnings of female employees (A) - numerator

		- Calculate average hourly earnings of male employees (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

G5.2	**Energy poverty of households**	
	Intent:	To assess poverty risk
	Indicator:	Percentage of households unable to afford the most basic levels of energy (more than 10% of the income spent on energy bills)
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of households unable to afford the most basic levels of energy (more than 10% of the income spent on energy bills) (A) - numerator - Calculate the total number of households in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	-

G5.3	**Population living below poverty line**	
	Intent:	To assess poverty risk
	Indicator:	Number of people living below the national poverty line set at country level divided by the total current population of the city
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of people living below the national poverty line set at country level (A) - numerator - Calculate the total current population of the city (B) - denominator - Calculate the value of the indicator as A/B (%) Note: The total number of people in the city living below the national poverty line shall be determined by multiplying the number of city households at or below the national poverty line by the current average number of persons per household for that city. The poverty line refers to the minimum level of income deemed adequate in a particular country. It is the minimum level of income considered adequate in a country. Individuals living below this line are those not able to adequately provide themselves over a 12 months

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		period with water, food, shelter and other basic needs for a healthy life.
	Standard:	-
	References:	Sustainable Development in the Mediterranean Report

G5.4	**Inequality**	
	Intent:	To assess the distribution of income or consumption across a population, to be able to quantify a society's relative inequality
	Indicator:	Gini coefficient of inequality
	Unit of measure:	n
	Assessment method:	The Gini coefficient (also known as the "Gini Index" or "Gini Ratio") is a measure of statistical dispersion that quantifies inequality among incomes or levels of consumption. The Gini coefficient is defined as a ratio of the areas on the Lorenz curve diagram. If the area between the line of perfect equality and Lorenz curve is A, and the area under the Lorenz curve is B, then the Gini coefficient is A / (A + B). A coefficient of zero expresses perfect equality, where all income or consumption values are the same. Conversely, a coefficient of one expresses maximal inequality.
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

G5.5	**Voter participation**	
	Intent:	To assess public's level of participation and degree of interest in local government
	Indicator:	Percentage of the eligible population that voted during the last municipal election
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of persons who voted in the last municipal election (A) - numerator - Calculate the total number of registered voters in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

G6	**Safety**	
G6.1	**Police service**	
	Intent:	To assess the overall crime prevention in place in a city

	Indicator:	Number of police officers per 1000 inhabitants
	Unit of measure:	n/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the number of permanent full-time (or FTE) sworn-in police officers (A) - numerator - Calculate one 1.000 of the city's total population (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

G6.2	**Fire service**	
	Intent:	To assess the overall fire security/prevention in place in a city
	Indicator:	Number of firefighters per 1000 inhabitants
	Unit of measure:	n/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the number of permanent full-time (or FTE) sworn-in firefighters (A) - numerator - Calculate one 1.000 of the city's total population (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

G6.3	**Population living in disaster prone areas**	
	Intent:	To assess population living in areas subject to significant risk of death or damage caused by prominent hazards: cyclones, drought, floods, earthquakes, volcanoes and landslides
	Indicator:	Percentage of inhabitants living in a zone subject to natural hazards
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total number of city inhabitants living in areas subject to significant risk of death or damage caused by prominent hazards (A) - numerator - Calculate total number of city inhabitants (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

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G7	Health	
G7.1	Life expectancy	
	Intent:	To assess life expectancy
	Indicator:	Average number of years that a new-born is expected to live if current mortality rates continue to apply
	Unit of measure:	Years
	Assessment method:	Calculation method: average number of years that a new-born is expected to live if current mortality rates continue to apply
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

G7.2	Physicians	
	Intent:	To assess the strength of a city's health system. There is evidence that the number of physicians is positively associated with immunization coverage, outreach of primary care, and infant, child and maternal survival
	Indicator:	Number of physicians per 1000 inhabitants
	Unit of measure:	n/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the number of general or specialized physicians working in the city (FTE) (A) - numerator - Calculate one 1.000 of the city's population (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

G7.3	In-Patient Hospital Beds	
	Intent:	To monitor the level of a health service delivery
	Indicator:	Number of in-patient public hospital beds per 1000 inhabitants
	Unit of measure:	n/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the total number of in-patient hospital beds (public and private) (A) - numerator - Calculate one 1.000 of the city's population (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

G8	Food security

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G8.1	Local production of food	
	Intent:	To assess the physical availability of food in terms of adequate supply
	Indicator:	Percentage of local food supplied from within 100 km of the urban area
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the amount of local food supplied to the city (within 100 km) (tonnes) (A) - numerator - Calculate the amount of total food supplied to the city (tonnes) (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

G8.2	Urban agricultural land	
	Intent:	To promote inclusion of areas devoted to urban agriculture and also plans of new urban development projects with the goal of producing food through reutilization of urban resources
	Indicator:	Total urban agricultural area used for food production located within city boundaries divided by one 1000 of the city's total population
	Unit of measure:	he/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the total designated urban agricultural area used for food production located within city boundaries (A) - numerator - Calculate one 1.000 of the city's total population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

H	Economy	
H1	Economic performance	
H1.1	Average annual per-capita income of residents	
	Intent:	To evaluate the economic well-being
	Indicator:	Average per-capita income of residents in the city relative to that of the urban region as a whole
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the per-capita income of residents in the city (A) - numerator

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		- Calculate the per-capita income of the whole urban region (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

H1.2	**Economic contribution from tourism activity**	
	Intent:	To assess the evolution of the tourist frequency
	Indicator:	Sum of overnight visitor stays divided by the city's total population
	Unit of measure:	stays/resident
	Assessment method:	Calculation steps: - Calculate the sum of overnight visitor stays in the city (A) - numerator - Calculate the city's total population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

H2	**Employment**	
H2.1	**Unemployment rate**	
	Intent:	To assess the labour market status, the economy development and citizens' quality of life
	Indicator:	Total number of working-age primary residents not in paid employment or self-employment, but available for work and seeking work divided by the total labour force
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of working-age primary residents who during the survey reference period were not in paid employment or self-employment, but available for work and seeking work (A) - numerator - Calculate the total labour force (B) - denominator - Calculate the value of the indicator as A/B (%) Note: Unemployment shall refer to individuals without work, actively seeking work in a recent period (past four weeks) and currently available for work. Labour force shall refer to the sum of the total persons employed and unemployed who are legally eligible to work and who are primary residents of the city.
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

H2.2	**Youth unemployment rate**

	Intent:	To quantify and analyse the current labour market trends and challenges of young people
	Indicator:	Total number of a city's unemployed youth divided by the city's youth labour force
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the total number of a city's unemployed youth (A) - numerator - Calculate the city's youth labour force (B) - denominator - Calculate the value of the indicator as A/B (%) Note: Unemployed youth shall refer to individuals above the legal working age and under 24 years of age who are without work, actively seeking work in a recent period (past four weeks) and currently available for work (registered students are not counted). Youth labour force shall refer to all persons above the legal working age and under 24 years of age who are either employed or unemployed over a specified reference period
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

H2.3	**Female employment**	
	Intent:	To assess working opportunities for women
	Indicator:	Total number of working age women in employment divided by the total female labour force
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of working-age women in employment (A) - numerator - Calculate the total female labour force (B) - denominator - Calculate the value of the indicator as A/B (%) Note: Female labour force shall refer to the sum of the total female persons employed and unemployed who are legally eligible to work and who are primary residents of the city.
	Standard:	-
	References:	Sustainable Development in the Mediterranean - Report 2020

H3	**Innovation**
H3.1	**New business registration rate**

	Intent:	To assess city's level of economic activity and economic performance
	Indicator:	The proportion of business registrations per 10.000 inhabitants aged 16 and above
	Unit of measure:	n
	Assessment method:	Calculation steps: - Calculate the number of business registrations per 10.000 inhabitants aged 16 and above
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

H4	**ICT infrastructure**	
H4.1	**Fixed Broadband Subscriptions**	
	Intent:	To assess the access to information and technology connectivity
	Indicator:	Percentage of households with fixed (wired) broadband
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of fixed broadband subscriptions in the city (A) - numerator - Calculate the total number of households in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

H4.2	**Wireless Broadband Coverage**	
	Intent:	To assess the access to information and technology connectivity
	Indicator:	Percentage of the city served by wireless broadband (3G, 4G, 5G)
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the area of city covered by mobile services (km2) (A) - numerator - Calculate the Total area of the city (km2) (B) - denominator - Calculate the value of the indicator as A/B (%) Note: each service should be reported on separately (3G and 4G)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

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H4.3	Availability of WIFI in Public Areas	
	Intent:	To increase access to internet at little or no cost
	Indicator:	Number of public WIFI hotspots in the city per 1000 inhabitants
	Unit of measure:	n/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the total number of WIFI hotspots provided by the city administration (A) - numerator - Calculate the one 1.000 of the city's total population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

H4.4	Mobile phone subscriptions	
	Intent:	To evaluate the levels of telecommunication technology, information, communication technology and innovation
	Indicator:	Total number of mobile phone subscriptions in the area divided by one 1000th of the area's total population
	Unit of measure:	n/1000 inhabitants
	Assessment method:	Calculation steps: - Calculate the total number of mobile phone connections in the city (A) - numerator - Calculate the one 1.000th of the city's total population (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

I	Climate change: mitigation and adaptation	
I1	Climate change mitigation	
I1.1	Greenhouse gas emissions	
KPI	*Intent:*	To assess the adverse contribution the city is making to climate change
	Indicator:	Total amount of greenhouse gases (equivalent carbon dioxide units) generated over a calendar year for all sectors, divided by the current city population
	Unit of measure:	t CO_2 eq. / inhabitant /yr
	Assessment method:	Calculation steps: - Calculate the total amount of greenhouse gases in tonnes (equivalent carbon dioxide units) generated over a calendar year by all activities within the city, including indirect emissions outside city boundaries (A) - numerator

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		- Calculate the current population of the city (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

I1.2	**CO_2 sequestration**	
	Intent:	To promote the CO_2 sequestration in the city
	Indicator:	Potential CO_2 sequestration in the city per he
	Unit of measure:	tepCO_2/he
	Assessment method:	Calculation steps: - Calculate the amount of CO_2 sequestration in the city (A) - numerator - Calculate the area of the city (he) (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	CESBA Alps project

I2	**Adaptation to the climatic action: heatwaves and increase of temperature**	
I2.1	**Albedo**	
	Intent:	To estimate the extent of the Urban Heat Island effect in the city
	Indicator:	Mean Solar Reflectance Index of paved surfaces and roofs in the area
	Unit of measure:	SRI
	Assessment method:	Calculation steps: 1. Identify the boundaries of the area being assessed 2. Obtain records of local ambient temperatures and wind speeds during summer conditions over a 3-year period 3. Obtain similar data for the larger urban region 4. Identify differences between the local and regional UHI effects 5. Identify factors in configuration of buildings, vegetation, surface albedo and other local factors that may explain the differences
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

I3	**Adaptation to the climatic action: pluvial flood**	
I3.1	**Permeability of land**	
KPI	*Intent:*	To improve the permeability of the area
	Indicator:	Percentage of weighted ground permeability
	Unit of measure:	%
	Assessment method:	Calculation steps:

		Calculation steps: - Calculate the size (Sa) of the city area (m2) - Calculate the size of the surfaces with a different paving or occupied by constructions in the city area (i.e. green areas, surfaces paved with asphalt, surfaces occupied by buildings, etc.). Include all the surfaces in the city area so that: $S_a = \sum_{i=1}^{n} S_{a,1}$ Sa = total surface of the city area Sa,i = surface i-th in the city area (m2) - Calculate the real permeability of soil considering the permeability coefficient of each surface. $S_{a,perm} = \sum_{i=1}^{n} (S_{a,i} \times \alpha_i)$ Sa,i = i-th surface in the city area (m2) αi= permeability coefficient of the i-th surface - Calculate the indicator's value as: $\frac{S_{a,perm}}{Sa} \times 100$ Note: • Reference permeability coefficients: - Grass = 1 - Gravel = 0,9 - Sand = 0,9 - Plastic gratings filled with land/grass = 0,8 - Concrete gratings leaning on the grass = 0,6 - Concrete gratings leaning on gravel = 0,6 - Interlocking elements leaning on sand = 0,3 - Interlocking elements leaning on gravel = 0,3 - Interlocking elements leaning on concrete pavement = 0 - Continuous pavements leaning on concrete = 0 - Asphalt = 0
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

I4	**Adaptation to the climatic action: fluvial and coastal flood**	
I4.1	**Flood risk**	
	Intent:	To assess flood risk of the city
	Indicator:	Percentage of population exposed to flood risk
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of inhabitants exposed to a flood risk with medium probability in the city (A) - numerator - Calculate the total population of the city (B) - denominator - Calculate the value of the indicator as A/B (%)

	Standard:	-
	References:	Reference Framework for Sustainable Cities - RFSC

I5	**Adaptation to the climatic action: drought**	
I5.1	**Rainwater collection and storage from buildings for non-potable uses**	
	Intent:	To promote rainwater collection for re-use
	Indicator:	Share of buildings in the city with a rainwater collection system
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the number of buildings in the city with a rainwater collection system (A) - numerator - Calculate the total number of buildings in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

I5.2	**Local vegetation**	
	Intent:	To promote the use of local vegetation
	Indicator:	Share of landscape (green areas) plated with local vegetation
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the extent of green areas planted with local vegetation in the city (A) - numerator - Calculate the total extent of green areas in the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

I6	**Adaptation to the climatic hazard: wildfire**	
I6.1	**Wildfire risk**	
	Intent:	To assess wildfire risk of the city
	Indicator:	Percentage of population exposed to wildfire risk
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the amount of population exposed to wildfire risk in the city (A) - numerator - Calculate the total population of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	-

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L	Governance	
L1	**Urban Planning**	
L1.1	**Community involvement in urban planning activities**	
	Intent:	To raise the level of community involvement in planning through the redistribution of power
	Indicator:	Percentage of residents active in public urban planning
	Unit of measure:	Level
	Assessment method:	To characterize the indicator's value: Use of the Sherry Arnstein ladder on citizen participation. Rate the level of users' involvement on planning. SCORE -1 (LEVEL 1) Non-participation or manipulation and therapy (in the Arnstein ladder). SCORE 0 (LEVEL 2) Degrees of tokenism: Information / Consultation / Placation (in the Arnstein ladder). SCORE 3 (LEVEL 3) Degrees of citizen power: Partnership, delegated power and citizen power (in the Arnstein ladder) in one phase, like diagnosis or after delivery. SCORE 5 (LEVEL 4) Degrees of citizen power: Partnership, delegated power and citizen power (in the Arnstein ladder), at every stages.
	Standard:	Sherry Arnstein
	References:	CESBA MED Project – SNTool assessment system

L2	Management and community involvement	
L2.1	**Involvement of residents in community affairs**	
	Intent:	To promote involvement of citizens in community affairs
	Indicator:	Percentage of resident population above 16 years having an involvement in community affairs
	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the amount of resident population above 16 years having an involvement in community affairs (A) - numerator - Calculate the total population above 16 years of the city (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

L3	Public buildings operation	
L3.1	**Public buildings sustainability**	
	Intent:	To evaluate the number of buildings with a certification label
	Indicator:	Percentage area of public buildings with recognized sustainability certifications for ongoing operations

	Unit of measure:	%
	Assessment method:	Calculation steps: - Calculate the floor area of public buildings with certification to a recognized standard for ongoing building operation (m^2) (A) - numerator - Calculate the total floor area of public buildings (m^2) (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities

L3.2	**Operating energy costs for public buildings**	
	Intent:	To evaluate the operational energy costs amount for public buildings
	Indicator:	Aggregated annual operating energy cost per aggregated indoor useful floor area
	Unit of measure:	€/m^2/yr
	Assessment method:	Calculation steps: - Calculate the aggregated annual operating energy cost per aggregated indoor useful floor area (m^2)
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

L3.3	**Energy consumption of public buildings**	
	Intent:	To evaluate the energy efficiency of public buildings
	Indicator:	Total end use of energy in public buildings within a city divided by total indoor useful area of these buildings
	Unit of measure:	kWh/m^2
	Assessment method:	Calculation steps: - Calculate the total end use of energy in public buildings within the city (kWh) (A) - numerator - Calculate the total indoor useful area of these buildings (m2) (B) - denominator - Calculate the value of the indicator as A/B
	Standard:	-
	References:	CESBA MED Project – SNTool assessment system

L4	**Equity**	
L4.1	**Women elected to city level office**	
	Intent:	To assess the opportunity in labour for leading positions of women
	Indicator:	Total number of elected city-level positions held by women divided by the total number of elected city-level positions
	Unit of measure:	%

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	Assessment method:	Calculation steps: - Calculate the total number of elected city-level positions held by women (A) - numerator - Calculate the total number of elected city-level positions (B) - denominator - Calculate the value of the indicator as A/B (%)
	Standard:	-
	References:	ISO 37120: Sustainable cities and communities - Indicators for city services and quality of life

5. Conclusions

The result of Activity 3.1.2 is a new assessment tool for evaluating the performance of a city, named Sustainable MED Cities SCTool. SCTool is a generic assessment system, reliable, comprehensive, contextualised to the European guidelines and adapted also to the South and East side of MED. It belongs to the "family" of the Generic frameworks based on the SBE Methodology, as SBTool and SNTool

The "IEFCA Calculation Guideline" document has played a fundamental role in the preparation of the SCTool; actually, it has been the main reference for the drafting of the content of the city generic framework, together with others key documents described in the previous paragraphs.

The **bottom-up approach** has been guaranteed during the entire drafting process, taking advantage from the interactions of different key stakeholders and on specific technical activities. As for the SBTool and SNTool, a fundamental next improvement for the SCTool will be represented by **the online implementation of all the indicators described herein**; indeed, they will be fully uploaded on the Collaborative Platform of Sustainable MED Cities project, in order to have practical and operational city tool available online.

This project has received funding from the European Union's ENI CBC Med Programme under Grant Contract C_B.4.3_0063

References

- International Standard ISO 37120:2018 - Sustainable cities and communities- Indicators for city services and quality of life.
- Riccaboni, A., Sachs, J., Cresti, S., Gigliotti, M., Pulselli, R.M. (2020): Sustainable Development in the Mediterranean. Report 2020. Transformations to achieve the Sustainable Development Goals. Siena: Sustainable Development Solutions Network Mediterranean (SDSN Mediterranean).
- Istanbul Environment Friendly City Award https://www.unep.org/unepmap/istanbul-environment-friendly-city-award.
- UNECE - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.
- RFSC: Reference Framework for Sustainable Cities (http://rfsc.eu/).

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6. Annex: IEFCA – Sustainability Indicators and Calculation Guideline

Istanbul Environment Friendly City Award

Framework of Sustainability Indicators

and

Calculation Guideline

Implemented by the UNEP/MAP – Barcelona Convention Secretariat as a Flagship Initiative of the Mediterranean Strategy for Sustainable Development, the Istanbul Environment Friendly City Award is financially supported by the Government of Turkey through a voluntary contribution to the UNEP/MAP Programme of Work and Budget.

The update of the "Indicators' Assessment Guide" for the fourth edition (2022-2023) is technically supported by the international initiative for Sustainable Built Environment (iiSBE-Italia) and experts in the context of the ENI CBC MED Sustainable Mediterranean Cities project.

Index

Framework of Urban Sustainability Indicators

A - Nature and Biodiversity Protection

A1 – Climate Change Mitigation

Code	Criterion	Indicator	Unit of measure
A1.1	Greenhouse gas emissions	Total amount of greenhouse gases in tonnes (equivalent carbon dioxide units) generated over a calendar year divided by the current city population	Tons CO_2eq/ inhabitant

A3 – Ecosystems protection

Code	Criterion	Indicator	Unit of measure
A3.1	Connectivity measures for natural areas	Amount of natural connected areas in the city divided by the total amount of natural areas in the city	%

B - Built Environment

B1 – Sustainable land use and green areas

Code	Criterion	Indicator	Unit of measure
B1.1	Population density	City population in relation to the city's land area	Inhabitants/km^2
B1.2	Availability of Green Urban Areas	Total amount of Green Urban Areas in the city's boundaries divided by the total area of the city	%
B1.3	Green Urban Areas in relation to the city population	Total extension of Green Urban Areas in the city divided by city's total population	m^2/inhabitant
B1.4	Distribution of Green Urban Areas	Total length of Green Urban Areas' boundaries (edges) divided by the city's urban area	m/ha
B1.5	Accessibility of shores/beaches	Total area of shores/beaches in the city area that are accessible by inhabitants divided by the total area of shores/beaches in the city's urban area	%
B1.6	Urban agricultural land	Total urban agricultural area used for food production located within city boundaries divided by one 1000th of the city's total population	ha/1000 inhabitants

B2 – Sustainable mobility

Code	Criterion	Indicator	Unit of measure
B2.1	Public Transport Network	Kilometers of public transport system per 1000th of the city's population	km/1000 inhabitants
B2.2	Usage of public transportation by population	Total annual number of public transport trips originating in the city divided by the total city population	trips/inhabitant
B2.3	Bicycle network	Total length of bicycle paths and lanes divided by the city's total population	m/inhabitant
B2.4	Green public vehicles	Total number of low emission public vehicles divided by total number of public vehicles	%
B2.5	Pedestrian infrastructure	Total area of pedestrian streets and walkways divided by the total area of streets and roads in the city	%
B2.6	Traffic fatalities	Number of traffic fatalities divided by 1000th of the city's population	number/1000 inhabitants
B2.7	Private transportation services	Number of taxi licenses per 1.000th of the city population	n/1000 inhabitants

B3 – Air pollution

Code	Criterion	Indicator	Unit of measure
B2.1	Fine particulate matter (PM2.5) concentration	Annual average fine particulate matter (PM2.5) concentration	µg/m^3 year
B2.2	Fine particulate matter (PM2.5) monitoring	Number of PM2.5monitoring stations	number
B2.3	Particulate matter (PM10) concentration	Annual average particulate matter (PM10) concentration	µg/m^3 year
B2.4	Particulate matter (PM10) monitoring	Number of PM10 monitoring stations	number

B4 – Solid waste

Code	Criterion	Indicator	Unit of measure
B4.1	Availability of solid waste collection	Number of people within the city who are served by regular solid waste collection divided by the total city population	%
B4.2	Solid waste generation	Total amount of solid waste generated divided by the total city population	tonnes/capita/year
B4.3	Solid waste recycling	Total amount of solid waste that is recycled divided by the total amount of solid waste produced in the city	%

B5 – Water

Code	Criterion	Indicator	Unit of measure
B5.1	Availability of a public municipal water supply	Total number of people with potable water supply service divided by total city population	number
B5.2	Total water consumption	Total amount of the city's water consumption in liters per day divided by the total city population	liters /day / inhabitant
B5.3	Sufficiency of domestic water provision	Volume of the water supplied for domestic uses divided by the overall domestic water demand	%
B5.4	Efficiency in water use	Volume of water supplied minus the volume of utilized water divided by the total volume of water supplied	%
B5.5	Access to wastewater collection	Number of people within the city who are served by wastewater collection divided by the city population	%
B5.6	Centralized wastewater treatment	Total volume of city wastewater collected for primary, secondary and tertiary treatment in centralized wastewater treatment facilities divided by the total volume of wastewater produced in the city	%
B5.7	Improved household sanitation	Total number of people using improved sanitation facilities divided by the total city population	%

B6 – Energy

Code	Criterion	Indicator	Unit of measure
B6.1	Access to authorized electrical service	Number of people in the city with authorized electrical service divided by the total population of the city	%
B6.2	Electrical service interruptions	Total sum of hours of interruption multiplied by the number of households impacted divided by the total number of households	hours/household
B6.3	Final energy consumption (natural gas)	Total end-use energy from natural gas consumed by the city divided by the total population of the city	GJ/inhabitant/year
B6.4	Final energy consumption (electricity)	Total end-use energy from electricity consumed by the city divided by the total population of the city	GJ/inhabitant/year
B6.5	Renewable electrical energy consumption	Total consumption of end-use electrical energy generated from renewable sources divided by total end-use electrical energy consumption	%
B6.6	Renewable energy locally produced	Total renewable electrical energy generated in the city's boundaries divided by the total renewable electrical energy consumed by the city	%

C - Social, Economic and Cultural Sustainability

C1 – Integration and solidarity

Code	Criterion	Indicator	Unit of measure
C1.1	Informal settlements	Area of informal settlements within the city boundary divided by the city area	%
C1.2	Unemployment rate	Total number of working-age primary residents not in paid employment or self-employment, but available for work and seeking work divided by the total labour force	%
C1.3	Youth unemployment rate	Total number of a city's unemployed youth divided by the city's youth labour force	%
C1.4	Female employment	Total number of working age women in employment divided by the total female labour force	%
C1.5	Accessibility of public buildings	Total number of public buildings accessible by disabled persons divided by the total number of public buildings	%
C1.6	Accessibility of public transport network	Total number of public vehicles accessible to disabled persons divided by total number of public vehicles	%
C1.7	Population living below poverty line	Number of people living below the national poverty line set at country level divided by the total current population of the city	%
C1.8	School-aged population enrolled in schools	Number of city's school-aged population enrolled in primary and secondary levels in public and private schools divided by the total number of the city's school-aged population	%
C1.9	Female school-aged population enrolled in schools	Number of city's female school-aged population enrolled at primary and secondary levels in public and private schools divided by the total number of a city's female school-aged population	%

C2 – Green economy and eco-innovation

Code	Criterion	Indicator	Unit of measure
C2.1	New jobs in green and circular economy	Number of jobs created in green and circular economy sector	number
C2.2	Digital processes	Number of digital processes operated by the municipality divided by the total number processes operated by the municipality	%
C2.3	Green public procurement	Number of procurement contracts that include green criteria (GPP) divided by the total number of contracts	%

Calculation Guideline

A - Nature and Biodiversity Protection

A1 – Climate change mitigation

Criterion A1.1	**Greenhouse gas emissions**
Intent	Cities account for about 50% of total global GHG emissions (IPCC 2014). The International Energy Agency's projections indicate that urban energy related GHG emissions could rise to 74% by 2030 (IEA 2008). Consequently, cities play a fundamental role in reaching the Paris Agreement's (COP21) GHG reduction targets.
Indicator	Total amount of greenhouse gases in tonnes (equivalent carbon dioxide units) generated over a calendar year divided by the current city population
Unit of measure	Tons CO_2 eq. / inhabitant
SDGs	13
Reference	Global Covenant of Mayors – Common Reporting Framework Sustainable MED Cities SCTool 2022 (I1.1)
Data sources	For guidance about the collection of data, see the "Global Covenant of Mayors Common Reporting Framework".

Assessment method

The reference standard for the calculation of city's GHG emissions is the "Common Reporting Framework" of the Global Covenant of Mayors (2019).

The emissions of the following gases shall be considered: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). GHG emissions shall be reported in metric tonnes of CO_2 equivalent (CO_2e).
GHG emissions shall be reported in relation to the following sectors:

- Stationary energy
- Transportation
- Waste

The emission's sources to consider are:

- Stationary sources: residential buildings, commercial buildings and facilities, institutional buildings, and facilities, industry and agriculture, forestry, and fisheries
- Transportation: on-road, rail, waterborne navigation, aviation, and off-road
- Waste: disposal and treatment of waste and wastewater.

To calculate the indicator's value;

1. Calculate the GHG emissions for sector, multiplying the final energy consumptions by the corresponding emission factor. IPCC (Intergovernmental Panel on Climate Change) emission factors can be used.
2. Sum all the GHG emissions calculated in the previous step.
3. Divide the total GHG emissions calculated in the previous step by the current city population

If the data for a specific sector aren't available, the indicator can be still calculated. The missing information shall be declared in the application form.

A3 – Ecosystems protection

Criterion A3.1	**Connectivity measures for natural areas**
Intent	Fragmentation of green areas is one of the main threats to the sustainability of biodiversity in a city.
Indicator	Amount of natural connected areas in the city divided by the total amount of natural areas in the city
Unit of measure	%
SDG	15
Reference	Reference Framework for Sustainable Cities Sustainable MED Cities SCTool 2022 (A3.3)
Data Sources	Information on natural areas should be obtained from municipal parks departments, planning departments, forestry departments and census. Natural areas can be delineated using aerial photography and/or land use/land cover maps.

Assessment method

The indicator shall be calculated as the amount of connected Green Urban Areas in the city (numerator) divided by the total amount of Green urban Areas in the city (denominator). Areas shall be measured in hectares. The result shall then be multiplied by 100 and expressed as a percentage.

To be connected, Green Urban Areas shall be less than 100 meters apart.

A Green Urban Area is defined as an urban land covered by vegetation of any kind, for instance natural zones, parks, public and private gardens.

B - Built Environment

B1 – Sustainable land use and green areas

Criterion B1.1	Population density
Intent	A well planned urban density increases the efficiency in resources' use and can be viewed as a community asset as it increases the proximity between residents and local goods and services. Its analysis indicates an initial idea of the urban sprawl level.
Indicator	City population in relation to the city's land area
Unit of measure	Inhabitants/Km2
SDG	11 – 13 – 15
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool (A1.1)
Data Sources	Statistical office

Assessment method

Population density shall be calculated as the total city population (numerator) divided by the city's land area. The result shall be expressed as number of persons per square kilometer.

Criterion B1.2	Availability of Green Urban Areas
Intent	Green areas can facilitate climate change adaptation and mitigation, improve health and quality of life, and may favor biodiversity conservation.
Indicator	Total amount of Green Urban Areas in the city's boundaries divided by the total area of the city
Unit of measure	%
SDG	3 - 11
Reference	European Environmental Agency (EEA) Sustainable MED Cities SCTool 2022 (A2.1)
Data Sources	Information on green area should be obtained from municipal parks departments, planning departments, forestry departments and census. Green areas can be delineated using aerial photography and/or land use/land cover maps.

Assessment method

The indicator shall be calculated as the total amount of Green Urban Areas in the city's boundaries (numerator) divided by the total area of the city (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

A Green Urban Area is defined as an urban land covered by vegetation of any kind, for instance natural zones, parks, public and private garden.

Criterion B1.3	Green Urban Areas in relation to the city population
Intent	Green areas offer important services in an urban setting, including the provision of recreation spaces for inhabitants.
Indicator	Total extension of green areas in the city divided by city's total population
Unit of measure	m2/inhabitant
SDG	3 - 11
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (A2.2)
Data Sources	Information on green area should be obtained from municipal recreation and parks departments, planning departments, forestry departments and census. Green areas can be delineated using aerial photography and/or land use/land cover maps.

Assessment method

The indicator shall be calculated as the total amount of vegetated areas in the city's boundaries (numerator) divided by the total city's population (denominator). Areas shall be measured in square meters.

A Green Urban Area is defined as an urban land covered by vegetation of any kind, for instance natural zones, parks, public and private garden.

Criterion B1.4	Distribution of Green Urban Areas
Intent	Green areas shall be equally distributed in cities to guarantee an equal accessibility for all inhabitants. An uneven distribution of green areas prevents connectivity of all the available green spaces in the ecological network.
Indicator	Total length of green area boundaries (edges) divided by the city's urban area
Unit of measure	m/ha
SDG	3 - 11
Reference	European Environmental Agency Sustainable MED Cities SCTool 2022 (A2.2)
Data sources	Information on green area should be obtained from municipal parks departments, planning departments, forestry departments and census. Green areas can be delineated using aerial photography and/or land use/land cover maps.

Assessment method

The indicator shall be calculated as the total length of green area boundaries (numerator) divided by the total city's urban area (denominator).

A Green Urban Area is defined as an urban land covered by vegetation of any kind, for instance natural zones, parks, public and private garden.

Criterion B1.5	Accessibility of shores/beaches
Intent	Shores/beaches provide important recreation opportunities and should be accessible by inhabitants.
Indicator	Total area of shores/beaches in the city area that are accessible by inhabitants divided by the total area of shores/beaches in the city's urban area
Unit of measure	%
SDG	3 - 11
Reference	European Environmental Agency Sustainable MED Cities SCTool 2022 (A2.2)
Data Sources	Information on shores and beaches should be obtained from municipal planning departments.

Assessment method

The indicator shall be calculated as the total area of shores/beaches in the city area that are accessible by inhabitants (numerator) divided by the total area of shores/beaches in the city's urban area (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Criterion	B1.6 Urban agricultural land
Intent	Food security is a global challenge. Municipalities should promote the inclusion of areas devoted to urban agriculture in the city. Plans of new urban development projects should foresee the goal of producing food through reutilization of urban resources.
Indicator	Total urban agricultural area used for food production located within city boundaries divided by one 1000th of the city's total population
Unit of measure	ha/1000 inhabitants
SDG	2 - 11
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (A2.2)
Data Sources	Information on shores and beaches should be obtained from municipal planning departments.

Assessment method

The indicator shall be calculated as the total urban agricultural area used for food production located within city boundaries divided by one 1000th of the city's total population (denominator).

B2 – Sustainable mobility

Criterion B2.1	Public Transport Network
Intent	The extent of a city's public transportation network provide insight into traffic congestion, transportation system flexibility and urban form. Cities with high quality public transport are more compact and support the use of non-motorized modes of transportation.
Indicator	Kilometers of public transport system per 1000th of the city's population
Unit of measure	km/1000 inhabitants
SDG	11, 13
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (F1.1)
Data sources	Information on kilometres of public transport should be gathered from municipal transport offices and local/regional transit authorities and can also be counted using computerized mapping, aerial photography or existing paper maps. This information may be gathered from transport system plans or other master plans

Assessment method

The public transport network includes all available passenger transport services (e.g., busses, trams, subway, light rail, trolleybuses, etc.).

The indicator shall be calculated as the total length (in kilometres) of the public transport systems operating within the city (numerator) divided by one 1000th of the city's total population (denominator).

Criterion B2.2	Usage of public transportation by population

Intent	An effective use of a city's public transportation network by the inhabitants allows to reduce traffic congestion, to improve the quality of air and to reduce the dependency on auto ownership..
tIndicator	Total annual number of public transport trips originating in the city divided by the total city population
Unit of measure	trips/inhabitant
SDG	11, 13
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (F1.3)
Data sources	Public transport data should be gathered from a number of sources including municipal transport authorities, official transport surveys, revenue collection systems (e.g. number of fares purchased) and national censuses (ISO 37120).

Assessment method

The public transport network includes all available passenger transport services (e.g., busses, trams, subway, light rail, trolleybuses, etc.).

This indicator shall be calculated as the total annual number of public transport trips originating in the city (numerator) divided by the total city population (denominator). The result shall be expressed as the annual number of public transport trips per capita.

In some countries, a large number of trips are made via "informal transport" services (e.g. minibuses not operated by the government or municipal transport corporation). These informal trips are not part of the official transport network and shall not be counted.

Criterion B2.3	Bicycle network
Intent	An extended and efficient bicycle network contributes to reduce traffic congestion and improve the quality of life. An economic benefit is also realized through reduced healthcare costs and reduced dependency on auto ownership.
Indicator	Total length of bicycle paths and lanes divided by the city's total population
Unit of measure	m/inhabitant
SDG	3, 11
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (F2.4)
Data sources	Information on city's bicycle network should be gathered from municipal transport offices and local/regional transit authorities. Information can also be acquired using computerized mapping, aerial photography or existing paper maps.

Assessment method

The indicator shall be calculated as the total length (in meters) of bicycle paths and lanes (numerator) divided by the city's total population (denominator).

Criterion B2.4	**Green Public Vehicles**
Intent	Low-carbon emission passenger vehicles offer several advantages over conventional vehicles: energy efficiency, absence of local emissions, less maintenance and quiet operation.
Indicator	Total number of low emission public vehicles divided by total number of public vehicles
Unit of measure	%
SDG	3, 11
Reference	U4SSC - Collection Methodology for Key Performance Indicators for Smart Sustainable Cities Sustainable MED Cities SCTool 2022 (F2.6)
Data sources	Data can be collected from government agencies that register passenger motor vehicles

Assessment method

The indicator shall be calculated as the number of low emission public vehicles (numerator) divided by the city's total number of public vehicles (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Low emission vehicles are:

- Electric Vehicles (EVs)
- Plug-in Hybrid-Electric Vehicles (PHEVs)

Criterion B2.5	Pedestrian infrastructure

Intent	Pedestrian streets and walkways encourage residents and workers to walk to local facilities as an alternative to using private cars. This behavior leads to health benefits, a decrease in congestion levels of roads, as well as a reduction in pollution, and improvement in air quality.
Indicator	Total area of pedestrian streets and walkways divided by the total area of streets and roads in the city
Unit of measure	%
SDG	3, 11
Reference	REFERENCE FRAMEWORK FOR SUSTAINABLE CITIES Sustainable MED Cities SCTool 2022 (F3.1)
Data sources	Information on city's bicycle network should be gathered from municipal urban planning offices.

Assessment method

The indicator shall be calculated as the total area of pedestrian streets and walkways (numerator) divided by the total area of streets and roads in the city (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Criterion B2.6	Traffic fatalities

Intent	Street design can enhance safety and quality of life by improving visibility and accessibility for people walking and cycling and encourage safer behavior from drivers. Traffic circles are effective at reducing traffic speeds at intersections, speed humps can control vehicle speeds near residential and school zones, narrower streets encourage more careful driving.
Indicator	Traffic fatalities divided by 1000th of the city's population
Unit of measure	number /1000 inhabitants
SDG	3, 11
Reference	Sustainable MED Cities SCTool 2022 (F3.4)
Data sources	National, regional or municipal statistical offices.

Assessment method

The indicator shall be calculated as the number of traffic fatalities (numerator) divided by 1.000th of city's population (denominator).

The number of traffic fatalities shall be calculated has the mean of the 3 previous years.

Criterion B2.7	**Private transportation services**
Intent	A private transportation service can be complementary to a public transportation service in reducing the need to use private cars.
Indicator	Number of taxi licenses divided by 1000th of the city's population
Unit of measure	number / 1.000 inhabitants
SDG	11
Reference	Sustainable MED Cities SCTool 2022 (F3.5)
Data sources	Municipal department responsible for the issue of taxi's licenses in the municipality or region.

Assessment method

The indicator shall be calculated as the number of taxi licenses (numerator) divided by 1.000th of city's population (denominator).

B3 – Air pollution

Criterion B3.1	Fine particulate matter (PM2.5) concentration
Intent	Fine particulate matter can cause major health problems in cities. According to the WHO, any concentration of particulate matter (PM) is harmful to human health. PM is carcinogenic and harms the circulatory system as well as the respiratory system.
Indicator	Annual average fine particulate matter (PM2.5) concentration
Unit of measure	µg/m3 year
SDG	3, 11
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (E1.1)
Data sources	Municipal department responsible for air quality in the municipality managing the data concerning the PM2.5 monitoring stations in the city's boundaries.

Assessment method

To calculate the annual mean concentration of PM2.5:

- collect the annual mean of PM2.5 concentration values measured over one year by each monitoring station installed in the city's boundaries.
- calculate the average of the values collected in the previous step as the sum of the annual mean PM2.5 concentration values (numerator) divided by the number of monitoring stations (denominator).

The annual concentration values measured by the monitoring stations shall correspond to the total mass of collected particles that are 2,5 µm or less in diameter divided by the volume of air sampled in standard cubic metres.

Criterion B3.2	**Number of PM2.5 monitoring stations**
Intent	A PM2.5 monitoring system provides information about the level of pollution in the city. It is a necessary tool to identify efficient actions to improve the quality of air.
Indicator	Number of PM2.5 monitoring stations
Unit of measure	-
SDG	3, 11
Reference	-
Data sources	Municipal department responsible for air quality in the municipality managing the PM2.5 monitoring stations in the city's boundaries.

Assessment method

Verify the number of PM2.5 monitoring stations that are active in the city's boundaries.

Monitoring stations should be able to provide information about the daily and annual mean concentration of PM2.5.

Criterion B3.3	**Particulate matter (PM10) concentration**
Intent	Airborne PM10 generates a consistent public health impact. The exposure to PM10 can be the cause of adverse health effects at the level experienced by urban populations in both developed and developing countries.
Indicator	Annual average particulate matter (PM10) concentration
Unit of measure	µg/m3 year
SDG	3, 11
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (E1.2)
Data sources	Municipal department responsible for air quality in the municipality managing the data concerning the PM10 monitoring stations in the city's boundaries.

Assessment method

To calculate the annual mean concentration of PM10:

- collect the annual mean of PM10 concentration values measured over one year by each monitoring station installed in the city's boundaries
- calculate the average of the values collected in the previous step as sum of the annual mean PM10 concentration values (numerator) divided by the number of monitoring stations (denominator).

The annual concentration values measured by the monitoring stations shall correspond to the total mass of collected particles in micrograms in the PM10 size range divided by the volume of air sampled in standard cubic metres.

Criterion B3.4	**Number of PM10 monitoring stations**
Intent	A PM10 monitoring system provides information about the level of pollution in the city. It is a necessary tool to identify efficient actions to improve the quality of air.
Indicator	Number of PM10 monitoring stations
Unit of measure	-
SDG	3, 11
Reference	-
Data sources	Municipal department responsible for air quality in the municipality managing the PM10 monitoring stations in the city's boundaries.

Assessment method

Verify the number of PM10 monitoring stations that are active in the city's boundaries.

Monitoring stations should be able to provide information about the daily and annual mean concentration of PM10.

B4 – Solid waste

Criterion B4.1	Availability of solid waste collection
Intent	City health, cleanliness depends on the availability of a regular solid waste collection. An efficient solid waste management system contributes to public health, the local economy and the environment
Indicator	Percentage of population with regular solid waste collection
Unit of measure	%
SDG	11
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (D1.1)
Data sources	Information should be obtained from the local operator(s) of solid waste collection systems, census data and municipal waste facilities.

Assessment method

The indicator shall be calculated as the number of people within the city who are served by regular solid waste collection (numerator) divided by the total city population (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Regular solid waste collection shall be defined as having the solid waste picked up from collection points, transported and dropped at a proper treatment facility (recycling or landfill sites) on at least a weekly basis or every two weeks. If the solid waste is collected in any moving vehicle by persons who have not constituted a legally established entity, the house shall not be considered as a household serviced with a solid waste collection service.

The number of households in the city serviced with regular solid waste collection shall first be determined. The number of households being serviced by the regular solid waste collection service shall then be multiplied by the current average household size for that city to determine the number of persons serviced with regular solid waste collection.

Criterion B4.2	Solid waste generation

Intent	High levels of municipal waste generate critical environmental problems. A waste reduction may be reached through eco-design, packaging reduction, by separate waste collection for recycling reuse and composting as well as through the promotion of social and economic activities linked to renting, sharing, swapping, repairing, and manufacturing products.
Indicator	Total amount of solid waste generated divided by the total city population
Unit of measure	Tonnes/inhabitant/year
SDG	11, 12
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (D2.1)
Data sources	Information should be obtained from the local operator(s) of solid waste collection systems, census data and municipal waste facilities.

Assessment method

This indicator shall be calculated as the total amount of solid waste (household and commercial) generated in tonnes (numerator) divided by the total city population (denominator).

Municipal waste shall refer to waste collected by or on behalf of municipalities.

Municipal waste shall include waste originating from:

- households;
- commerce and trade, small businesses, office buildings and institutions (e.g. schools, hospitals, government buildings).

Municipal waste also includes:

- bulky waste (e.g. white goods, old furniture, mattresses);
- garden waste, leaves, grass clippings, street sweepings, the content of litter containers, and market cleansing waste, if managed as waste;
- waste from selected municipal services, i.e. waste from park and garden maintenance, waste from street cleaning services (e.g. street sweepings, the content of litter containers, market cleansing waste), if managed as waste.

Not to include in the calculation:

- waste from municipal sewage network and treatment;
- municipal construction and demolition waste.

Criterion B4.3	Solid waste recycling
Intent	Recycling is defined as the recovery and reuse of materials from wastes. Recycling provides many benefits versus landfilling, including offsetting primary production of materials, reduced greenhouse gas emissions, lower priced secondary materials, production of compost and generation of energy. Many cities generate more solid waste than they can dispose of. Diverting recyclable materials from the waste stream is one strategy for addressing this municipal issue.
Indicator	Total amount of solid waste that is recycled divided by the total amount of solid waste produced in the city
Unit of measure	%
SDG	11, 12
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (D2.2)
Data sources	Information should be obtained from the local operator(s) of solid waste collection systems, census data and municipal waste facilities.

Assessment method

The indicator shall be calculated as the total amount of the city's solid waste that is recycled in tonnes (numerator) divided by the total amount of solid waste produced in the city in tonnes (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Recycled materials shall refer to those materials diverted from the waste stream, recovered and processed into new products following local government permits and regulations.

B5 – Water

Criterion	**B5.1 Availability of a public municipal water supply**
Intent	City health and a good quality of life for inhabitants depends critically by the availability of a potable water supply.
Indicator	Total number of people with potable water supply service divided by total city population
Unit of measure	%
SDG	3, 6
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (C1.1)
Data sources	Information should be obtained from the local operator(s) of water supply systems.

Assessment method

Potable water shall refer to drinkable water that has been treated and is confirmed safe for human consumption. A potable water supply service shall refer to a service that delivers potable water through a pipe or similar duct that is connected to a network. If a house or group of houses has a “mother” pipe connected either provisionally or permanently, it shall be considered to have access to potable water

The indicator shall be calculated as the total number of people with potable water supply service (numerator) divided by total city population (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

The total number of people with potable water supply service shall be calculated as the total number of households in the city connected to a potable water supply service multiplied by the current average household size for the city.

A house shall not be considered to have access to potable water when an individual house or group is served by a conduit system built with, for example, wood, bamboo, or rubber hose, connected directly to a river, well or another house.

Criterion	B5.2 Total water consumption
Intent	A sustainable water consumption can be achieved through improvements in water supply systems and changes in water consumption patterns. Consumption of water depends on the availability and price of water, the climate and the uses to which water is customarily put by individuals and industrial, commercial and agricultural entities.
Indicator	Total amount of the city's water consumption in liters per day divided by the total city population.
Unit of measure	liters/day/inhabitant
SDG	6, 14
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (C2.1)
Data sources	Information should be obtained from the local operator(s) of water supply systems.

Assessment method

The indicator shall be calculated as the total amount of the city's water consumption (numerator) divided by the total city population (denominator). The result shall be expressed as the total water consumption per capita in litres/day.

Criterion	B5.3 Sufficiency of domestic water provision
Intent	The capacity to meet the domestic water demand is a key aspect for the quality of life of city's inhabitants.
Indicator	Volume of the water supplied for domestic uses divided by the overall domestic water demand
Unit of measure	%
SDG	3, 6
Reference	Sustainable MED Cities SCTool 2022 (C2.3)
Data sources	This information should be obtained from the main water supply companies, which maintain records on water supplied, delivered, consumed and ultimately paid for by the end-users for domestic purposes.

Assessment method

The indicator shall be calculated as the volume of water supplied for domestic uses (numerator) divided by the total volume of domestic water demand (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Criterion	B5.4 Efficiency in water use
Intent	Part of the water supplied to users might be lost through leakage. In cities with old and deteriorating water reticulation systems, a substantial proportion of piped water might be lost through cracks and flaws in pipes. The minimization of water leakage is an important action to reach a sustainable management of available water resources.
Indicator	Volume of water supplied minus the volume of utilized water divided by the total volume of water supplied
Unit of measure	%
SDG	6, 14
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (C2.2)
Data sources	Data should be obtained from water utilities servicing the city.

Assessment method

The indicator shall be calculated as the volume of water supplied minus the volume of utilized water (numerator) divided by the total volume of water supplied (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

The percentage of water loss (unaccounted for water) represents the percentage of water that is lost from treated water entering distribution system and that is not accounted for and billed by the water provider. This includes actual water losses, for example due to leaking pipes, and billing losses, for example due to an informal or illegal connection.

Criterion	B5.5 Access to wastewater collection
Intent	The availability of water resources Impacts on biodiversity, health, whole economic sectors including leisure and tourism. Cities shall ensure excellent wastewater collection and treatment to reduce the pressure on water resources The availability of a wastewater collection is an indicator of city health, cleanliness and quality of life.
Indicator	Number of people within the city that are served by wastewater collection divided by the city population.
Unit of measure	%
SDG	6, 14
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (C1.2)
Data sources	Information on the number of households in the city serviced with regular wastewater collection should be obtained from the local operator(s) of wastewater systems.

Assessment method

The indicator shall be calculated as the number of people within the city who are served by wastewater collection (numerator) divided by the city population (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

The number of households in the city serviced with wastewater collection shall first be determined by counting the number of households that are connected as part of a public or community-owned system of discharge of served waters and other residues through a pipe or similar duct connected to a network that takes it to a facility where it is treated. The number of households being serviced by wastewater connection shall then be multiplied by the then current average household size for that city to determine the number of persons serviced with wastewater collection.

Criterion	B5.6 Centralized wastewater treatment
Intent	The improvement of water treatment reduces the incidence of a variety of water-borne diseases. A reliable wastewater treatment system is a major indicator of the level of local development and of community health. Water pollution from human waste is less of a problem in countries that can afford to treat sewage and wastewater, and water pollution can be minimized with adequate investment in treatment systems
Indicator	Total volume of city wastewater collected for primary, secondary and tertiary treatment in centralized wastewater treatment facilities divided by the total volume of wastewater produced in the city
Unit of measure	%
SDG	3, 6, 14
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (C3.1)
Data sources	This information may be obtained from municipal authorities and the main water supply and treatment companies.

Assessment method

The indicator shall be calculated as the total volume of city wastewater collected for primary, secondary and tertiary treatment in centralized wastewater treatment facilities (numerator) divided by the total volume of wastewater produced in the city (denominator). This result is then multiplied by 100 and expressed as a percentage.

Primary wastewater treatment shall refer to the physical separation of suspended solids from the wastewater flow using primary clarifiers.
Secondary treatment shall refer to the process of removing or reducing contaminants or growths that are left in the wastewater from the primary treatment process.
Tertiary treatment shall refer to the next wastewater treatment process after secondary treatment. This step removes stubborn contaminants that secondary treatment was not able to clean up.

Criterion	B5.7 Improved household sanitation
Intent	Access to improved sanitation is a fundamental need, vital for the dignity and health of all people. About 2,6 billion people lack even a simple "improved" latrine. Furthermore, 1,6 million people die every year from diarrhoeal diseases attributable to lack of safe drinking water and basic sanitation.
Indicator	Total number of people using improved sanitation facilities divided by the total city population
Unit of measure	%
SDG	3, 6, 14
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (C3.1)
Data sources	This information may be obtained from municipal authorities and the main water supply and treatment companies.

Assessment method

The indicator shall be calculated as the total number of people using improved sanitation facilities (numerator) divided by the total city population (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Access to improved sanitation facilities shall refer to the percentage of the city population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal and insect contact with excreta. Improved facilities range from simple, protected pit latrines to flush toilets with a sewerage connection to a collective wastewater network. To be effective, facilities have to be correctly constructed and properly maintained.
Improved sanitation facilities shall include:
— flush or pour-flush to piped sewer system, septic tank or pit latrine,
— ventilated improved pit latrine,
— pit latrine with slab, and
— composting toilet.

Unimproved sanitation shall include
— flush or pour-flush to elsewhere,
— pit latrine without slab or open pit,
— bucket, hanging toilet or hanging latrine, and
— no facilities or bush or field (open defecation).

The percentage of the city population using wastewater on-site disposal systems can be deduced from indicator B5.5.

B6 – Energy

Criterion	B6.1 Access to authorized electrical service
Intent	An authorized access to the electricity supply system is an indicator of lawful provision of a basic urban service, which is of particular relevance to cities in less developed regions of the world. Electrical service is a contributing indicator of sustainability, resilience and economic productivity.
Indicator	Number of people in the city with authorized electrical service divided by the total population of the city
Unit of measure	%
SDG	7, 8, 10
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (B1.1)
Data sources	This information may be obtained from electricity supply authorities.

Assessment method

The indicator shall be calculated as the number of people in the city with authorized electrical service in residential buildings (numerator) divided by the total population of the city (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Authorized electrical service shall refer to a lawful connection to the electrical supply system.

The number of city households with authorized connections to the electricity supply system (often referred to as the electricity grid) shall be multiplied by the current average city household size to determine the number of people with authorized connection to the electricity supply system.

Criterion	B6.2 Electrical service interruptions
Intent	The amount of electrical service interruptions allows to verify the reliability performance in electric utility services and resource constraints. This indicator is affected by the age, standard of maintenance and reliability of the infrastructure that constitutes electricity distribution and transmission. Cities with older infrastructure, intermittent power supply, war or civil unrest, or exposure to natural hazards will tend to experience more service interruptions.
Indicator	Total sum of hours of interruption multiplied by the number of households impacted divided by the total number of households
Unit of measure	hours/household
SDG	7, 8, 10
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (B1.2)
Data sources	This information may be obtained from electricity supply authorities.

Assessment method

The indicator shall be calculated by taking the total sum of hours of interruption multiplied by the number of households impacted (numerator) divided by the total number of households (denominator). The result shall be expressed as the average annual hours of electrical service interruptions per household.

It is normal to experience interruptions in service for a number of reasons including scheduled maintenance, equipment breakdown and power load shedding. To ensure valid comparisons between energy providers, major storms and weather events should be excluded due to their variability with geographic location.

Criterion	B6.3 Final energy consumption (natural gas)
Intent	An understanding of how much energy is currently being consumed can help cities to effectively manage the generation, consumption and conservation of energy. This process can be aided further with an understanding of what types of energy are used by end-use sector.
Indicator	Total end-use energy from natural gas consumed by the city divided by the total population of the city
Unit of measure	MWh/inhabitant/year
SDG	7
Reference	ISO 37120: Sustainable cities and communities
Data sources	Data should be gathered from fuel distributors.

Assessment method

The indicator shall be calculated as the total end-use energy from natural gas consumed by the city in gigajoules (numerator) divided by the total population of the city (denominator). The result shall be expressed as the total end-use energy consumed per capita in gigajoules per year.

The end use sectors to be included in the calculation are:

- Residential
- Commercial (tertiary/service sector ranging from commerce to administration - public buildings, financial and real estate activities, services to business, personal services, education, health and social services)
- Industrial
- Transportation.

Criterion	B6.4 Final energy consumption (electricity)
Intent	An understanding of how much energy is currently being consumed can help cities to effectively manage the generation, consumption and conservation of energy. This process can be aided further with an understanding of what types of energy are used by end-use sector.
Indicator	Total end-use energy from electricity consumed by the city divided by the total population of the city
Unit of measure	GJ/inhabitant/year
SDG	7
Reference	ISO 37120: Sustainable cities and communities
Data sources	Data should be gathered from electricity distributors. Electricity consumption statistics are typically collected in categories of residential, industrial, transportation, commercial and other sector.

Assessment method

The indicator shall be calculated as the total end-use energy from electricity consumed by the city in gigajoules (numerator) divided by the total population of the city (denominator). The result shall be expressed as the total end-use energy consumed per capita in gigajoules per year.

The end use sectors to be included in the calculation are:

- Residential
- Commercial (tertiary/service sector ranging from commerce to administration - public buildings, financial and real estate activities, services to business, personal services, education, health and social services)
- Industrial
- Transportation.

Criterion	B6.5 Renewable electrical energy consumption
Intent	Cities emit significant and growing amounts of greenhouse gases (GHGs) - accounting for 37- 49 of total global GHG emissions. The use of renewable energy allows to minimize the greenhouse gas emissions, secure and diversify the energy supply, maximize the environmental protection. The International Energy Agency's projections indicate that urban energy related GHG emissions will rise from around 67% today to 74% by 2030 (IEA 2008).
Indicator	Total consumption of electricity generated from renewable sources divided by total energy consumption
Unit of measure	%
SDG	7, 13
Reference	ISO 37120: Sustainable cities and communities
Data sources	Data are available from local utility providers, city energy or environment offices.

Assessment method

The indicator shall be calculated as the total consumption of end-use energy generated from renewable sources (numerator) divided by total end-use energy consumption (denominator9. The result shall then be multiplied by 100 and expressed as a percentage.

Renewable sources should include geothermal, solar, wind, hydro, tide and wave energy, and combustibles, such as biomass.

Criterion	B6.6 Renewable electrical energy locally produced

Intent	Cities will need to accommodate two-thirds of the world's population in a livable, low-carbon environment by 2050. Accelerated uptake of locally produced renewables can strengthen the urban economy, create new jobs and improve people's living conditions and welfare.
Indicator	Total renewable electrical energy generated in the city's boundaries divided by the total renewable electrical energy consumed by the city
Unit of measure	%
SDG	7, 13
Reference	ISO 37120: Sustainable cities and communities
Data sources	Data are available from local utility providers, city energy or environment offices.

Assessment method

The indicator shall be calculated as the total renewable electrical energy generated in the city's boundaries (numerator) divided by total renewable electrical energy consumed by the city (denominator9. The result shall then be multiplied by 100 and expressed as a percentage.

Renewable sources should include geothermal, solar, wind, hydro, tide and wave energy, and combustibles, such as biomass.

C - Social, Economic and Cultural Sustainability

C1 – Integration and solidarity

Criterion	C1.1 Informal settlements
Type	Settlements characterized by unplanned development and buildings that are not in compliance with local building codes and regulations are generally marginal and precarious, and affect social well-being, human health and economic development.
Indicator	Area of informal settlements within the city boundary divided by the city area
Unit of measure	%
SDG	1, 11
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (G2.4)
Data sources	Data should be gathered from the city planning department, together with departments knowledgeable about the city neighbourhoods. Local academic institutions may also be of assistance.

Assessment method

The indicator shall be calculated as the area of informal settlements within the city boundary (in square kilometres) (numerator) divided by the city area in square kilometres (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

The UN Statistics Division has developed the following definitions of informal settlements:
a) Areas where groups of housing units have been constructed on land that the occupants have no formal legal claim to.
b) Unplanned settlements and areas where housing is not in compliance with current planning and building regulations (unauthorized housing).

While many informal settlements also meet the definition of slum, the terms are not synonymous. Slums might exist in areas that do not meet the definition of informal settlements. Some informal settlements might have improved such that they do not meet the definition of slum.

Criterion	C1.2 Unemployment rate
Intent	The unemployment rate reflects the general performance of the labour market and the health of the economy. When economic growth is strong, unemployment rates tend to be low and when the economy is stagnating or in recession, unemployment rates tend to be higher.
Indicator	Total number of working-age primary residents not in paid employment or self-employment, but available for work and seeking work divided by the total labour force.
Unit of measure	%
SDG	1, 8
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (H2.1)
Data sources	National or regional statistical organisations.

Assessment method

The indicator shall be calculated as the number of working-age primary residents who during the survey reference period were not in paid employment or self-employment, but available for work and seeking work (numerator) divided by the total labour force (denominator). The result shall be multiplied by 100 and expressed as a percentage.

Unemployment shall refer to individuals without work, actively seeking work in a recent period (past four weeks) and currently available for work.

Labour force shall refer to the sum of the total persons employed and unemployed who are legally eligible to work and who are primary residents of the city.

Criterion	C1.3 Youth unemployment rate
Intent	Youth unemployment rate allows to quantify and analyse the current labour market trends and challenges of young people, being considered as more sensitive to market changes. Youth unemployment can have damaging effects on individuals, communities, economies and society at large. Unemployed or underemployed youths are less able to contribute effectively to community and national development and have fewer opportunities to exercise their rights as citizens.
Indicator	Total number of a city's unemployed youth divided by the city's youth labour force.
Unit of measure	%
SDG	1, 8
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (H2.2)
Data sources	National or regional statistical organisations.

Assessment method

The indicator shall be calculated as the total number of a city's unemployed youth (numerator) divided by the city's youth labour force (denominator). The result shall be multiplied by 100 and expressed as a percentage.

Unemployed youth shall refer to individuals above the legal working age and under 24 years of age who are without work, actively seeking work in a recent period (past four weeks) and currently available for work (registered students are not counted).

Youth labour force shall refer to all persons above the legal working age and under 24 years of age who are either employed or unemployed over a specified reference period.

Criterion	C1.4 Female employment
Intent	Unemployment is considered to increase the risks of poverty and to generate a consequent social exclusion. Cities shall promote the increase in employment rates among vulnerable groups.
Indicator	Total number of working age women in employment divided by the total female labour force
Unit of measure	%
SDG	8
Reference	REFERENCE FRAMEWORK FOR SUSTAINABLE CITIES Sustainable MED Cities SCTool 2022 (H2.3)
Data sources	National or regional statistical organisations.

Assessment method

The indicator shall be calculated as the number of working-age women in employment (numerator) divided by the total female labour force (denominator). The result shall be multiplied by 100 and expressed as a percentage.

Female labour force shall refer to the sum of the total female persons employed and unemployed who are legally eligible to work and who are primary residents of the city.

Criterion	C1.5 Accessibility of public buildings

Intent	In the perspective of social integration and equality, municipalities shall guarantee the accessibility of (at least) public buildings by physically disabled persons.
Indicator	Total number of public buildings accessible by disabled persons divided by the total number of public buildings
Unit of measure	%
SDG	10
Reference	Sustainable MED Cities SCTool 2022 (G1.1)
Data sources	Organization or sector managing public buildings in the city.

Assessment method

The indicator shall be calculated as the total number of public buildings accessible by disabled persons divided by the total number of public buildings.

An accessible building is a building where a person with a disability is afforded the opportunity to acquire the same information, engage in the same interactions, and enjoy the same services as a person without a disability in an equally effective and equally integrated manner, with substantially equivalent ease of use.

A disability refers to a physical, sensory or mental limitation that interferes with a person's ability to move, see, hear or learn.

Criterion	C1.6 Accessibility of public transport network

Intent	An accessible public transport network provides a way for disabled people who do not have access to private motorised transport a way to access essential services, as well as employment, entertainment and social activities.
Indicator	Total number of public vehicles accessible to disabled persons divided by total number of public vehicles
Unit of measure	%
SDG	10
Reference	Sustainable MED Cities SCTool 2022 (G1.3)
Data sources	Information should be gathered from municipal transport offices and local/regional transit authorities.

Assessment method

The indicator shall be calculated as the total number of public vehicles accessible to disabled persons (numerator) divided by total number of public vehicles (denominator).

An accessible vehicle is barrier-free and can be used by people who have disabilities, including those who use wheelchairs.

Criterion	C1.7 Population living below poverty line

Intent	The percentage of the city's population living below the national poverty line is an indicator of relative poverty that reflects social equity and levels of economic and social marginality and/or inclusiveness in a city.
Indicator	Number of people living below the national poverty line set at country level divided by the total current population of the city
Unit of measure	%
SDG	1
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (G5.3)
Data sources	National and regional statistical offices.

Assessment method

The indicator shall be calculated as the number of people living below the national poverty line set at country level (numerator) divided by the total current population of the city (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

The total number of people in the city living below the national poverty line shall be determined by multiplying the number of city households at or below the national poverty line by the current average number of persons per household for that city.

The poverty line refers to the minimum level of income deemed adequate in a particular country. It is the minimum level of income considered adequate in a country. Individuals living below this line are those not able to adequately provide themselves over a 12 months period with water, food, shelter and other basic needs for a healthy life.

Criterion	C1.8 School-aged population enrolled in schools

Intent	Education is one of the most important aspects of sustainable development. This indicator addresses the issue of educational opportunity by indicating how widespread formal education is in the city among the school-age population
Indicator	Number of city's school-aged population enrolled in primary and secondary levels in public and private schools divided by the total number of the city's school-aged population.
Unit of measure	%
SDG	4
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (G5.3)
Data sources	Data on school enrolment should be obtained from local school boards, or the relevant Ministry or Department of Education.

Assessment method

The indicator shall be calculated as the number of city's school-aged population enrolled in primary and secondary levels in public and private schools (numerator) divided by the total number of the city's school-aged population (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Part-time enrolment of a half-day or more shall be counted as a full-time enrolment.

Primary education is the first stage of basic education. It typically covers six years of full-time schooling with the legal age of entrance normally being not younger than 5 years or older than 7 years. Primary education refers to children aged 5–12 years or 1st grade through to 5th or 6th grade, as defined by local education systems. Secondary education is the second stage of basic education and marks the end of compulsory education where it exists. Secondary students usually enter between the ages of 10 and 13. Secondary education usually ends approximately 12 or 13 years after the beginning of primary education (or around age 18). Secondary education also refers to 6th grade (or 7th grade) to 12th grade, as defined by local education systems.

Criterion	C1.9 Female school-aged population enrolled in schools
Intent	Education is one of the most important aspects to reach the gender equity. This indicator addresses the issue of educational opportunity, by indicating how widespread formal education is in the city among female school-aged population.
Indicator	Number of city's female school-aged population enrolled at primary and secondary levels in public and private schools divided by the total number of a city's female school-aged population
Unit of measure	%
SDG	4, 5
Reference	ISO 37120: Sustainable cities and communities Sustainable MED Cities SCTool 2022 (G4.2)
Data sources	Data on school enrolment should be obtained from local school boards, or the relevant Ministry or Department of Education.

Assessment method

The indicator shall be calculated as the number of city's female school-aged population enrolled at primary and secondary levels in public and private schools (numerator) divided by the total number of a city's female school-aged population (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

Part-time enrolment of a half-day or more shall be counted as a full-time enrolment.

C2 – Green economy and eco-innovation

Criterion	C2.1 New jobs in green and circular economy
Intent	The shift to a green and circular economy is impacting labour market and new jobs are emerging. A job in green and circular economy is an occupation in the field of renewable energy, waste and resource management. (repair, recycling, rental, leasing). Municipalities can enable the upscaling of jobs in green and circular economy through policies, action plans and training programs.
Indicator	Number of jobs created in green and circular economy sector
Unit of measure	%
SDG	9, 16
Reference	-
Data sources	Surveys and inventories can provide a simple and effective way of assessing how many green jobs exist in specific sectors at municipal level. A survey is usually carried out in the form of a questionnaire sent out to relevant companies, government departments or analysts, whilst an inventory commonly draws on a national or regional database to provide employment statistics.

Assessment method

The indicator shall be verified as the number of new jobs created in green and circular economy sector through the initiatives, policies, programs deployed by the municipality in the last 5 years.

A green job is an occupation reducing negative environmental impacts, in the field of renewable energy, waste and resource management. (repair, recycling, rental, leasing).

Criterion	C2.2 Digital processes
Intent	Digitization is the process of converting information into a digital format. The digitalization of public services and processes deliver social benefits for citizens as well as organizations.
Indicator	Number of digital processes operated by the municipality divided by the total number processes operated by the municipality
Unit of measure	%
SDG	9, 16
Reference	REFERENCE FRAMEWORK FOR SUSTAINABLE CITIES
Data sources	Data should be obtained from different departments in the municipality.

Assessment method

The indicator shall be calculated as the number of digital processes operated by the municipality (numerator) divided by the total number of processes operated by the municipality. (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

The reference period are the last 3 years.

Examples of digital services: provision of certificates, online payments, services' subscriptions, etc.

Criterion	C2.3 Green public procurement
Intent	Public authorities are major consumers. By using their purchasing power to choose environmentally friendly goods, services and works, they can make an important contribution to sustainable consumption and production.
Indicator	Number of procurement contracts that include green criteria (GPP) divided by the total number of contracts
Unit of measure	%
SDG	9, 16
Reference	REFERENCE FRAMEWORK FOR SUSTAINABLE CITIES
Data sources	Data should be obtained from different departments in the Municipality (e.g. the transport department for sustainable procurement of roads; the housing department for sustainable procurement of a large-scale urban development project, etc).

Assessment method

The indicator shall be calculated as the number of municipality's procurement contracts that include green criteria (numerator) divided by the total number of a city's procurement contracts (denominator). The result shall then be multiplied by 100 and expressed as a percentage.

The reference period are the last 3 years.