



SEACAP 4 SDG

Med SE(A)CAP integration through uniform adapted assessment and financing methods, mainly targeting buildings in education and health sectors, for sustainable development goals in a smart society

Reports on SEACAP SDG Living Labs - Egypt (Output 4.2)

Developed by



**UNIVERSITY OF
PATRAS**
ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΑΤΡΩΝ



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SEACAP 4 SDG

Summary of Report1: current situation and action plan

Country: Egypt

Region: Governorate of Alexandria

Municipality/Local Authorities: Alexandria Water Company

Beneficiary and Stakeholder: Secondary Technical School of Alexandria Water Company

Year of the SEAP: 2023

Partner declaration about the selection of Municipality/Local Authority

• Since 1860 there were two private companies to supply Alexandria people with pure water. In 1979, the Alexandria water company was established as a company owned by the government. It provides the following regions with water (Figure 1:

- 1) Alexandria government; 2) Part of Matrouh government; and 3) Behara government.

it covers 10 water supply station with total capacity of 3541500 m3/day average daly use 2021-2022 is 2.82 Milion m3/day. For more details, visit the website Link: <https://alexwater.com.eg/>.

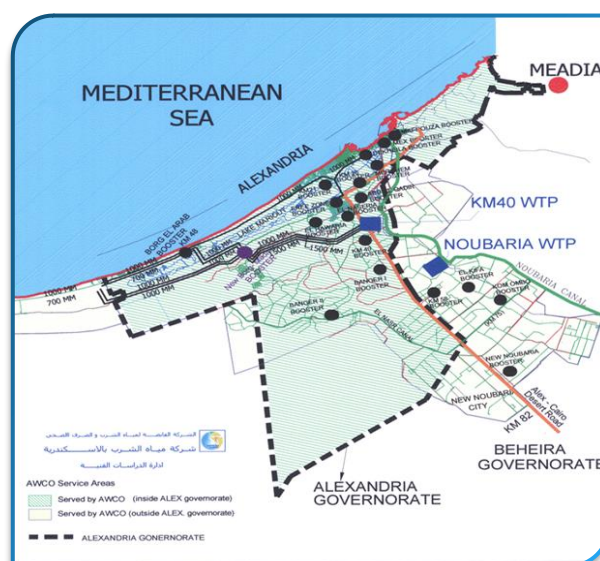


Figure 1 Area Covered by the Municipality

Beneficiary and stakeholder



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Applying project methodology on a public building related to the company in particular school building owned by the company and ensuring the implementation of the resulting activities. Figure 2 shows the photo of public building as a case study, Secondary Technical



Figure 2 The secondary technical school of water company as a beneficiary

School of Alexandria Water Company

- making the feasibility analysis to enhance energy efficiency for school building to make an action plan based on the priorities.

The school has 132 students and it consists of 4 floors as shown in Figure 3 with an area of about 4300m². It has a water analysis lab beside workshops, library and computer labs. The school has a plan to retrofit, so some of the project results will be addressed for implementation.



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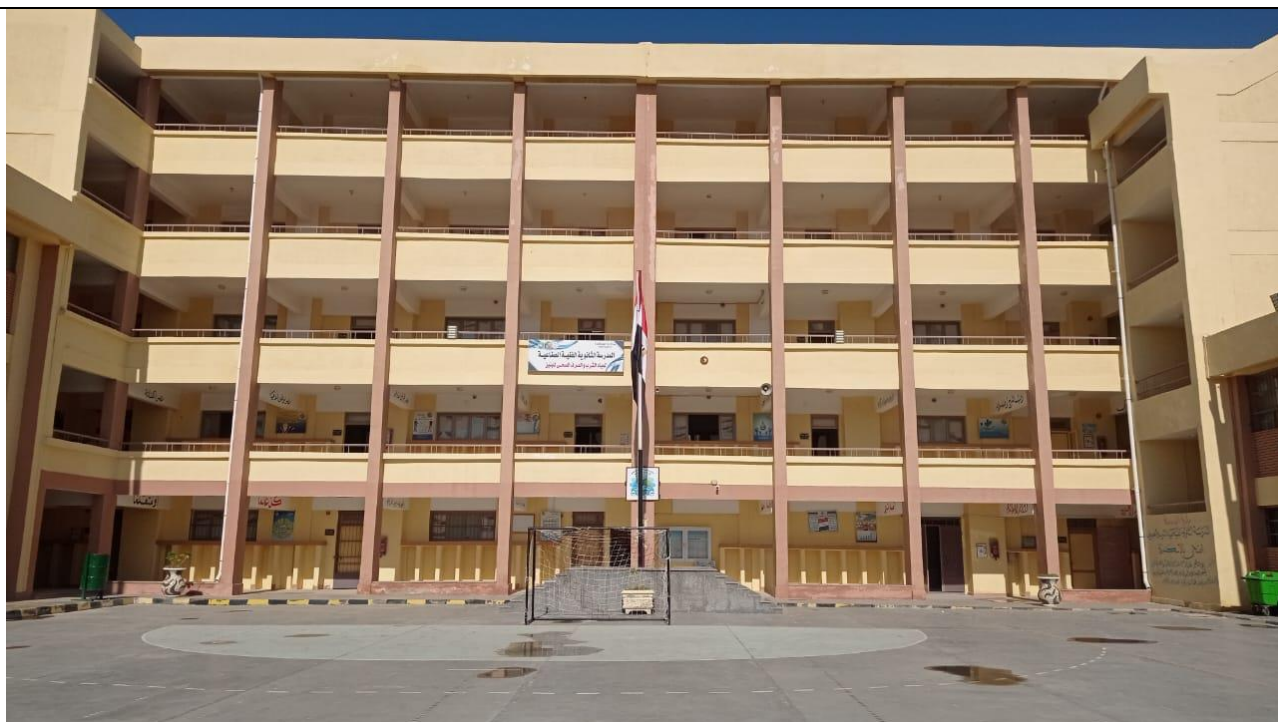


Figure 3 School over view

External entity declaration about the opinion on the outcomes identified and selected (Name, surname, position)

*As an external entity, we will assist the beneficiary, Technical School of Alexandria Water Company, to select the most useful toolkits of the SEACAP 4 SDG project for Phases 1 and 2. The external entity select is **EGEC, (Egyptian for Engineering & Commerce)**. EGEC is one of the leading companies in the field of Electrical installation, Renewable energy and energy efficient system, and Industrial Control*

- *It has more than 200 employees. It has two Branches in Cairo and Borg in addition to the Head Office and Factory Located in Alexandria*
- ***EGEC** is approved by The New Renewable Energy Authority (NREA) for Solar Energy and Energy Efficiency Projects*
- ***EGEC** is an agent and distributor for many international electrical products such as, Schneider Electric, SOCOMIC, ABB, Balluff, ENDA, Optics*



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- ***EGEC** has established many energy efficient water pumping stations and smart energy monitory system in different companies and cities such as: Pirelli, EL Delta Company for fertilizer and chemical industries, Gardenia Compound (6th October City), The American University (5th District), El Alamein " Marrasy, Nile Kord SA Egypt Plot 7 Industrial Zone B1, Mondelez Egypt Foods S.A. El Khalily Street*
- ***EGEC C** has installed different PV plants (on-grid and off-grid) with more that 7 MW Based on the attended on-line training sessions on the Toolkit in the framework of the Living Lab; EGE C and Alexandria water Company and its associated school representative will discuss the most suitable ToolKit for the selected case study the most suitable TOOLKIT; 1) IMPULSE Preparatory set-up and 2) EDUFOOTPRINT*

Actions planned

To implement the project methodology different actions have been taken among municipality, beneficiary and external entity to discuss the situation and confirm the methodology and communication plan as follow:

1 - Meetings : To assist the Municipality of Alexandria water company to select the most appropriate tools and methodologies proposed by the SEACAP 4SDG project based on needs of the municipality and financial situation. The meetings have been done physical/visual with identified members of the LivingLab and the suitable building to be used at 1/12/2022 online and on site at 26/12/2022. Additional meeting and training has been carried out at 1/5/2023 for: 1) tool kits training (Edufootprint and Impulse) and take an action plan form energy befficient procedure.

2- Site Visit: a group represent expert from external entity and 3 members from municipality have been visited the school to make site survey, energy situation energy consumption and current initiatives at 26/12/2022 and 1/5/2023 in addition to physical training on selected tool kits (Edufootprint and Impulse).

3- Data analysis : the beneficiary school energy and water consumption will be collated within the last year 201-2022 by the municipality's representatives to evaluate and plan the planned energy management measures. This is done based on the analysis of the energy consumption of the selected school using the selected tools and methodologies. Based on the site visits at 26/12/2022 and 1/5/23, communication with beneficiary representative and school administrative staff school consumptions and classification are carried out as:

- 1) The total consumption within 2021-2022 has been collected,
- 2) The types of loads (lightings, equipment, labs, instruments) are listed



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3) Online load consumption using data logger to address the effect of energy conservation initiatives are carried out within 8-12/5/2023

4- Roadmap : a roadmap for a rehabilitation of the school building is developed by the members of the Living Lab that describe :

1) Carrying out training on energy efficiency and management system in addition to the suitable toolkits that can be implemented in the school.

2) construct Energy Team, consists of representatives of municipality, beneficiary and external expert, to:

a) carry measure and data analysis plan

b)) discuss the priority energy management measures to be implemented, while using the selected tools/methodologies;

c)) implement schedule and estimate of the expected energy savings as well as the potential for replication and scaling of these measures.

d) a plan for the involvement of key stakeholders in the implementation of the energy management measures.

e) review the energy efficient initiatives, measure, and analysis its impacts.

3) analysis the feasibility of energy efficient techniques to select the most appropriate procedure to be implemented and financing mechnizime

5- Implemented actions : according to the identified constraints, conduct a feasibility study of some proposed measures from a legal, financial and economic point of view, identifying possible sources of financing and the risks associated with the planned investment.

The summary of actions that are already identified and planned by the expert team according to the above methodology :

4.1 Construct the Living Lab members (2 from Municipality, 2 from beneficiary and 3 from external expert)

4.2 Site visits and local awareness and training about the SEACAP outputs and toolkits that can be implemented (26/12/2022). In this visit the following activities have been carried out:

1- Meet the representatives of municipality and beneficiary to discuss the current situation and energy initiatives and actions that are taken.

2- Visit the student in the classes and discuss the knowledge of student on energy efficient and SDG's

3- Make surveys on the classes, labs, offices, library, conference hall, etc.

4- Collect the energy data and building information: total yearly consumption 79640 kWh and lighting represent the bulk load.



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Photos of School site visit at 26/12/2022



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4.3 Training on Toolkits (Edufootprint and Impulse) that will be implemented and workshop on the users' initiatives and attitude changes of users' energy behaviors in buildings through the implementation of energy mix and efficient (1/5/2023). Apply the edufootprint on the current situation of energy consumption the environmental impact of some initiatives. The attendee of training organized by energy research unit of AASTMT from municipality, beneficiary, and external expert as follow:

Eng.Amr Khamis Mohamed; Energy Efficiency General Manager
Eng.Samar Badr Bassem Al sayed; Manager Of Renewable Energy Department
Eng. Rita Selim Antoun Zaki, Manager Of Generators Department
Eng. Mohamed Bakr Mohamed; Manager of Desalination Studies Department
Mr. Yasser Mahmoud Metwaly; School Administrators
Dr. Eslam Mohamed Anwar; P.E. teacher & Project Coordinator
Prof. Mostafa Abdelgeliel(organizer), Energy research unit and external expert consultant
Eng. Hayam Mohamed. External expert representative (EGEC company)



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CERTIFICATE OF ATTENDANCE

This certificate is presented to

Samar Badr Bassem Al Sayed

for successfully completing the Local Living Lab training-Egypt of the SEACAP 4 SDG project
on 1 May 2023.

This training provided an overview of SEACAPs, Living Labs, Toolkits and the effectiveness of school building energy efficiency

Prof. Mostafa Abdelgeliel

Mostafa
Head of Energy Research Unit
Arab academy for Science, Technology and
Maritime Transport

Sample of LL training on Water School at 1/5/2023



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Photos of School site visit and Toolkit training at 1/5/2023

4.4 Energy Management Team is constructed, which has representatives from municipality, beneficiary (school administrative, teachers, technical persons, students). The Energy management teams members are:

Energy Team

A representative of Alex Water Company: Eng.Samar Badr Bassem

A representative of the school administration:

Mr. Yasser Metwly

Mr. Gaber Moustafa

School members:

Dr. Eslam Anwar

Eng. Mohamed Bakr



SEACAP 4 SDG

Eng. Wafaa Gohary
Eng. Ahmed Awad
Mr. Mohamed Moustafa
Mr. Mahmoud El-Gamal
Mr. Mohamed Abd-Allah
Mr. Moustafa Ahmed
Student members
St. Ahmed El-Dershaby
St. Ahmed Shoman
St. Khaled Mansour
St. Mohamed Samy
St. Saad El-Masry
St. Mahmoud Abo-Hantash
St. Mohamed Walead
St. Hassan El-Gerba
St. Radwan Abo Al-Ahrar
St. Abd El-Rahman Ahmed
St. Mohamed Hemaïda
St. Omar Ahmed El-Sayed
St. Abd El-Rahman Moustafa
St. Abd-Allah Hany
St. Youssef Ashoush
St. Mòamen Amro
Lab. Alaa Ashraf
Lab. Ali Karam

4.5 Possible solution that can be implemented

- 1) involve the students in energy efficient plan and analysis the impact by:
 - a) Select one student to be responsible for switching on/off the class lighting.
 - b) Adapt the lamp lighting based on the environmental condition and class orientation
 - c) Make some nudges to help of the school members about energy efficient and SDG's.
- 2) Observer the impact of energy efficient plants through online monitoring of energy consumption.
- 3) Implement online energy monitoring system to be observed by the municipality to help in decision support.
- 4) Implement automatic lighting using automation technology like motion and presence sensors.
- 5) Utilize the roof to install a PV plant for self-consumption and/or feed-in-tariff.

Results

- 1- Implementing Tool kits after training:



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- a) EDUFOOTPRINT** to shows the environmental effect before and after implementation of energy mix plan
- b) IMPULSE PLUS** KPIs-processor's PLUG-IN for automated hierarchy of public buildings to be renovated annually after having selected the pilot buildings.
- c) MED-ECOSURE** Tool of retrofit solutions can be implemented if needed: calculator
- 2- Energy Management Team construction for school as described in the action plan
 - 3- Online monitoring of the energy management activities impacts
 - 4- Make the priority of action that can be implemented based on the feedback of initiative impacts
 - 5- Prepare the feasibility study of the alternatives to be implemented and retrofitting plan.



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Date: 26 December 2022

Location: Alexandria (Egypt)

Delivered by:

Energy Research Unit AAST



Participants:

- Staff from Municipality of Water Company
- Staff from Beneficiary of water School
- Specialists of the external entity
Technical group





SEACAP 4 SDG



Date: 1 May 2023

Location: Water Secondary
School, Alexandria (Egypt)

Delivered by:

Energy Research Unit AAST



Participants:

- Staff from Municipality of Water Company (3 members)
- Staff from Beneficiary of water School (3 members)
- Specialists of the external entity Technical group (1 member)



Tool kits Training Attendees

The attendee of training organized by energy research unit of AASTMT from municipality, beneficiary, and external expert as follow:

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Training Certificate Sample



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Energy Team of School

Energy Management Team is constructed, which has representatives from municipality, beneficiary (school administrative, teachers, technical persons, students).

The Energy management teams members are:

- A representative of Alex Water Company: Eng.Samar Badr Bassem
- A representative of the school administration:
Mr. Yasser Metwly and
Mr. Gaber Moustafa

Energy Team of School

- School members

School staff

Dr. Eslam Anwar
Eng. Mohamed Bakr
Eng. Wafaa Gohary
Eng. Ahmed Awad
Mr. Mohamed Moustafa
Mr. Mahmoud El-Gamal
Mr. Mohamed Abd-Allah
Mr. Moustafa Ahmed

Student members

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St. Ahmed Shoman
St. Khaled Mansour
St. Mohamed Samy
St. Saad El-Masry
St. Mahmoud Abo-Hantash
St. Mohamed Walead
St. Hassan El-Gerba
St. Radwan Abo Al-Ahrar
St. Abd El-Rahman Ahmed
St. Mohamed Hemaida
St. Omar Ahmed El-Sayed
St. Abd El-Rahman Moustafa
St. Abd-Allah Hany
St. Youssef Ashoush
St. Mòamen Amro
Lab. Alaa Ashraf
Lab. Ali Karam



SEACAP 4 SDG Egypt Project Living Lab Training

Presented By

Mostafa Abdelgeliel

Representative of External Entity (EGEC)

Municipality: Alexandria Water Company

- Since 1860 there were two privet companies in to supply Alexandria people with pure water.
- In 1979, the Alexandria water company was established as a company owned by the government.
- It provides the following regions with water:
 - Alexandria government
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 - Behara government
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Beneficiary and Stakeholder: Secondary Technical School of Alexandria Water Company



External Entity: Egyptian for Engineering and Commerce (EGEC)



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- **EGEC** has installed different PV plants (on-grid and off-grid) with more than 7 MW

External Entity: Egyptian for Engineering and Commerce (EGEC) Clients



RKW



Egyptian British Co.
Specialty Chemicals & auxiliaries



Mondelēz
International



External Entity: Egyptian for Engineering and Commerce (EGEC) Responsibility



❖ Phase 1: Energy-mix efficiency plans

- Assist the Municipality to use the Toolkit in their day-to-day work to a specific purpose: improve their SEACAP or energy-mix efficiency
 - Collect data and communicate with the main stakeholders, decide what channels of communication/participation need to be used.
- Elaborate an improved SEACAP or energy-mix efficiency plan, based on the used Toolkit. The final document could be elaborated in local languages and summary in English.
- Assessment of existing conditions (Energy Audit).
- Planned energy improvements, the municipality presents an overview of the proposed actions and the necessary investments
- Behavioral change.

External Entity: Egyptian for Engineering and Commerce (EGEC) Responsibility



Phase 2: Road map and detail documentation for select target buildings and stakeholders

- Elaborate a recommendation list of the buildings from the municipality to become demonstrators and participate in the selection process
- Elaborate a report that includes the following points:
 - A detailed description of the planned energy improvements in the selected target
 - Detail description and implementation of selected activities planned to engage stakeholders and the impact of the actions proposed, including energy savings and avoided CO2 emissions and the project's potential for up-scaling and/or replication. Entities must demonstrate at this stage that they expect to achieve a minimum energy saving of 5% over the total energy consumption of the city in alignment with the project objectives.

External Entity: Egyptian for Engineering and Commerce (EGEC) Suggested Tool Kit



- Based on the attended on-line training sessions on the Toolkit in the framework of the Living Lab; EGEC and Alexandria water Company and its associated school representative will discuss the most suitable ToolKit for the selected case study
- Till now the most suitable TOOLKIT
 1. IMPULSE Preparatory set-up
 2. EDUFOOTPRINT

External Entity: Egyptian for Engineering and Commerce (EGEC)

Current Situation

- Communication and a strong collaboration among Municipality, EGEC and Beneficiary.
- School Audit visit has been carried out on 25 Dec. 2022 for data collection
- Energy consumption and initiative are currently analyzed
- **EDUFOOTPRINT Tool Kit is utilized**
- The data to prepare the first report is collected
- The draft of the 1st report will be ready by Mid April

School Building



Class Visit



Class Visit



Google Map School Photo



Computer Lab



School Water Analysis Laboratory



School Meeting Room



School Library





Date: 26 December 2022

Location: Alexandria (Egypt)

Delivered by:

Energy Research Unit AAST



Participants:

- Staff from Municipality of Water Company
- Staff from Beneficiary of water School
- Specialists of the external entity Technical group



حصر الإنارة الداخلية والخارجية للمدرسة الفنية الثانوية لمياه الشرب والصرف الصحي

م	نوع اللمبة	القدرة (وات)	العدد		الاجمالي (وات)
			كشاف	لمبة	
1	ليد كروية	11	-	49	539
2	ليد كروية	9	-	39	351
3	كشاف (1 لمبة)	18	1	1	18
4	كشاف (2 لمبة)	18	19	2	684
5	كشاف (3 لمبة)	18	24	3	1296
6	كشاف (4 لمبة)	18	131	4	9432
7	كشاف شوارع	150	14		2100
8	كشاف واجهات	250	7		1750
الإجمالي					16170

عداد رقم 14329075

KW hr		معامل القراءة	KW hr	التاريخ
1560		40	39	Jan-22
81200		40	2030	Jan-23
79640		الفرق		

عداد رقم 14329075

معامل القراءة	KVhr		KWhr		معامل القراءة	KWhr	التاريخ
40	26		80200		40	2005	26/12/2022

Plan

- Energy team
- Data Collection: real time data collection
- Data Analysis
- Action plan and activities
- Initiatives and its impact



School Low Carbon Footprint in Mediterranean cities

SEACAP 4 MED training

*Guideline for Energy Efficiency monitor and
management in public buildings*

October 13th 2022

Antonio Zonta

The Guidelines

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2. MAIN PROBLEMS ENCOUNTERED IN THE ENERGY MANAGEMENT OF BUILDINGS

- **Lack of awareness by the owners and managers of public buildings**
- **Gathering the needed information in a clear and reliable way**
 - *Building owners do not use directly the buildings, therefore there is no awareness of the real needs of the end users;*
 - *Frequent turn over among school users (in particular students)*
 - *Lack of a reference figure to provide information*
 - *Lack of systematic gathering of useful data by staff responsible for storing energy consumption data;*
 - *Segmented tasks within administrative offices: due to the cumbersome organization of Public Administrations, energy-related issues are under the responsibility of several offices;*
 - *Diversified users within schools: often, some areas of schools such as gyms are also used in extracurricular multipurpose hours*
 - *Relatively low level of awareness on the need of applying energy efficiency policies and other aspects of energy management of buildings*

3. THE PROCEDURE FOR AN EFFECTIVE ENERGY MANAGEMENT OF THE SCHOOL BUILDINGS

The procedure for a proper management described and developed within these guidelines is summarized below:

- **Establishment of an Energy Team (ET)** supervising the data collection phase;
- Introduction of a methodology for collecting and archiving data to obtain an updated and detailed **building file**;
- Implementation of a **consumptions' monitoring plan**;
- Introduction of an **analytical phase** of these elements: usage profiles, users' behaviors, envelope and installations;
- Definition of an **energy action plan**;
- Undertaking an **awareness-raising campaign** for **various interest groups** related to the need for an effective energy management of the school buildings.

In the following chapters each of these issues will be described in detail.

3. THE PROCEDURE FOR AN EFFECTIVE ENERGY MANAGEMENT OF THE SCHOOL BUILDINGS

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- Introduction of an **analytical phase** of these elements: usage profiles, users' behaviors, envelope and installations;
- Definition of an **energy action plan**;

In the following chapters each of these issues will be described in detail.

4. SETTING UP AN ENERGY TEAM COORDINATED BY AN ENERGY MANAGER

To create effective synergy among the various users of the building, it is proposed to appoint an **Energy Team (ET)** for each structure with the task of collecting and storing all information related to the energy aspects of that building. The ET should interfere with all the institutions involved in the use of the school such as:

- **Property** (various public administration offices);
- **Managers** (Comprehensive Institutes, various Public Administration Offices);
- **Users** (school managers, sport associations, other associations, etc.).

It should also be the reference for collecting any problems and needs from users and evaluating possible solutions with the Administration. In principle, the ET could consist of:

- Two representatives for the school (one for the students and one for the teachers);
- A representative for the public administration;
- A representative for the ATA staff (Administrative, Technical and Auxiliary staff, i.e. bureaus and school staff).

It would be advisable, to make the synergy even more effective, that the ET be coordinated by an **Energy Manager (EM)** appointed by the property of the building (typically the Public Administration).

What is a building?

A building is not only a shell

It also contains technologies

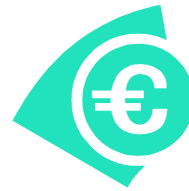
And, unlike many engineers think, it's made of spaces

And – last but not least – of people

Its operation requires a daily amount of energy

and of maintenance activities,

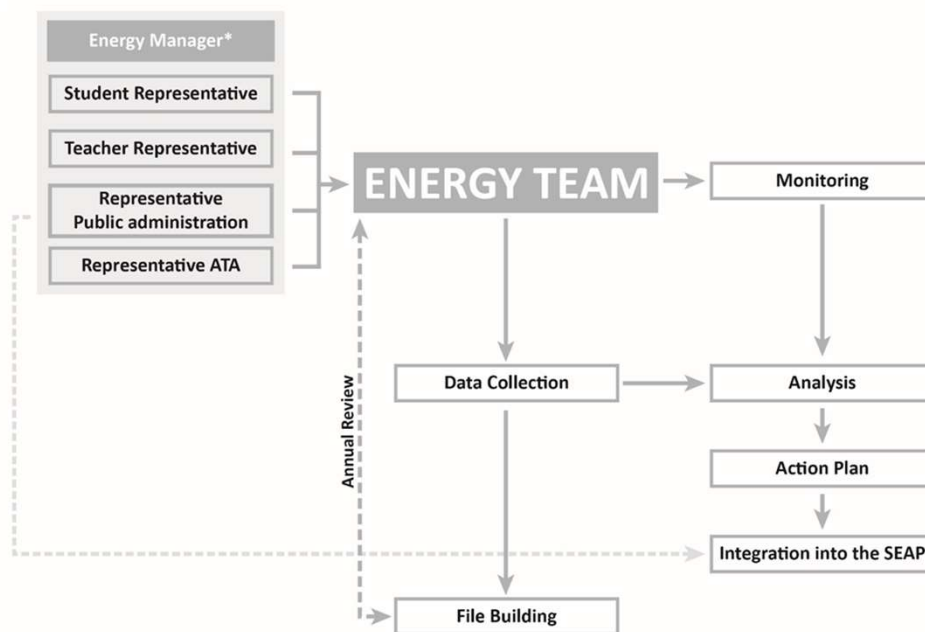
which are not independent from how the building is used, and are worth money



Interactions Building/People

		Building		
		Technology	Space	Relations/ behaviours
Roles of people involved	Owner			
	Manager			
	Final user			

Energy Team & Energy Action Plan



*In the absence of an Energy Manager this role will be covered by the Rappresentative of Public Administration

*This is much more easily
said than done...
Today it's probably only
a wishful thinking!*



***But never give up!
If you never make the
first step, you can be
sure that you will never
make it***

Let people participate, as many as you can

Give people a motivation, or a nudge, promoting awareness raising campaigns

Tell people what you expect from their participation

Energy saving!

Building up Energy Teams

Give people a goal

Tell them how much energy they can save

Don't be too formal

What can the first step be?



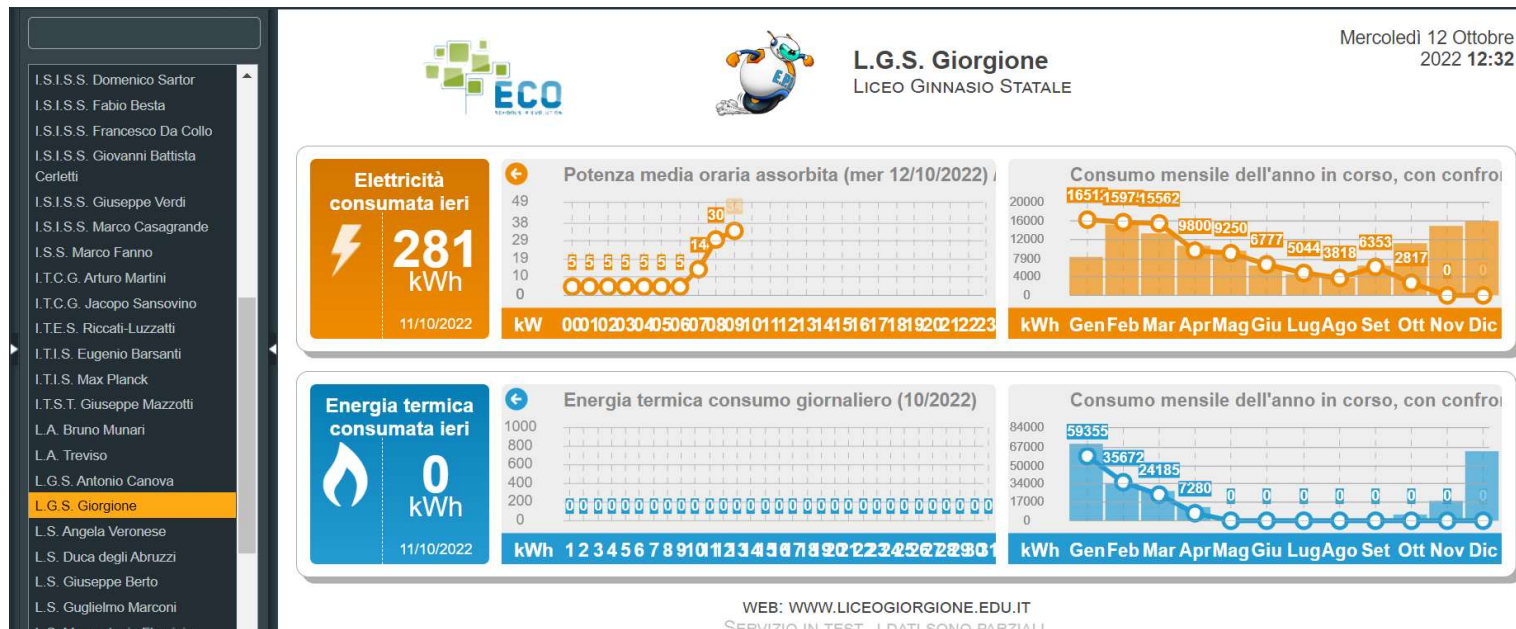
MEASURE!

MEASURE!

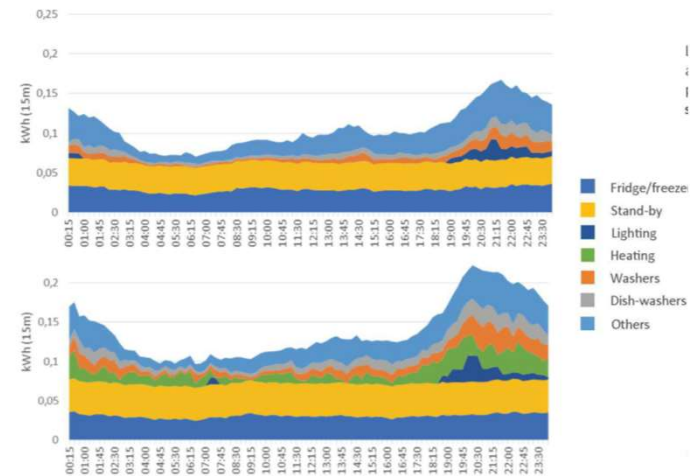
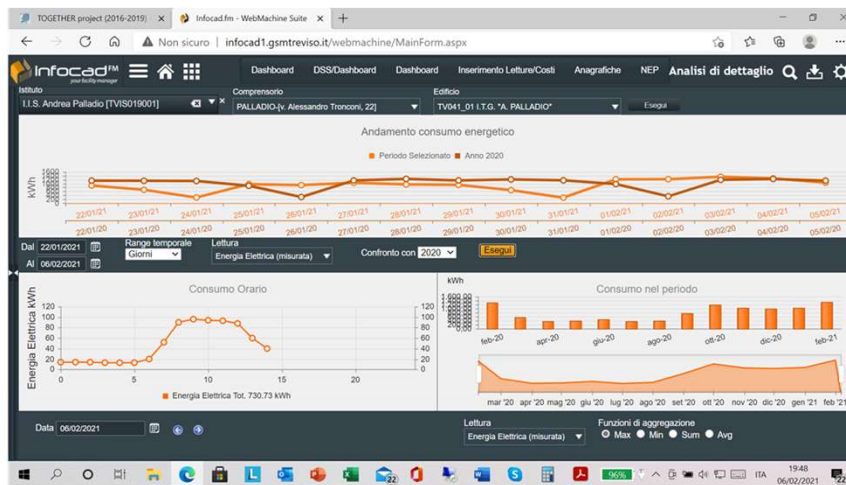


MEASURE!

Then, if possible, make good use of data analytics



Then, if possible, make good use of data analytics



Third, if possible, make an Energy Audit of your buildings

7 CALCOLO DEL FABBISOGNO ENERGETICO DELL'IMMOBILE

7.1 MODELLIZZAZIONE E RISULTATI

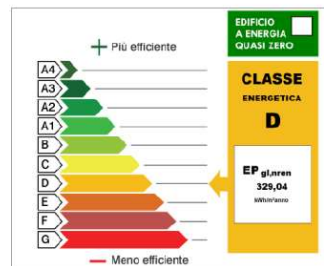
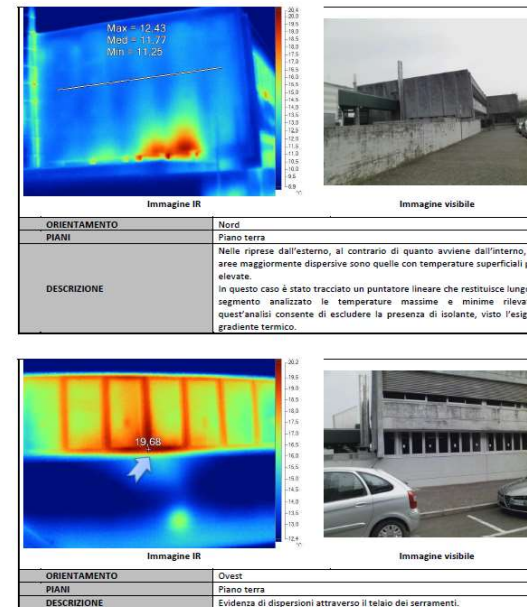
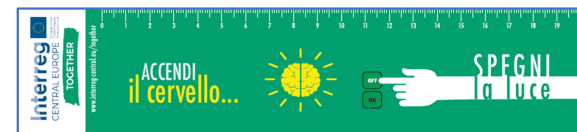


Figura 15 – Elaborazioni eseguite con il software TERMOLOG Epix 7: modello 3D dell'edificio e classe energetica.



Last, but not **LEAST**

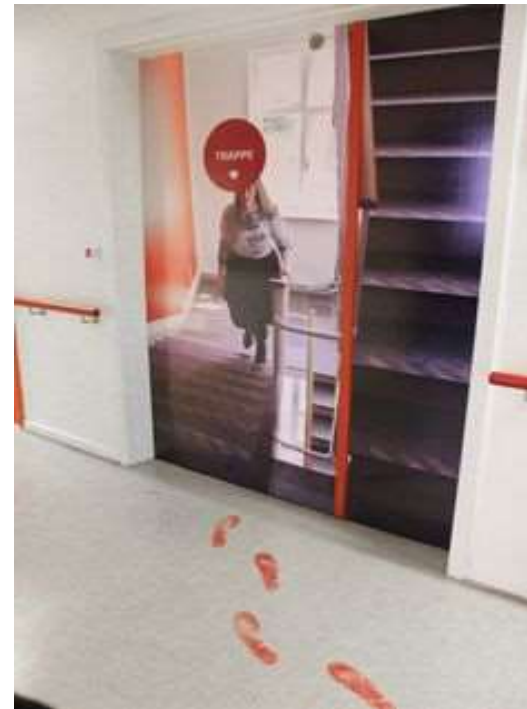
Involve as many people as you can, and if you can't give them a motivation, try to give them a **NUDGE**



More examples of nudges



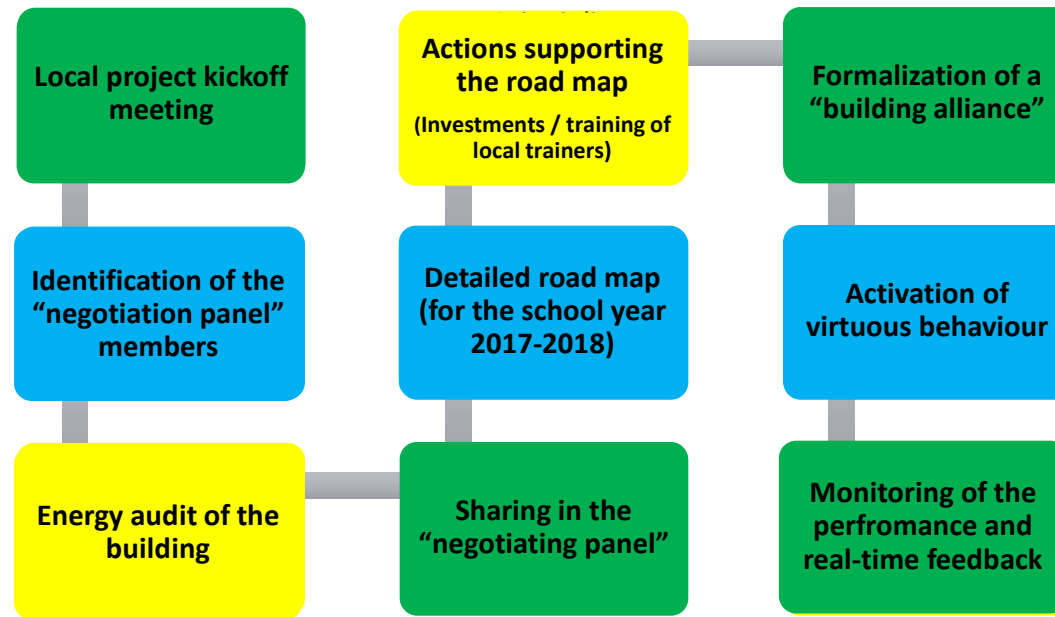
More examples of nudges



Building the Energy Team

A practical example

Building the Energy Team. A practical example



Key to colours: yellow Province of TV, blue building stakeholders, green both

LOCAL PROJECT KICKOFF MEETING



Objectives:

- Presentation of the objectives of the project to all the building stakeholders
- Discussion of the starting points: SWOT, barriers and restraints

Expected results:

- Start of a steady collaboration
- Exchange of contact details for the project
- Planning of next steps

IDENTIFICATION OF THE “NEGOTIATION PANEL MEMBERS”



Objectives:

- Establishing a steady group to supervise and monitor the project activities, a group that is really representative of all the interests at stake within the building

Expected results:

- Project start-up meeting
- Scheduling of periodic meetings during the year
- Internal rules (facsimile provided by the Province)

ENERGY AUDIT OF THE BUILDING

Province of Treviso

STEP 3

Objectives:

- Identifying precisely needs, limits and improvement potentials of the building energy efficiency, involving its occupants and the other relevant stakeholders in the audit process

Expected results:

- Clear indication of efficiency improvement measures to be implemented in terms of:
 - Technological investments
 - Organizational measures (e.g. opening and closing times)
 - Behavioural change

SHARING OF THE ENERGY AUDIT RESULTS



Objectives:

- Informing the “negotiating panel” members of the audit results and of its implications
- Transferring the basic contents to all the building population, through one or more ad hoc events

Expected results:

- Awareness raising of the stakeholders
- Devising a sustainable road map

DETAILED ROAD MAP

**Building
stakeholders**

STEP 5

Objectives:

- Developing a list of activities to be implemented in the school year 2017-2018

Expected results:

- Involvement of all the building stakeholders in the process
- Setting achievable and objectively measurable objectives in a short time span
- Devising innovative ideas to promote the achievement of the road map objectives with the involvement of all the stakeholders
- Preparing the ground for a reinvestment plan of part of the benefits obtained by the owner after the implementation of the activities

ACCOMPANYING ACTIONS

Province of Treviso

STEP 6

Objectives:

- Accompanying and supporting the road map objectives through:
 - Technological investments (primarily: “smart meters” and related “real time” monitoring service - pursuant to a usage agreement with the bodies)
 - Actions of “training to the local trainers” (12 days divided into 3 modules, with the resources and the tools acquired during the Krakow event in February 2017 and based on a requirements analysis performed by Agenda 21)
 - Possible integration/coordination with investments planned by the owner

Expected results:

- Facilitating the achievement of the road map objectives
- Making it possible to objectively compare the improvements obtained and the related rewards

FORMALIZATION OF A “BUILDING ALLIANCE”

Province of Treviso
and building
stakeholders

STEP 7

Objectives:

- Engaging reciprocally the Province and all the building stakeholders (involved in the “negotiating panel”) in achieving the detailed road map objectives and in sharing the deriving benefits, after implementing, where they are not already in place, the technological tools for monitoring and sharing the building energy performance

Expected results:

- Definition of the method for calculating and sharing the benefits deriving from the road map in favour of the building stakeholders
- Transformation of the alliance into a commitment for all the stakeholders

ACTIVATION OF VIRTUOUS BEHAVIOUR



Objectives:

- Implementing, during the school year 2017-18, the activities planned in the detailed road map (made possible by the technological investments and the training) and achieving the relevant results through a collective effort of all the building stakeholders

Expected results:

- Achievement of the detailed road map objectives
- Achievement of the benefits related to the performance
- Implementation of the necessary behavioural and/or organizational changes related to the building management

PERFORMANCE MONITORING



Objectives:

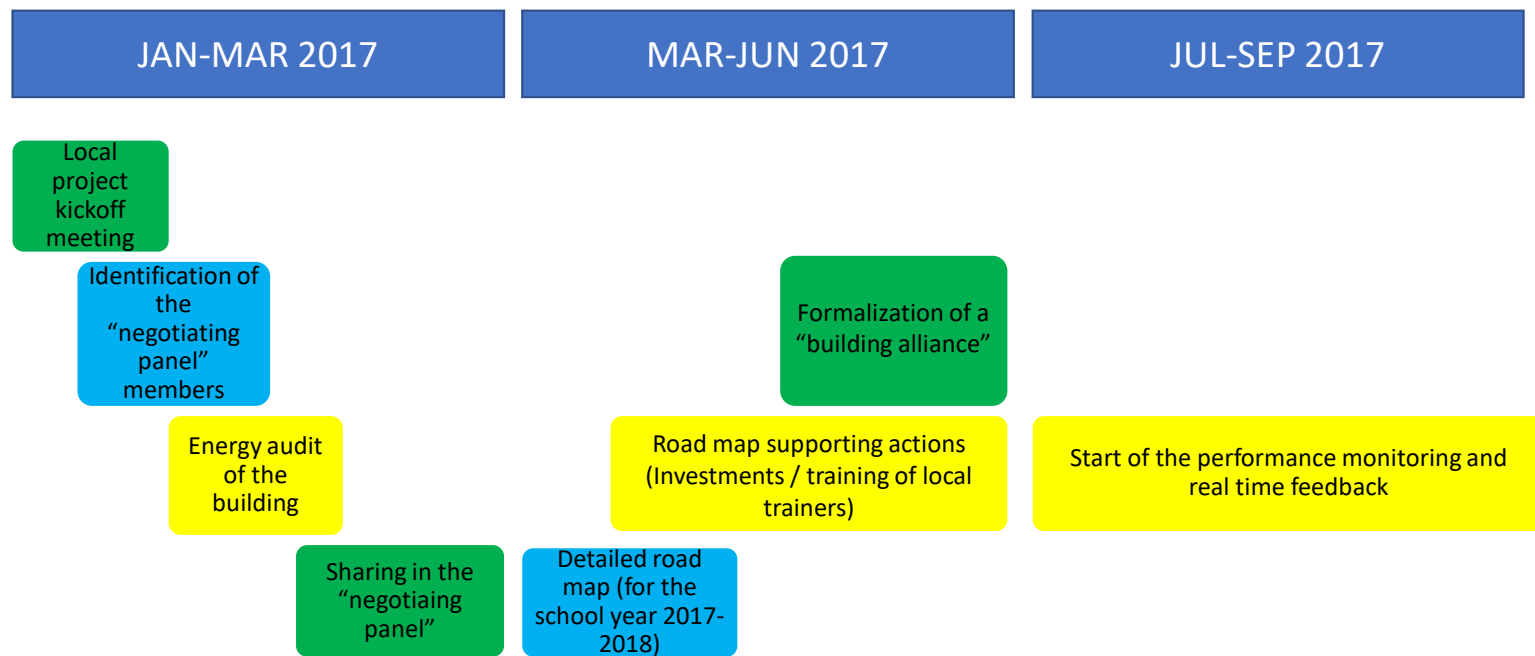
- Performing periodic checks of the patterns of the main indicators of consumption and energy efficiency in the building
- Communicating transparently and with the frequency set in the road map, the monitoring results to all the involved stakeholders

Expected results:

- Speeding up the achievement of the objectives or the correction of possible deviations during the implementation
- Spreading the culture and awareness of the importance of measuring the results as a guide to changing actions

SUMMARY OF THE ACTIVITIES

GANTT Diagram



Monitoring Plan and Usage Profile

A practical Example

Monitoring plan and usage profile. A practical example

Once you have completed the set up phase of your energy team, you can start with your monitoring plan and the usage analysis



Acknowledgment:

The following section of the presentation is the result of the work conducted in 2017 by Edoardo Santinon, Leonardo Frasson and Marco Pallaro, then students at Giorgione High School in Castelfranco Veneto

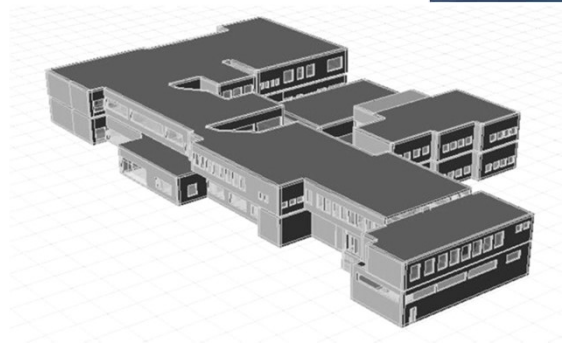
Project of Work-Linked Training

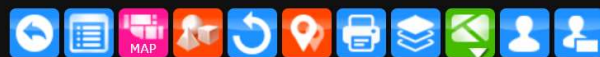
Our theoretical school's electrical consumption and potential savings

We were assured that our school building used to waste high amounts of energy - but was it only a fault of the structure itself?

We were basically convinced that the consumption observed in the last years could be mostly caused by an eco-destructive behaviour of our fellow students and teachers.

Therefore, we decided to develop that project in order to show how much could the final users of a public building affect its consumption. Furthermore, we also struggled in order to reach a convincing “saving plan” - that became our last goal.





GIORGIONE-[v. Verdi, 25], CV046_01
LICEO SCIENTIFICO E CLASSICO

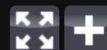


Temi **Legenda** Asset Tools Keyplan

Destinazione d'uso [MACRO]



- Altro (546.17 mq.)
- Aula (490.79 mq.)
- Aula in uso diverso (30.46 mq.)
- Biblioteca (88.51 mq.)
- Deposito (29.30 mq.)
- Infermeria (9.43 mq.)
- Laboratorio (52.81 mq.)
- Locale Tecnico (3.91 mq.)
- Palestra (353.55 mq.)
- Sala Insegnanti (58.67 mq.)
- Sala Riunioni (102.83 mq.)
- Servizi Igienici (94.76 mq.) (+0.00 mq.)
- Spoilatoio (27.25 mq.)



TOT 2029.11 mq.

TEM 2029.11 mq.

SEL 0.00 mq.

Poligoni Documenti

Mail

The Method We Used

1. Carry out a survey with all school building's electrical devices
2. Find the necessary data/information
 - School hours table
 - Weather data
 - Classrooms' devices usage
3. Create Excel sheets
 - Lighting and Devices' sheet
 - Theoretical illumination's sheet
4. Graphs creation
5. Analyse the results

The Method We Used

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Examples



Servers



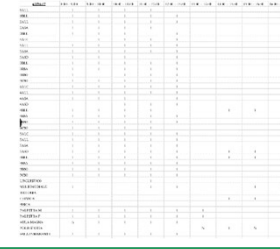
PCs and Monitors

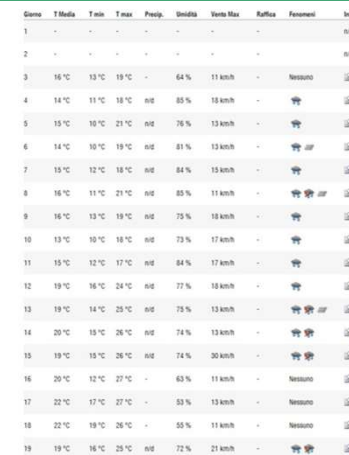


Vending Machines

The Method We Used

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Date	T Media	T min	T max	Humid	Veloc Max	Raffica	Fenestre	Info
1	-	-	-	-	-	-	-	n/d
2	-	-	-	-	-	-	-	n/d
3	16 °C	13 °C	19 °C	-	64 %	11 km/h	-	Nessuno
4	14 °C	11 °C	18 °C	n/d	85 %	18 km/h	-	☁
5	15 °C	10 °C	21 °C	n/d	76 %	13 km/h	-	☁
6	14 °C	10 °C	19 °C	n/d	81 %	13 km/h	-	☁
7	15 °C	12 °C	18 °C	n/d	84 %	15 km/h	-	☁
8	16 °C	11 °C	21 °C	n/d	85 %	11 km/h	-	☁
9	16 °C	13 °C	19 °C	n/d	75 %	18 km/h	-	☁
10	13 °C	10 °C	18 °C	n/d	73 %	17 km/h	-	☁
11	15 °C	12 °C	17 °C	n/d	84 %	17 km/h	-	☁
12	19 °C	16 °C	24 °C	n/d	77 %	18 km/h	-	☁
13	19 °C	14 °C	25 °C	n/d	75 %	13 km/h	-	☁
14	20 °C	15 °C	26 °C	n/d	74 %	13 km/h	-	☁
15	19 °C	15 °C	26 °C	n/d	74 %	30 km/h	-	☁
16	20 °C	12 °C	27 °C	-	63 %	11 km/h	-	Nessuno
17	22 °C	17 °C	27 °C	-	53 %	13 km/h	-	Nessuno
18	22 °C	19 °C	26 °C	-	55 %	11 km/h	-	Nessuno
19	19 °C	16 °C	25 °C	n/d	72 %	21 km/h	-	☁

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[illegible]

	A	B	C
1	01/05/2017	7.4	0
2	02/05/2017	0.2	0
3	03/05/2017	3	0
4	04/05/2017	20.8	2
5	05/05/2017	0	0
6	06/05/2017	15.8	2
7	07/05/2017	0.6	0
8	08/05/2017	0.4	0
9	09/05/2017	18.6	2
10	10/05/2017	1.4	0
11	11/05/2017	0	0
12	12/05/2017	0	0
13	13/05/2017	0.4	0
14	14/05/2017	23.2	2
15	15/05/2017	13.8	2
16	16/05/2017	0.2	0
17	17/05/2017	11	2
18	18/05/2017	0	0
19	19/05/2017	11	2
20	20/05/2017	5.8	0
21	21/05/2017	0.2	0
22	22/05/2017	0	0
23	23/05/2017	0	0
24	24/05/2017	0	0
25	25/05/2017	6.4	0
26	26/05/2017	0	0
27	27/05/2017	0	0
28	28/05/2017	0	0
29	29/05/2017	0	0

	Tipi Ricerche	Media (SD)	Rank (D)	Trend di sviluppo (D)	Media (SD)	Note
					(Percentuale)	
Aula IV	Aula IV - vecchia	38,0 (3,1)	1	✓	38	L'abbandonamento dell'aula di laboratorio è stato deciso in seguito alla valutazione dei rischi.
	Laboratorio Legittimo	38,0 (3,1)	1	✓	38	
Riformazione	Primo	39,0 (3,1)	2	✓	39	Per ogni laboratorio di chimica è stato redatto un piano di sicurezza.
	Aula Normale	39,0 (3,1)	2	✓	39	
Sostituzione per aula doppia	Primo	39,0 (3,1)	2	✓	39	L'aula di chimica è stata sostituita da una aula doppia.
	Aula Normale	39,0 (3,1)	2	✓	39	
Nuove Ricerche	Primo	39,0 (3,1)	2	✓	39	L'aula di chimica è stata sostituita da una aula doppia.
	Aula Normale	39,0 (3,1)	2	✓	39	
Laboratorio Autonomo	Primo	39,0 (3,1)	2	✓	39	L'aula di chimica è stata sostituita da una aula doppia.
	Aula Normale	39,0 (3,1)	2	✓	39	
Laboratorio Chimica	Primo	39,0 (3,1)	2	✓	39	L'aula di chimica è stata sostituita da una aula doppia.
	Aula Normale	39,0 (3,1)	2	✓	39	

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Project Information		Schedule Overview																	
Project Name	Project Number	Activity Schedule																	
W	Th	F	Sa	Su	Mo	Tu	We	Th	F	Sa	Su	Mo	Tu	We	Th	F	Sa	Su	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9
9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4
4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6
26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5
24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
8	9	10	11																

Specific Consumption (m³)		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Housing Consumption (m³)		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Public Consumption (m³)		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Total Consumption (m³)		2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000

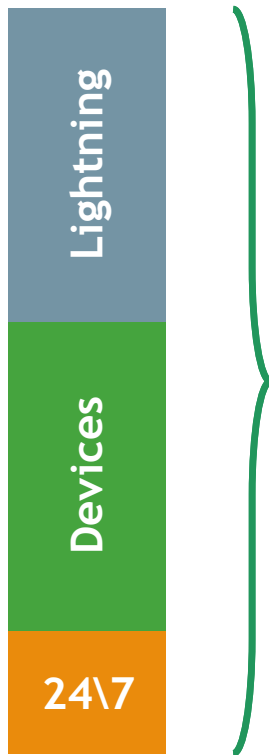
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To understand the graphs



Total Amount of power consumption

Note: We used random amounts

To understand the graphs

Location	Device	Power Consumption (W)	Usage	Number of units	Daily Consumption (KWh/Day)
Special classrooms	Apple TV	1,5	24\7	2	0,1
	Router Apple	8	24\7	2	0,4
Servers room	Server + PC	100	24\7	9	21,6
	Switch HP	795	24\7	1	19,1
	Switch Tp-Link	11,2	24\7	3	0,8
	Mac (Server)	100	24\7	2	4,8
	Condizionatore	860	24\7	1	20,6
Vending Machines	Necta Astra (caffè)	142	24\7	1	3,4
	Necta Samba (bibite e snaks)	630	24\7	4	60,5
	Necta Canto (caffè)	175	24\7	2	8,4
Chemistry Laboratory	Frigorifero INDESIT	14	24\7	1	0,3
Infirmary	Frigorifero IGNIS	25	24\7	1	0,6

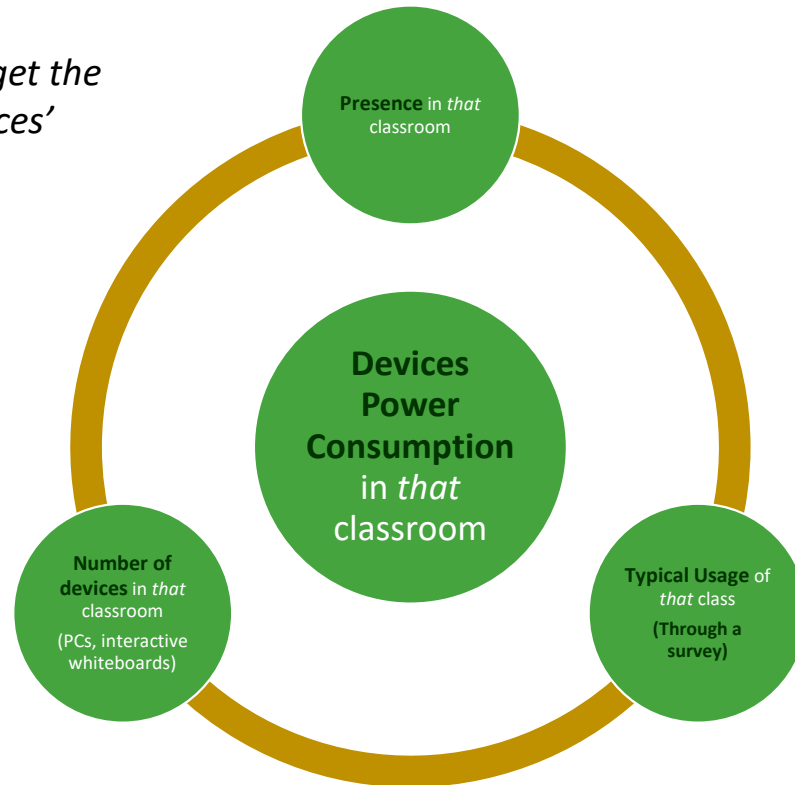
24\7

Permanent consumption (servers, vending machines, etc.)

To understand the graphs



How we managed to get the whole amount of devices' power consumption in each classroom



To understand the graphs

Lightning

Lighting Power consumption

Devices

We worked out a theoretical illumination “algorithm” in order to achieve a convincing lighting time - so without any waste or bother registered by the users.

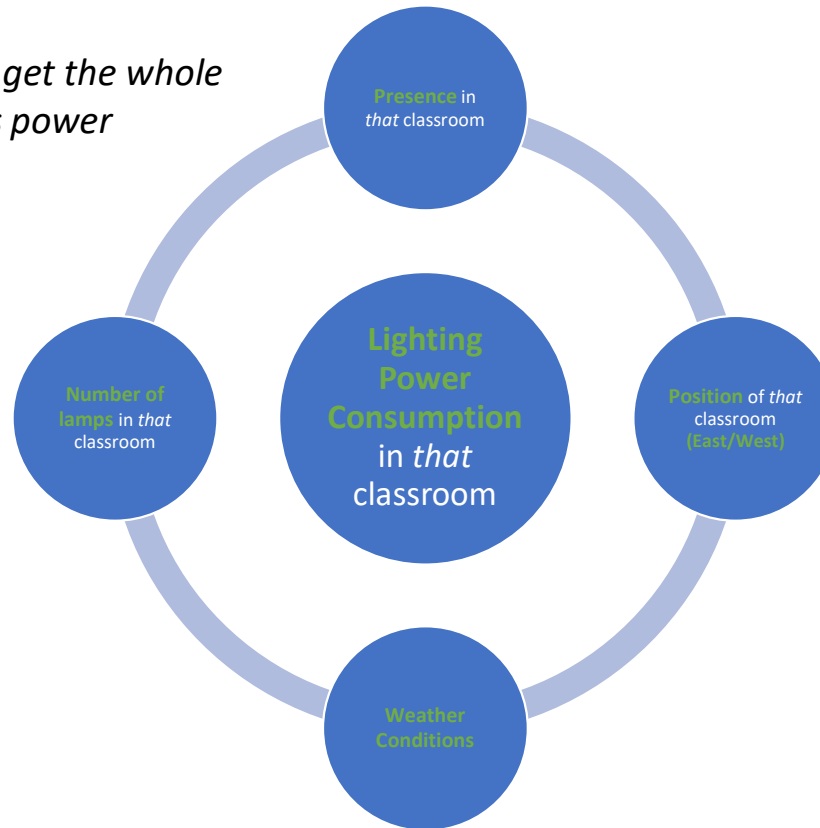
Our choices depends on the stint in which we carried out the survey – that is May.

24\7

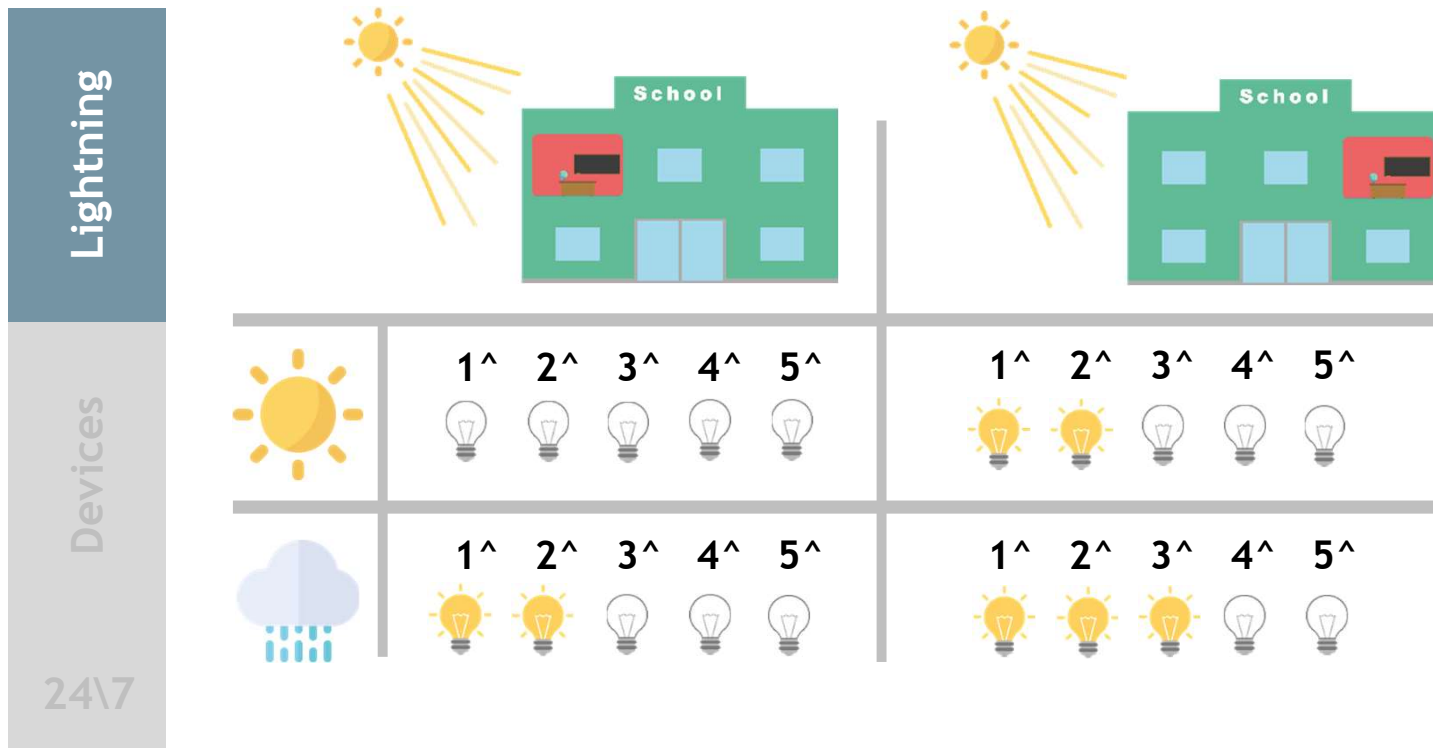
To understand the graphs



How we managed to get the whole amount of lightning's power consumption in each classroom



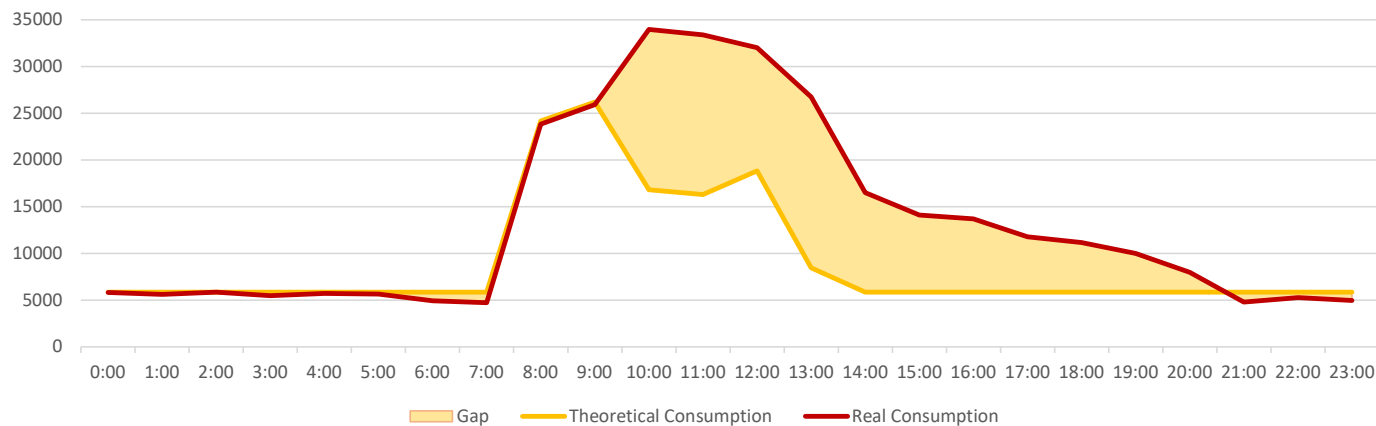
Weather Algorithm



The Graph

Linking all the data and information we searched for, our group was able to create a **daily consumption's graph** - the yellow one - comparing it with the **real one** - the red graph - whose data are recorded by a Smart Meter that send them on an online platform called Energy Sentinel.

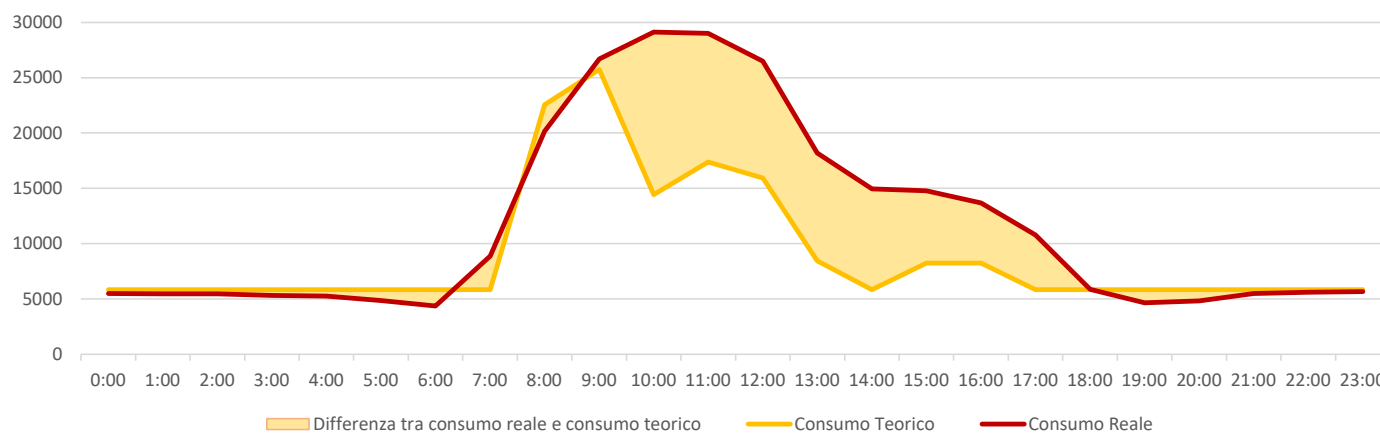
We arranged this comparison for each school day of the two weeks we considered - the first one and the last one of May.



The Graph

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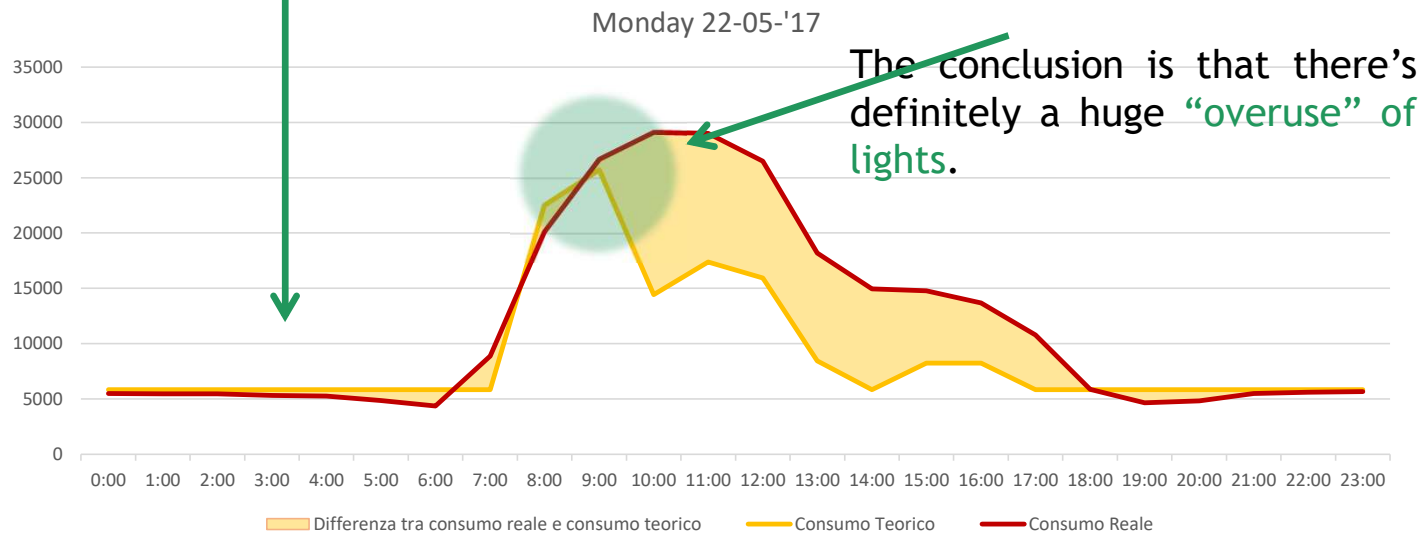
We arranged this comparison for each school day of the two weeks we considered - the first one and the last one of May.



Analysing The Graph

It can be seen how the two graphs are almost overlapped in the permanent consumption zone.

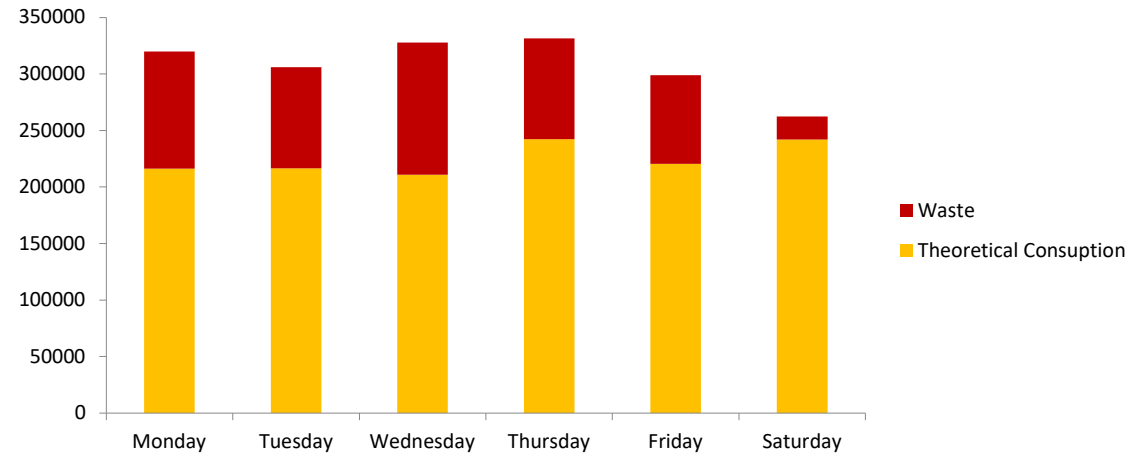
We realized that until 9:00 the two graphs basically follow the same trend - in the stint during which we theoretically “switched off” the lights.



Week Analysis

Day	Real Consumption (Wh)	Theoretical Consumption (Wh)	Waste	Waste Rate	Potential Saving
Monday	319671	216188	103483	32%	20,70 €
Tuesday	305883	216526	89357	29%	17,87 €
Wednesday	327660	210707	116953	36%	23,39 €
Thursday	331355	242200	89155	27%	17,83 €
Friday	298963	220389	78574	26%	15,71 €
Saturday	262364	241849	20515	8%	4,10 €
Weekly Waste Average				26%	99,61 €

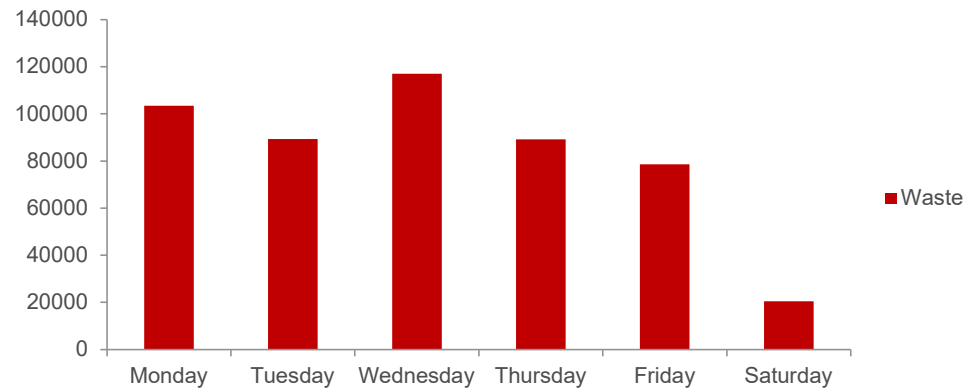
Week Analysis



Even if the theoretical amount of electricity consumed on Saturday is one of the highest, the total consumption is the lowest of the week.



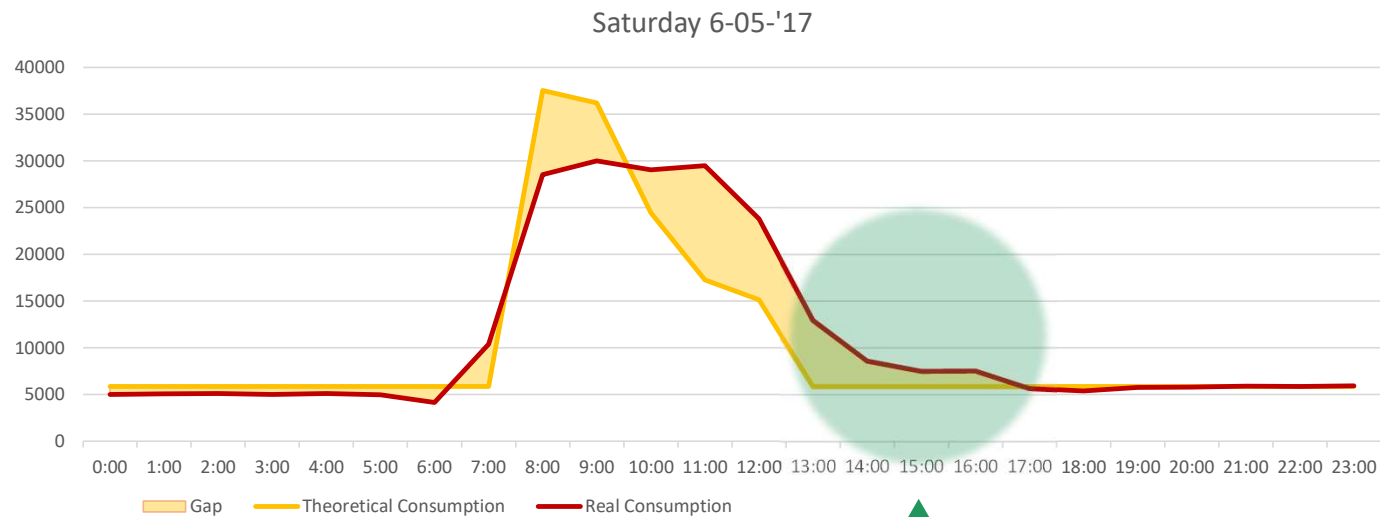
Week Analysis



This phenomenon is determined by the lower waste of energy registered.



Week Analysis



The lower waste is caused by the **lack of activities** during Saturday's afternoons - as the school is usually closed earlier.

Achieving Our Goal

How can we reduce energy waste in our school?

Is there a plan to follow in order to save money?

The last step is now setting a realistic saving plan – improved in order to cut off the waste registered.

We are looking forward to promote a kind of “Guerrillia Marketing Plan” in our school. That strategy is basically based on several low-cost actions - which swiftly attract interests of different users.

Anyway, we are assured that any project to carry out in our school must follow three essential points:

- · Reduce consumption significantly
- · Make users enjoy and believe the project itself
- · Durable effects

Applied Examples

We hang some posters on the hall walls that reminds to save energy

- ✓ ● Reduce consumption significantly
- ✓ ● Make users believe and enjoy the project itself
- ✗ ● Durable effects

Tell students the importance of saving energy during a “students assembly”

- ✗ ● Reduce consumption significantly
- ✓ ● Make users believe and enjoy the project itself
- ✗ ● Durable effects

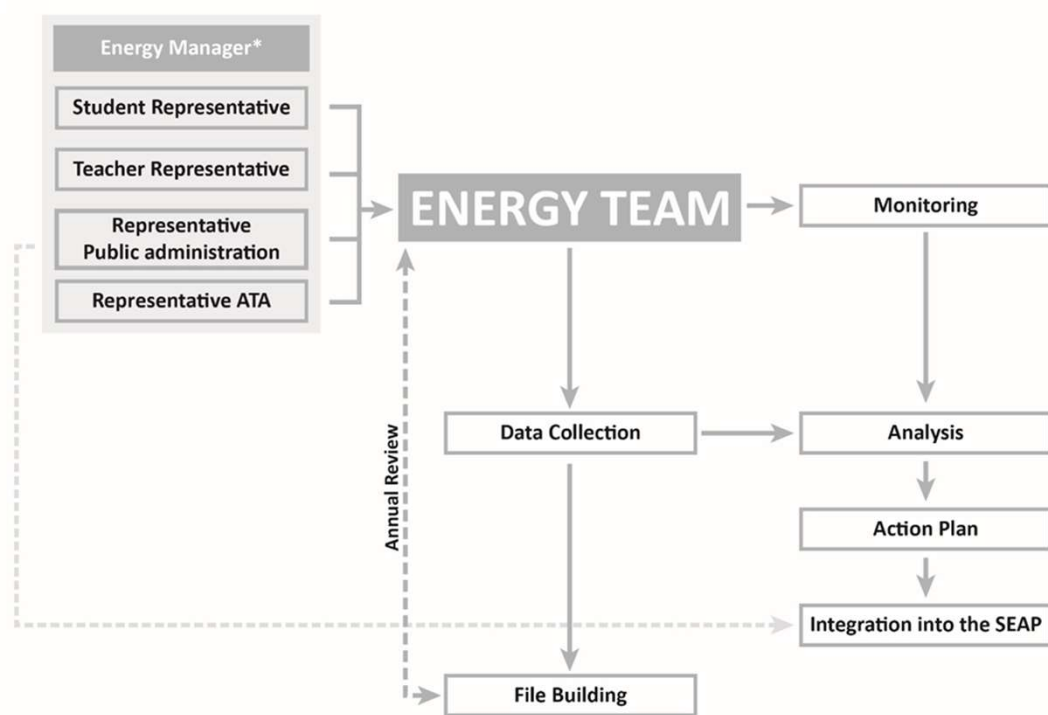
The head teachers removes the vending machines forever

- ✓ ● Reduce consumption significantly
- ✗ ● Make users believe and enjoy the project itself
- ✓ ● Durable effects

Organize an “energy team” which cares about school consumption and the ways to reduce it

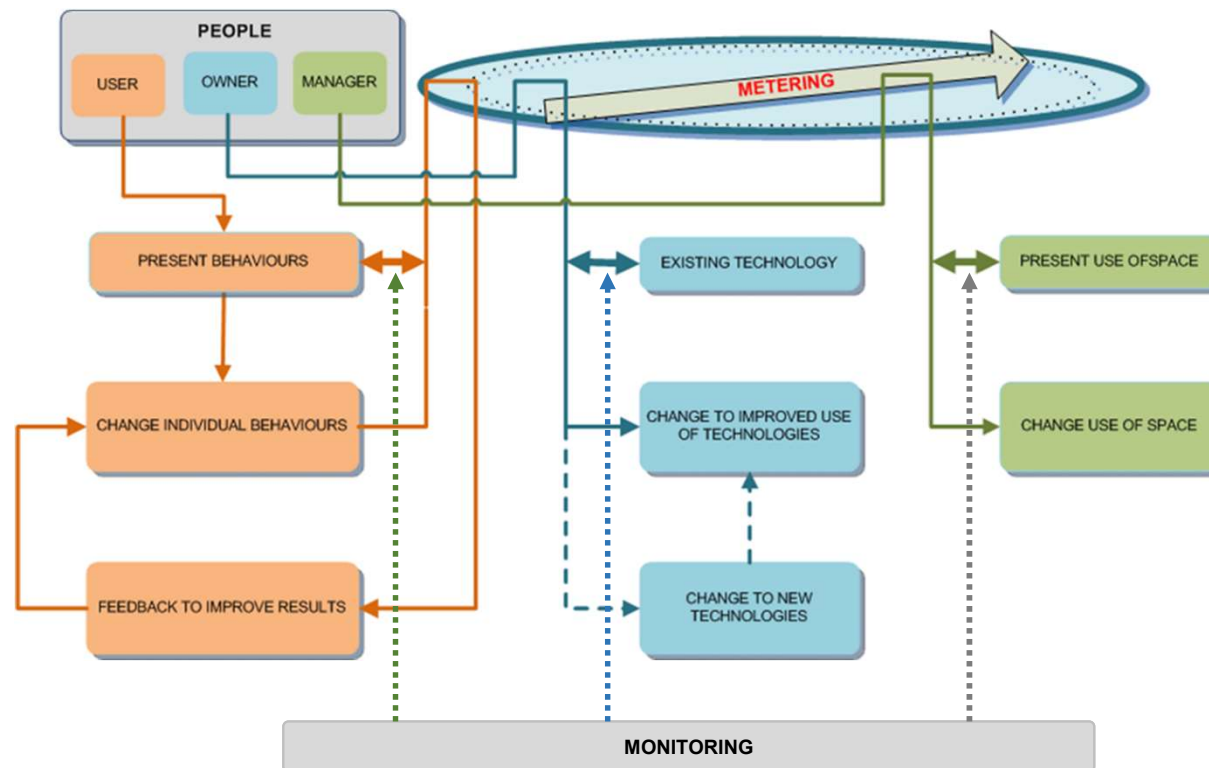
- ✓ ● Reduce consumption significantly
- ✓ ● Make users believe and enjoy the project itself
- ✓ ● Durable effects

Energy Action Plan

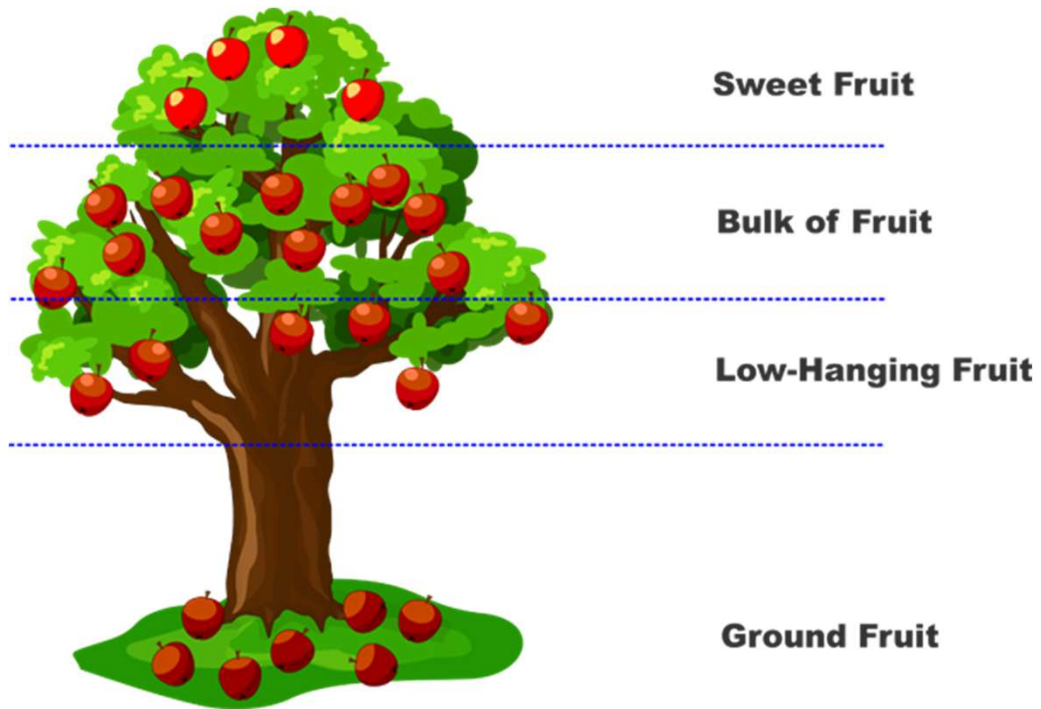


*In the absence of an Energy Manager this role will be covered by the Representative of Public Administration

Energy Action Plan (re-designed)



The tree of Energy Efficiency



And a final remark from a truly Mediterranean Philosopher



Non est ad astra mollis e terris via
There is no easy way from the earth to the stars

Lucius Annaeus Seneca

Thanks for your attention!

CONTACTS:

Antonio Zonta

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Interreg
Mediterranean



EduFootprint

Project co-financed by the European
Regional Development Fund





School Low Carbon Footprint in
Mediterranean cities



SEACAP 4 MED training

***School Environmental Footprint Guidelines
EduFootprint Platform***

October 11th 2022

Antonio Zonta

To know something about EduFootprint, let's start with a journalistic approach

Who

What

Where

When

Why



What

EduFootprint is a project aiming at introducing a new, unconventional way of measuring and managing **energy** and **environmental** resources in **school buildings** and **school activities**

What


Traditional approach:

- Aiming at Energy Efficiency through reduction of Direct Energy Consumption
- Measure Energy Consumption
- Implement actions to minimize Energy Consumption



EduFootprint approach:

- Aiming at Energy & Environmental Efficiency through reduction of Direct & Indirect Energy Consumption
- **Measure** Direct Energy Consumption
- **Calculate** (the effects of) Direct & Indirect Energy Consumption
 - Carbon Footprint
 - Environmental Footprint

EduFootprint calculator 										
RESULTS BY AREA: School's Environmental Footprint										
TOTAL	Total primary energy (kWh)	Climate change (kg CO2 eq)	Ozone depletion (kg CFC-11 eq)	Freshwater ecotoxicity (CTUe)	Human toxicity, cancer (CTUh)	Human toxicity, non-cancer (CTUh)	Particulate matter (kg PM2.5 eq)	Ionizing radiation (Sv)	Photochemical smog (kg NO2 eq)	Acidification (kg SO2 eq)
TOTAL	57,426.31	4,568.97	0.00	5,315.54	0.00	0.00	1.02	276.67	5.87	
BUILDING CONSUMPTION		4,568.97	0.00	5,315.54	0.00	0.00	1.02	276.67	5.87	
ELECTRIC ENERGY	1,176.65	0.00	0.00	0.00	0.00	0.00	0.43	104.08	2.35	
THERMAL ENERGY	3,320.89	0.00	0.00	0.00	0.00	0.00	0.56	62.10	3.36	
WATER CONSUMPTION	71.48	0.00	0.00	0.00	0.00	0.00	0.03	10.49	0.16	

Why

The final purpose of **EduFootprint** is to raise awareness among the students, managers and building owners about the need of a responsible use of **energy** and **environmental** resources in **school buildings** and **school activities**

When



Project developed
between end 2015
and beginning
2016

- Start project activities: November 2016
- End: May 2019

Who

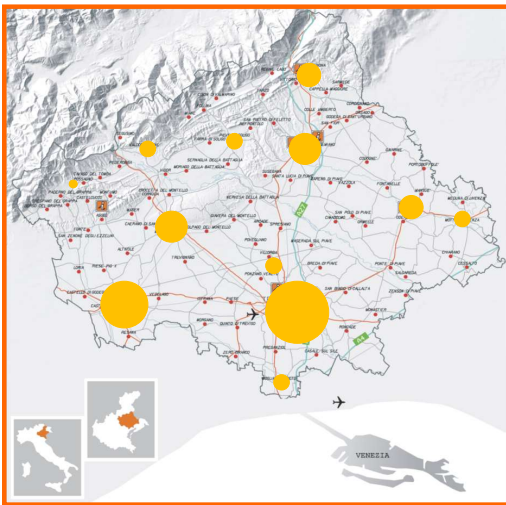
- Province of Treviso
- Ambiente Italia
- Rete ISIDE



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The General Context of the Province of Treviso



Province in figures

- Inhabitants: 887.420
- Surface: 2.476,68 kmq
- Density: 358,65 ab/kmq
- 8th most populated province in Italy and 10th more densely populated
- 95 municipalities

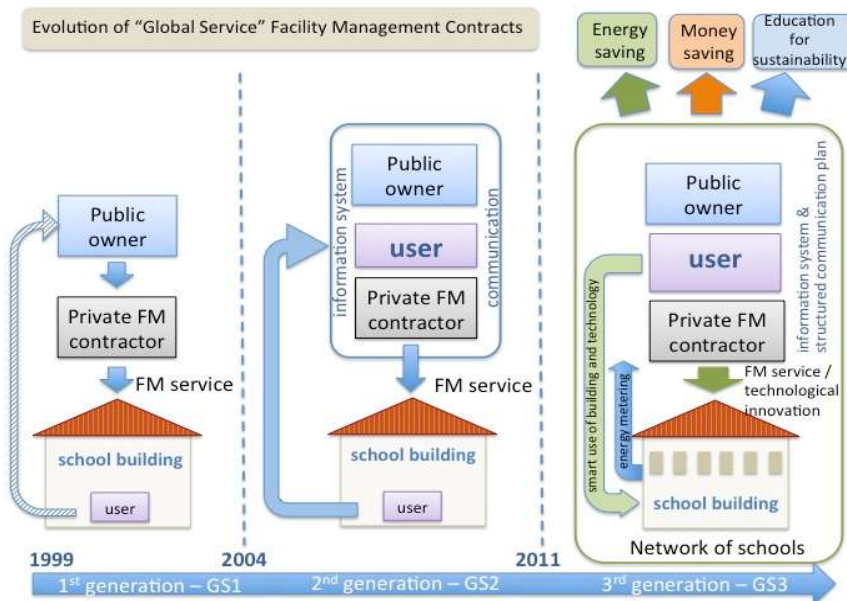
The General Context of the Province of Treviso

The Province of Treviso's building stock profile					
Typology of buildings	Number of buildings	Surface (sqm)	Thermal energy [GWh/year] 2009/2010	Thermal energy [GWh/year] 2014/2015	Users
School buildings	132	454.000	34.5	25.0	41,000
Institutional buildings	18	24.600	2.5	1.8	600
Total	150	478.600	37.0	26.8	41,600

The school buildings belong to **37 schools**, disseminated in **13 municipalities**



The Operation & Maintenance and Energy Management Procedures



The O&M and EM procedures were based on 3 consecutive Facility Management contracts including progressively higher involvement of users

The 3rd Generation of the Global Service Contract

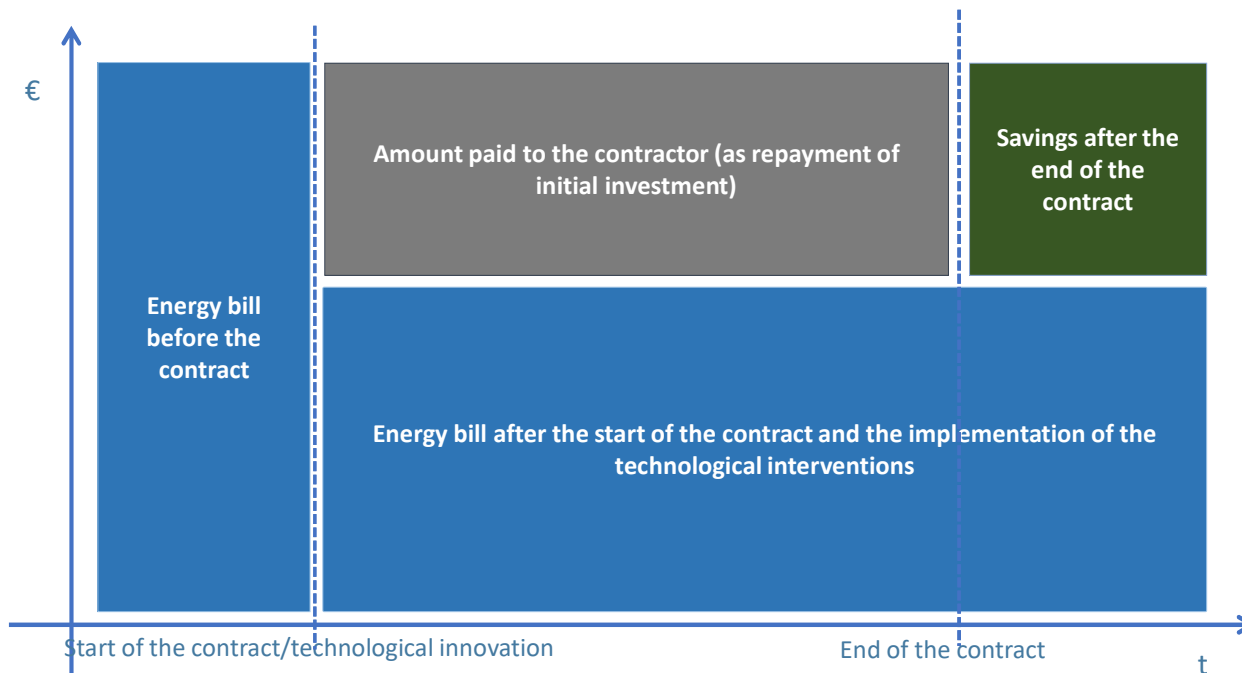
The most important effort to achieve energy efficiency was made with the 3rd Generation Contract (2011 – 2018), designed on an Energy Performance Contract scheme.

The scheme was structured on two main categories of tools:

- Technological
- Social
 - Behaviours
 - Space/time management

What is an Energy Performance Contract in a nutshell

TOGETHER



Energy Metering as a means to engage people

- People engagement requires a **motivating goal**
- Setting a goal requires Metering
- Motivation requires a continuous feedback on the effectiveness of the actions undertaken to achieve the pre-defined goal
- The use of technologies for real-time, high-resolution energy metering is a fundamental tool to engage people in energy saving activities



Importance of Energy Metering in the relationship between Building Owner and Contractor

Analytical DSM: The availability of Real-time, Hi-Res energy data provides to both parties of the contract a powerful tool to check the effectiveness of investments and O&M activities, for **early detection** of deviations from the pre-set goals.



From Analytical DSM to Behavioural DSM

- The availability of high-resolution & real-time data on energy consumption (both thermal and electric) provides feedback to users on the effectiveness of their actions,.
- As final users contribute through personal behaviour to the overall result, a new category of DSM – Behavioural DSM - can be introduced
- A smart metering system and dashboard displays have been installed in each school building to provide users with real-time evidence of the energy consumption level



Tools for the involvement of external users

The involvement of the external users
(Students, Teachers, School staff, Headmasters)
relies on specifically developed tools:

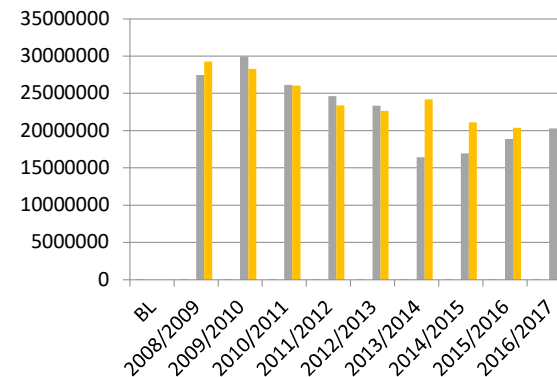
- Green Schools Competition, a contest among Schools to promote sustainable behaviours
- EU Funded Initiatives:
 - Interreg Central Europe TOGETHER
 - Interreg Mediterranean EduFootprint
 - Interreg Europe INTENSIFY



Macro Results

Results achieved with the Energy Performance Contract:

- Since positive results emerged also from buildings where no significant technological improvements were made, it is to be supposed that technological investments alone cannot justify the overall savings, and a contribution from management and behaviour needs therefore to be considered.

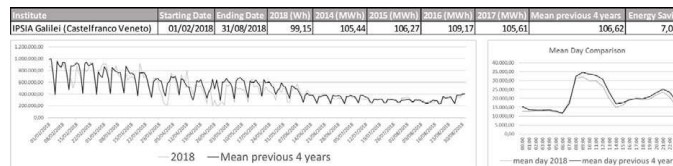
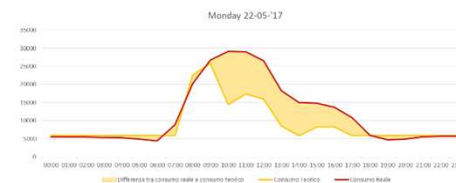


Micro Results

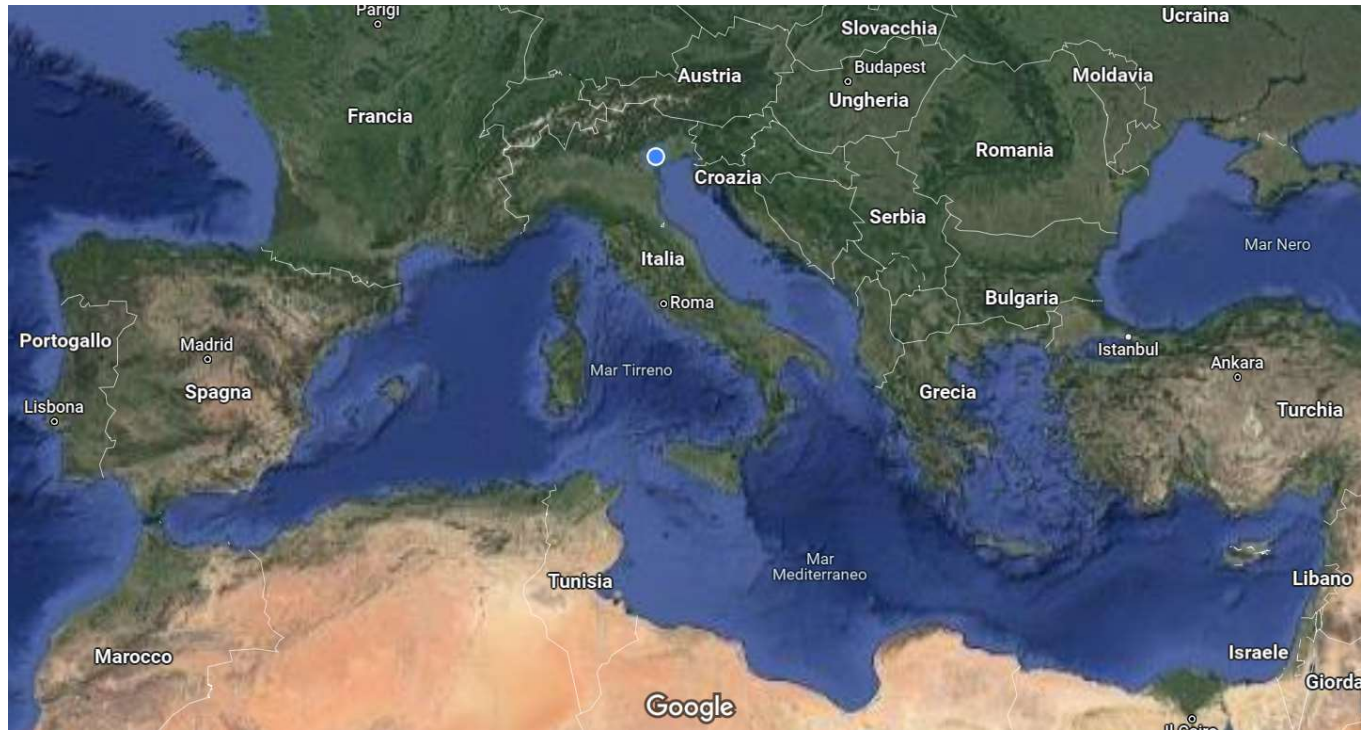
Besides results at a macro level, important achievements were registered thanks to the «living lab» approach at the level of the single Schools:

- Energy consumption theoretical model
- Energy Waste detection
- Measurement of savings

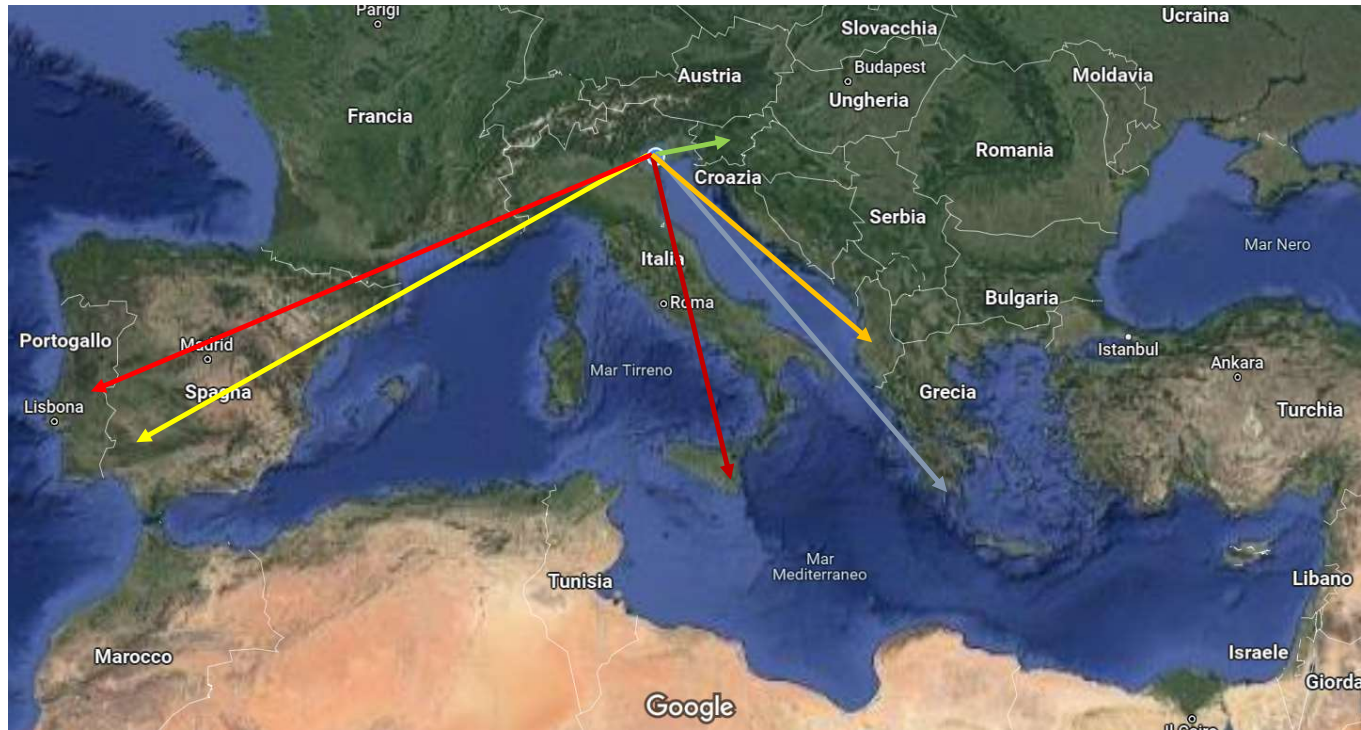
Location	Device	Power Consumption (W)	Usage	Number of units	Daily Consumption (KWh/Day)
Special classrooms	Apple TV	1,5	24\7	2	0,1
	Router Apple	8	24\7	2	0,4
Servers room	Server + PC	100	24\7	9	21,6
	Switch HP	795	24\7	1	19,1
	Switch Tp-Link	11,2	24\7	3	0,8
	Mac (Server)	100	24\7	2	4,8
	Condizionatore	960	24\7	1	20,6
Vending Machines	Necta Astra (caffè)	142	24\7	1	3,4
	Necta Samba (bibite e snacks)	630	24\7	4	60,5
	Necta Canto (caffè)	175	24\7	2	8,4
Chemistry Laboratory		14		1	0,3
Infirmary	Frigorifero IGDIS	25	24\7	1	0,6



Where



Where



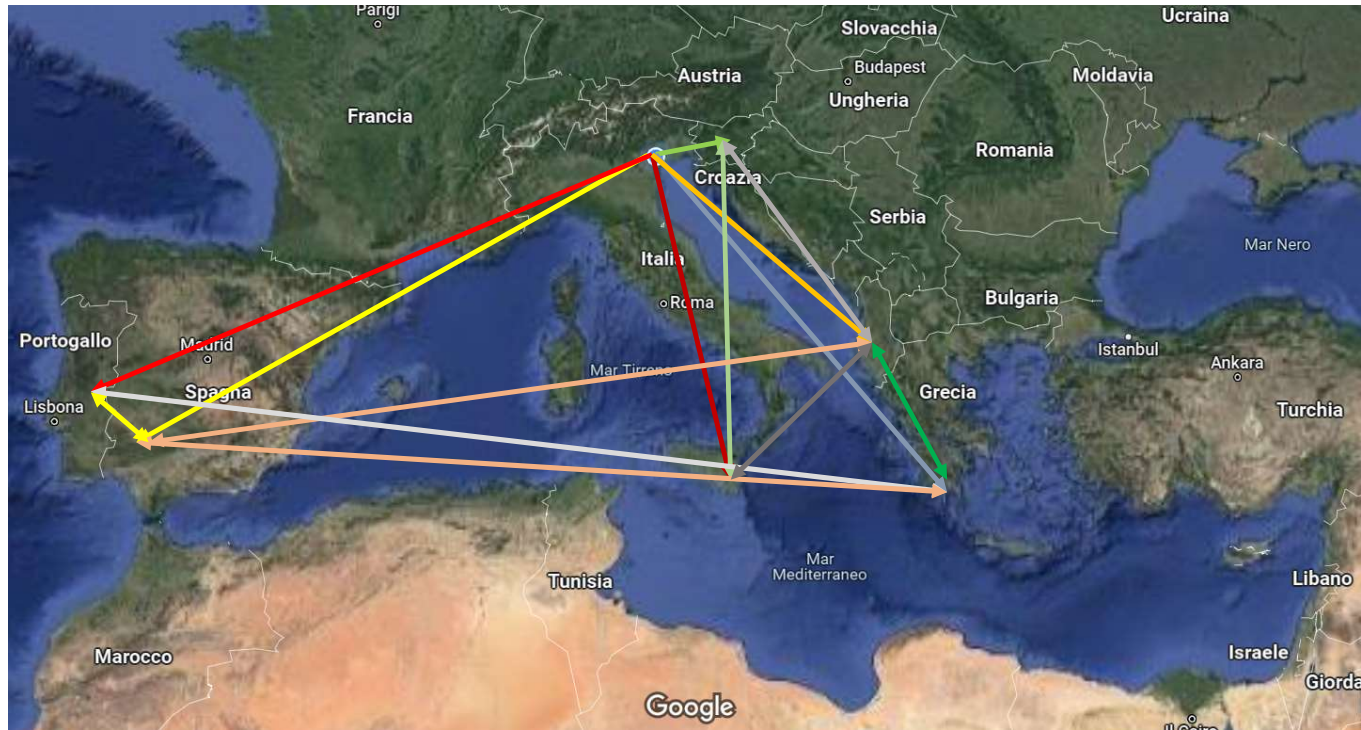
Who

- Province of Treviso
- Ambiente Italia
- Rete ISIDE
- Regional Energy and Environment Agency from North Alentejo, AREANATEjo, Portalegre
- Institute for Innovation and Development of University of Ljubljana, IRI UL
- Centre EuroMediterranean for the sustainable Development Svi.Med. onlus
- Pashko Institute, Tirana
- EGTC Efxini Poli – SolidarCity NETWORK, POLIS, Athens & Peloponnese
- Official College of Industrial Engineers of Western Andalusia, COIIAOC

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Where



Project Identity card

- Start: November 2016
- End: May 2019
- co-financed by the Interreg MED Programme:
 - ✓ € 1.200.684,75
 - ✓ **FESR**: € 934.839,99
 - ✓ **IPA**: € 85.742,05
- It is one of the 10 modular projects dealing with the energy efficiency and collaborating in the thematic community **Efficient Buildings** created in the frame of **MED Programme**. The thematic community is coordinated by the horizontal MEDNICE project (MED programme Networks for an Innovative Cooperation in Energy efficiency).

Project co-financed by the European
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Project rationale



EduFootprint intends to **raise capacity of owners and managers of public buildings for better management of energy**; considering not only the direct energy impacts of buildings (consumption), but also the indirect ones (use and consume of water, paper, food, cleaning, mobility, waste)

Activities concentrated in the **test and transferability** of an integrated energy strategy with a Life Cycle Assessment (LCA) approach in schools, consisting in the elaboration and implementation of energy efficient practices integrated with local Sustainable Energy Action Plans (SEAPS).

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Target group

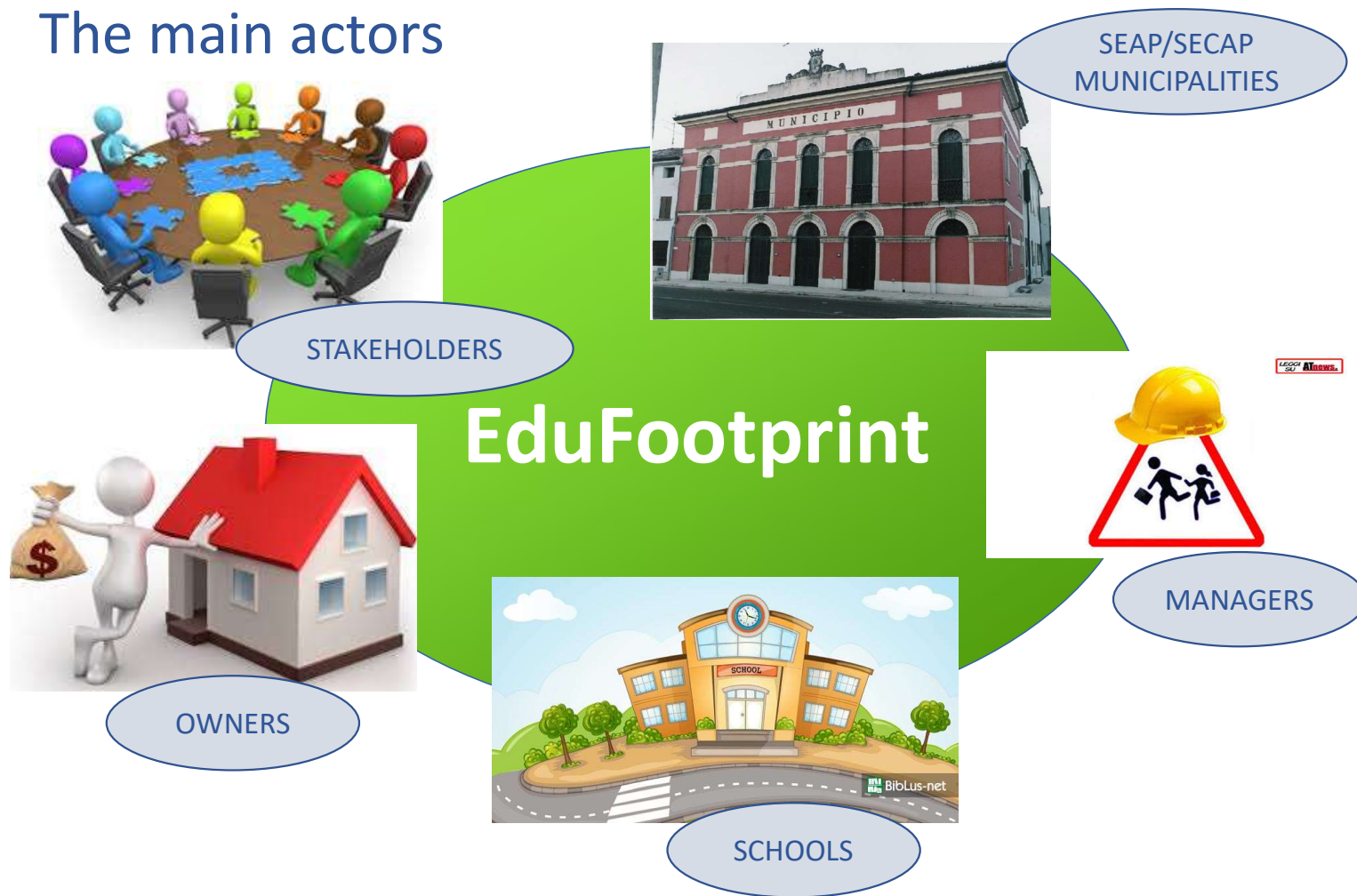
- ✓ Project partners
- ✓ Energy managers of the public buildings
- ✓ School communities (administrative staff, teachers, students and families)
- ✓ School and university building owners
- ✓ National, regional and local authorities



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The main actors



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EduFootprint: a testing project

The activities have been carried out in 7 pilot areas Alentejo , Veneto, Sicily , Andalusia, Ljubljana, Peloponnese , Albania, involving:

- 62 school buildings (kindergartens, primary schools , lower high schools, upper high schools and University)
- 22 SEAP municipalities
- 1 SEAP union of municipalities



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Methodology



Based on some tools ***to evaluate the carbon footprint in the schools:***

- A **calculator**, accompanied by a **Guideline** for the environmental footprint of the schools for the owners and managers
- A **pre-defined group of actions** to reduce the footprint
- **Monitoring of the effects** of the implemented activities and the possible reduction of the environmental footprint in the schools

Aim of the methodology:

- Elaboration and adoption of the practices for the energy efficiency, structured in a **School Energy Plan**
- Integration of the School Energy Actions in the **SEAPs** /SECAPs
- Support to the local authorities to better link the school activities and the SEAP/SECAP's actions.

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from the schools....

1. **“TRAINING FOR TRAINEES”**: webinars for the responsables of the local training;

2. **“LOCAL TRAINING”**: for those who locally implemented the activities in the pilot areas (use of the calculator, how to create the plans to improve the energy efficiency of the school buildings - considering the direct and indirect consumption);

3. **USE OF THE CALCULATOR** (2016 - 2017 school baseline)

4. identification of the hot spots and realisation of the **SCHOOL ENERGY PLANS** with the implementation the necessary actions to reduce the energy consumption and the carbon footprint in the school buildings

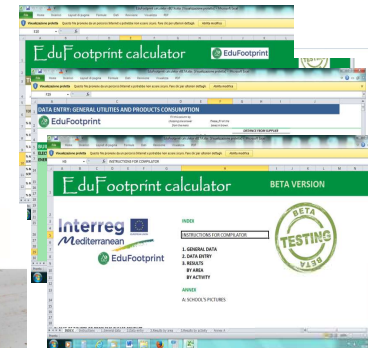
5. **RE CALCULATION**

EDUFOOTPRINT ENERGY ACTION PLAN				UPDATING (31/12/17)	
Name of the organization	SM Municipality of Postoma	Country	Treviso - Italy		
#	Objectives	Actions (general description)	Performance indicators	Time	Responsible
1	Monitoring water use and consumption	Collect data and measuring	Water consumption	12/17-02/18	Energy management
2	Reducing water consumption	Monitoring water consumption in the common indoor bathrooms and in the gym. Organization of education activities and a project to reuse of rainwater for non-potable use. Education and training activities on change behaviour to promote environmental improvement.	Water consumption	12/17-02/18	Energy management team
3					
4					
5					
6					



School Low Carbon Footprint in Mediterranean cities

Deliverable 3.2.1
School Environmental Footprint
Guidelines (SEFGs)



School Low Carbon Footprint in Mediterranean cities

Deliverable 3.3.3
EduFootprint Competition
Award Rules



to the territory.....

- 1. MEETING WITH THE SEAP MUNICIPALITIES:**
information about the project progress. The initial meetings have been organised in the municipality headquarters while the feedbacks have been done in the pilot schools that have been able to show their project activities;
- 2. INVOLVEMENT OF THE STAKEHOLDERS:**
informative workshop about the project, newsletters, info etc.



Interreg
Mediterranean
Project co-financed by the European
Regional Development Fund
EduFootprint



School Low Carbon Footprint in Mediterranean cities

Deliverable 3.3.2
Guideline for energy efficiency
monitor and management in
public Buildings



The final commitment

MUNICIPALITY OF TREVISO_6 schools
MUNICIPALITY OF SILEA_1 school
MUNICIPALITY OF PAESE_1 school
MUNICIPALITY OF CAERANO SAN MARCO_1 school
MUNICIPALITY OF VALDOBBIADENE_1 school
MUNICIPALITY OF GODEGA DI SAN URBANO_1 school
MUNICIPALITY OF CASTELFRANCO_2 school
MUNICIPALITY OF CONEGLIANO_1 school

ACTION N° XX		Action plan for the reduction of the environmental footprint of the school "I.C. Marco Polo" developed within the European project EDUFOOTPRINT																																																					
OBJECTIVE	Building an Action Plan to reduce the environmental footprint of school buildings starting from the direct involvement of students and teachers in activities aimed at reducing: thermal energy, electricity, water, mobility, waste, food and consumer goods																																																						
PLACE	Secondary school "Marco Polo"	AREA OF INTERVENTION	Behavioural changes																																																				
SECTOR	Municipal buildings/equipment facilities	POLICY	Awareness raising training																																																				
DESCRIPTION	Among the possible intervention areas for the reduction of environmental footprint faced by EDUFOOTPRINT European project (thermal energy, electricity, water, mobility, waste, food and consumer goods) the school decided to focus on waste, carrying out an activity aimed at increasing the knowledge on the differentiation of the materials of which the waste is composed and consequently on the correct comportment according to the collection methods adopted by the school. The activity, carried out by all the classes and with the involvement of all the school subjects with the support of the teachers and the supervision of a teacher of Rete Iride (one of the EDUFOOTPRINT partners), has foreseen: a monitoring of the quantity of the waste produced in the classroom and in internal and external common areas; the publication of reports on the progress of waste collection; a work of analysis and design of the collection points to suit the school and pupils; the organization of activities aimed at reusing materials for the creation of new products; the awareness and information campaigns aimed at the whole school, including the realization of a story telling video. The Municipality supported the activity by hosting in the public library the final exhibition of the reuse products created by the students, taking up the slogan of the project "No waste is normal". Furthermore, it has inserted a page dedicated to EDUFOOTPRINT and the school's activity on its website. The EDUFOOTPRINT activity involved a calculation of the school's environmental footprint at the beginning of the project (B1 2015-2016 considered as the base year) and one at the end of the project (B1 2017-2018). To analyse the results in terms of CO ₂ of the activities carried out, it is specified that the calculation of the CO ₂ obtained with the use of the EDUFOOTPRINT calculator is based on the LCA method. More information on www.edufootprints.innogy.net/en																																																						
	<table><tr><th>Indicator (EDUFOOTPRINT calculator)</th><th>B1 2015-2016 (CO₂ eq)</th><th>B1 2017-2018 (CO₂ eq)</th></tr><tr><td>Building direct consumption (electricity, thermal energy, water)</td><td>600 kg</td><td>600 kg</td></tr><tr><td>Goods consumption (paper, office products, bath and cleaning products, instrumentation, laboratory chemicals, gardening)</td><td>600 kg</td><td>600 kg</td></tr><tr><td>Mobility (school vehicles, home-school mobility, educational tours)</td><td>600 kg</td><td>600 kg</td></tr><tr><td>Food (canteen, bar, vending machines)</td><td>600 kg</td><td>600 kg</td></tr><tr><td>Waste (garbage, waste water)</td><td>600 kg</td><td>600 kg</td></tr><tr><td>Total</td><td>600 kg</td><td>600 kg</td></tr><tr><td>CO₂ reduction</td><td>600 kg</td><td>600 kg</td></tr></table>						Indicator (EDUFOOTPRINT calculator)	B1 2015-2016 (CO ₂ eq)	B1 2017-2018 (CO ₂ eq)	Building direct consumption (electricity, thermal energy, water)	600 kg	600 kg	Goods consumption (paper, office products, bath and cleaning products, instrumentation, laboratory chemicals, gardening)	600 kg	600 kg	Mobility (school vehicles, home-school mobility, educational tours)	600 kg	600 kg	Food (canteen, bar, vending machines)	600 kg	600 kg	Waste (garbage, waste water)	600 kg	600 kg	Total	600 kg	600 kg	CO ₂ reduction	600 kg	600 kg																									
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CO ₂ reduction	600 kg	600 kg																																																					
PERSONS IN CHARGE	Teachers, Rete Iride (EDUFOOTPRINT Partner)	PERSONS INVOLVED	Teachers, students, ATA staff (administrative, technical and auxiliary), Municipality, Province, Waste management company (Comieco s.p.a.)																																																				
TIMELINE	<table><tr><th></th><th>2015</th><th>2017</th><th>2018</th><th>2019</th><th>2020</th></tr><tr><td>CALCULATION METHODOLOGY</td><td colspan="5">The calculation methodology is based on the EDUFOOTPRINT calculator, an environmental footprint calculation tool developed within the EDUFOOTPRINT project</td></tr><tr><td rowspan="3">MAIN RESULTS</td><td colspan="2">% OF IMPLEMENTATION</td><td colspan="3">Completed - 100%</td></tr><tr><td colspan="2">INTERACTION</td><td colspan="3">Action INF-01</td></tr><tr><td colspan="2">Energy from RES (MWh)</td><td colspan="3">N/A</td></tr><tr><td rowspan="2">FUNDINGS</td><td colspan="2">Energy saving (MWh)</td><td colspan="3">N/A</td></tr><tr><td colspan="2">Emissions reduction (CO₂)</td><td colspan="3">N/A</td></tr><tr><td rowspan="2">MONITORING</td><td colspan="2">INTERREG MEDITERRANEAN 2014-2020 European Programme</td><td colspan="2">COSTS</td><td>Rete Iride tutoring and equipments purchasing € 5.000</td></tr><tr><td colspan="5">Monitoring can be performed using the EDUFOOTPRINT calculator which calculates the environmental footprint</td></tr></table>						2015	2017	2018	2019	2020	CALCULATION METHODOLOGY	The calculation methodology is based on the EDUFOOTPRINT calculator, an environmental footprint calculation tool developed within the EDUFOOTPRINT project					MAIN RESULTS	% OF IMPLEMENTATION		Completed - 100%			INTERACTION		Action INF-01			Energy from RES (MWh)		N/A			FUNDINGS	Energy saving (MWh)		N/A			Emissions reduction (CO ₂)		N/A			MONITORING	INTERREG MEDITERRANEAN 2014-2020 European Programme		COSTS		Rete Iride tutoring and equipments purchasing € 5.000	Monitoring can be performed using the EDUFOOTPRINT calculator which calculates the environmental footprint				
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EDUFOOTPRINT METHODOLOGY

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Index

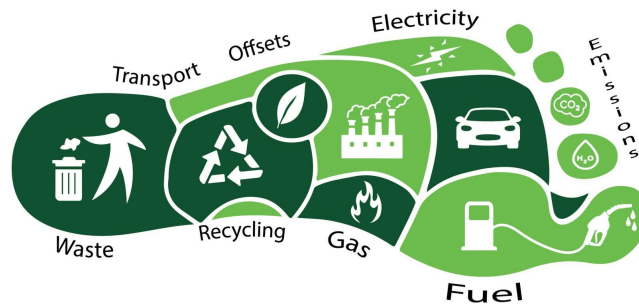
- What's environmental footprint and LCA approach?
- Phases of an OEF in educational organisation
- Definition of “organisation” (unit of analysis) and system boundaries
- Data collected
- Tool: Edufootprint calculator
- EduFootprint Calculation: First results

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What's the environmental footprint?

“...a **measure** that, based on various criteria, indicates the **environmental performance** of a product or a service...”



“ ... based on **Life Cycle Assessment** approach...”

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Why calculate the environmental footprint?



**To check impacts related
to resource
consumption
(energy, water,
materials)**

**To adopt solutions
that allow a more
efficient use of
resources**

**To obtain economic
advantages (cost reduction)
and social benefits
(responsible behaviour)**

Interreg
Mediterranean



EduFootprint

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LIFE CYCLE ASSESSMENT approach



The reference methodology is the Environmental Footprint defined by the European Commission in [Recommendation 2013/179/EU](#) of 9 April 2013 on the use of common methods to measure and communicate **the life cycle environmental performance of products and organisations (PEF and OEF)**.

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Another way to represent LCA approach



What does organisation mean (unit of analysis)?



It is requested to provide a measure of the potential pressures (energy and resource consumption) related to the service offered by schools.

In EduFootprint Project the unit of analysis is the student who attended the school (or other educational organisation) to receive the educational service

Unit of measurement: **one student (or child, or pupil) registered in one school or educational organisation in one year**

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Definition of organisation

DIRECT
ACTIVITIES for...

Technological
(heating,
cooling, etc)



Lunchroom,
meals,
catering



Lab devices



Operating &
maintenance,
cleaning



TEACHING, EDUCATING, TRAINING

- in classroom
- in lab
- others (study trips, ...)



Support
(management, adm, ..)

INDIRECT
ACTIVITIES for...

Mobility and
transport
(public and
private)



Procurement



Waste
management



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System boundaries

UPSTREAM



CORE

school processes



DOWNSTREAM

waste management



wastewater



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Data collected

- **Electric energy**
 - ✓ EE production for each project target area
 - ✓ Certified clean energy from renewable sources
 - ✓ EE from self-produced renewable energy
 - ✓ EE from district energy
- **Thermal energy**
 - ✓ Fuels for heating
 - ✓ Fuel from renewable sources (biogas, biomass, district heating)
- **Water consumption** (impact from different sources)
- **Paper products**
 - ✓ Office paper
 - ✓ Office recycled paper
 - ✓ Toilet paper
 - ✓ Roll paper towels
- **Stationery products**
 - ✓ Board and plastic folders, toner, cartridge for printers

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Data collected

- **Toilet and cleaning products**
 - ✓ Liquid soap for washing and toilet
 - ✓ Towel hand roll
 - ✓ Chemicals (ammonia, bleach, detergent, etc)
- **Equipment**
 - ✓ PC, laptop
 - ✓ Digital screen
 - ✓ Printer, photocopiers
 - ✓ air-conditioners and refrigerant gas
- **Chemical products in Lab**
- Organic, inorganic substances and chemicals in **gardening**
- **Mobility:**
 - ✓ Fuel consumption for own means
 - ✓ km*pers for home-school means
 - ✓ km*pers for travel excursions

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Data collected

- **Food – canteen** (different impact for each target area)
 - ✓ Impact of menu with meat
 - ✓ Impact of menu without meat
- **Bar products** (snacks, bottles of water, bottles of others drinks, TetraPak drinks, fruits)
- **Snack&food dispensing machines products** (snacks, bottles of water, bottles of others drinks, TetraPak drinks, fruits)
- Collecting, treatment and recycle of **waste** (separated for type) and for each target area (average national impact measurement)
- Wastewater treatment

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EDUFOOTPRINT CALCULATOR

Interreg
Mediterranean



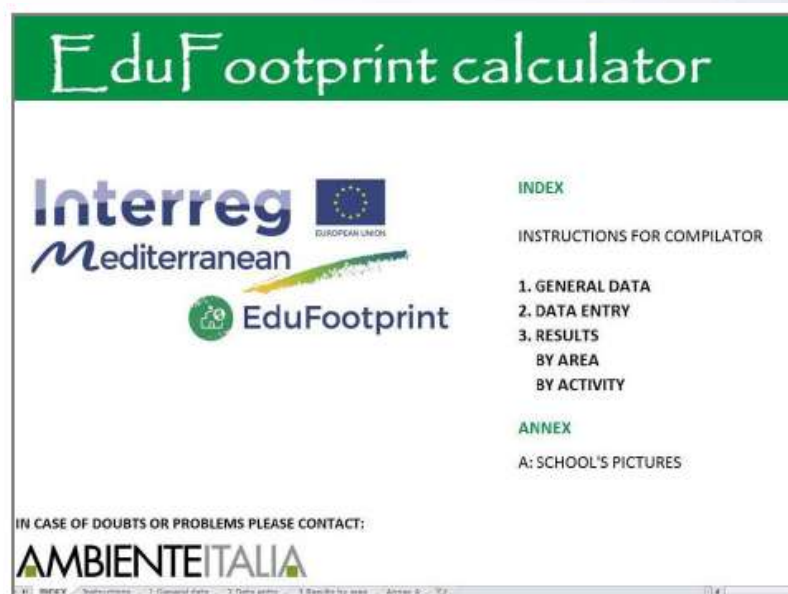
EduFootprint

Project co-financed by the European
Regional Development Fund



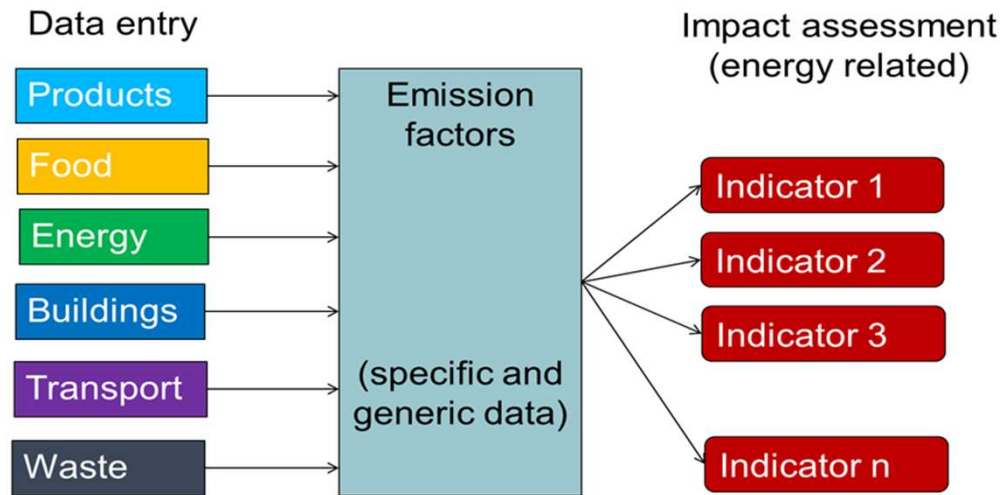
Edufootprint calculator

The calculator measures the consumption of resources and activities carried out in the educational organisation and converts them in the environmental impact. It may help owners and manager of schools/university building to identify the main environmental impacts of everyday activities and implement more sustainable practices. The **EduFootprint Calculator** is based on Microsoft Excel.



Edufootprint calculator: conceptual structure

EDUFOOTPRINT CALCULATOR



Sources of the impact indicators: Ecoinvent 3.4 and specific LCA studies regarding products and services connected with educational service

Table of impacts

Impact categories	Unit of measure	Assessment model
Climate change	kg CO2-eq	GWP 100 years
Ozone depletion	kg CFC-11 eq	EDIP model based on the ODPs of the WMO over an infinite time horizon
Ecotoxicity for aquatic fresh water	CTUe	USEtox model
Human toxicity- cancer effect	CTUh	USEtox model
Human toxicity- non cancer effect	CTUh	USEtox model
Particulate matter / respiratory inorganics	kg PM2,5-eq	RiskPoll model
Ionising radiations - human health effects	kg U235 eq	Human health effect model
Photochemical ozone formation	kg NMVOC	LOTOS-EUROS model
Acidification	Mole of H+ eq	Accumulated Exceedance model
Eutrophication - terrestrial	Mole of N eq	Accumulated Exceedance model
Eutrophication - aquatic freshwater	kg P eq	EUTREND model
Eutrophication - marine	kg N-eq	EUTREND model
Resource depletion - water use	m ³ eq	Swiss Ecoscarsity model
Resource depletion - mineral, fossil & renew.	kg Sb-eq	CML2002 model
Land transformation	kg C deficit eq	Soil Organic Matter (SOM) model

Table of impacts from EU Official Journal

Table 2

Default EF impact categories with their respective EF impact category indicators and EF impact assessment models for OEF studies

EF Impact Category	EF Impact Assessment Model	EF Impact Category Indicator	Source
Climate Change	Bern model - Global Warming Potentials (GWP) over a 100 year time horizon	Tonne CO ₂ equivalent	Intergovernmental Panel on Climate Change, 2007
Ozone Depletion	EDIP model based on ODPs of the WMO over an infinite time horizon	kg CFC-11 equivalent (*)	WMO, 1999
Ecotoxicity – fresh water (!)	USEtox model	CTUe (Comparative Toxic Unit for ecosystems) (!)	Rosenbaum et al., 2008
Human Toxicity - cancer effects	USEtox model	CTUh (Comparative Toxic Unit for humans) (!)	Rosenbaum et al., 2008
Human Toxicity – non-cancer effects	USEtox model	CTUh (Comparative Toxic Unit for humans) (!)	Rosenbaum et al., 2008
Particulate Matter/ Respiratory Inorganics	RiskPoll model	kg PM _{2.5} equivalent (**)	Humbert, 2009

EF Impact Category	EF Impact Assessment Model	EF Impact Category Indicator	Source
Ionising Radiation – human health effects	Human Health effect model	kg U ²³⁵ equivalent (to air)	Dreicer et al., 1995
Photochemical Ozone Formation	LOTOS-EUROS model	kg NMVOC equivalent (***)	Van Zelm et al., 2008 as applied in ReCiPe
Acidification	Accumulated Exceedance model	mol H ⁺ equivalent	Seppälä et al., 2006; Posch et al., 2008
Eutrophication – terrestrial	Accumulated Exceedance model	mol N equivalent	Seppälä et al., 2006; Posch et al., 2008
Eutrophication – aquatic	EUTREND model	fresh water: kg P equivalent marine: kg N equivalent	Struijs et al., 2009 as implemented in ReCiPe
Resource Depletion – water	Swiss Ecoscarcity model	m ³ water use related to local scarcity of water (!)	Frischknecht et al., 2008
Resource Depletion – mineral, fossil	CML2002 model	kg Sb equivalent (****)	van Oers et al., 2002
Land Use	Soil Organic Matter (SOM) model	kg C (deficit)	Milà i Canals et al., 2007

From Recommendation 2013/179/EU - OJEU

In developing qualitative descriptions of potential environmental impacts, the following information sources should be considered:

- OEF and OEFSR-based studies of similar organisations;
- Product Environment Footprint and Product Environmental Footprint Category Rule-based studies for key products provided by the organisations;
- Previous, detailed studies of similar organisations;
- EMAS sectorial reference documents, where these exist for the sector;
- Organisation environmental reporting rules from other initiatives/ schemes;
- Environmental Impact of Products (EIPRO) and Environmental Improvement of Products (IMPRO) studies for products provided by the Organisation;
- Environmental Key Performance Indicators for sectors, as reported by DEFRA (<http://archive.defra.gov.uk/environment/business/reporting/pdf/envkpi-guidelines.pdf>);
- Other peer-reviewed literature.

For the availability of environmental data worldwide

Publisher of the world's
most consistent & transparent
life cycle inventory database

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ecoinvent version 3.8

Focusing on user comfort, ecoinvent 3.8 includes enhanced documentation and expands the sectorial coverage of the ecoinvent database with around 360 new and 700 updated datasets.

[Learn more about ecoinvent 3.8](#) →

3.8

Edufootprint calculator: data entry

The **main worksheet** is “**Data entry**” where all data must be filled in to allow the automatic calculation of the environmental footprint.

DATA ENTRY: GENERAL UTILITIES AND PRODUCTS CONSUMPTION								
EduFootprint		Fill this column by choosing one answer from the menu		Please, fill all the boxes in brown				
		AVAILABLE DATA?	Unit of measure	DATA	DISTANCE FROM SUPPLIER			NOTES
					(km by truck)	(km by train)	(km by ship)	
BUILDING CONSUMPTION								
ELECTRIC ENERGY	Electricity consumption from network	Yes	kWh	2.311,00	-	-	-	
	Country where the school is		-	Italy	-	-	-	
	Electricity consumption from network: just certified clean energy from renewable sources	Not applicable	kWh		-	-	-	
	...percentage produced by solar power (thermal, photovoltaic, concentrated)		%		-	-	-	
	...percentage produced by hydroelectric power		%		-	-	-	
	...percentage produced by wind power		%		-	-	-	
	...percentage produced by geothermal energy		%		-	-	-	
	...percentage produced by biofuels		%		-	-	-	
	...percentage produced by the renewable part of waste		%		-	-	-	
	...percentage produced by other sources (please, specify in Notes)		%		-	-	-	
	Electricity consumption from self-produced renewable energy	Yes	kWh	450,00	-	-	-	
	...percentage produced by solar power (thermal, photovoltaic, concentrated)	Yes	%	450,00	-	-	-	
	...percentage produced by hydroelectric power	Not applicable	%		-	-	-	
	...percentage produced by wind power	Not applicable	%		-	-	-	
	...percentage produced by biofuels	Not applicable	%		-	-	-	
	...percentage produced by other sources (please, specify in Notes)	Not applicable	%		-	-	-	
	Self-produced energy (not consumed but sold)	Yes	kWh	0,00	-	-	-	
	Electricity consumption [TOTAL]		kWh	2.761,00	-	-	-	
		MJ	9.939,60	-	-	-		

Edufootprint calculator: results by area

In the worksheet "Results by area" it is possible to **check the results of the environmental footprint** of the educational organisation, totally or related to one student.

Results are expressed by all the 15 impact categories defined by the European Commission in the 'Product Environmental Footprint (PEF) Guide' (Annex II to Recommendation (2013/179/EU).

EduFootprint calculator 																
RESULTS BY AREA: School's Environmental Footprint																
TOTAL	Total primary energy MJ	Climate change kg CO ₂ e	Ozone depletion kg CFC-11eq	Freshwater ecotoxicity CTUe	Human toxicity, cancer CTUh	Human toxicity, non-cancer CTUh	Particulate matter kg PM _{2.5} e	Ionizing radiation Hh kBqU235eq	Photochemical ozone formation kg NMVOCe	Acidification mole H+eq	Terrestrial eutrophication mole Neq	Freshwater eutrophication kg Peq	Marine eutrophication kg Neq	Water resource depletion m ³ water eq	Mineral, fossil & non resource kg Sb eq	Land use kg C deliv
TOTAL	57,426,31	4,568,97	0,00	5,315,54	0,00	0,00	1,02	276,67	5,87	17,33	14,21	0,49	1,41	55,16	0,01	393,61
BUILDING CONSUMPTION		4,568,97	0,00	5,315,54	0,00	0,00	1,02	276,67	5,87	17,33	14,21	0,49	1,41	55,16	0,01	393,61
ELECTRIC ENERGY		1,176,65	0,00	3,081,27	0,00	0,00	0,43	184,08	2,35	5,00	7,63	0,31	0,76	10,95	0,00	292,23
THERMAL ENERGY		3,320,89	0,00	1,754,32	0,00	0,00	0,56	62,10	3,36	10,89	6,03	0,12	0,59	0,50	0,00	48,67
WATER CONSUMPTION		71,43	0,00	480,15	0,00	0,00	0,03	30,49	0,16	0,43	0,56	0,06	0,06	43,71	0,00	52,71



Calculator results

- EduFootprint calculator results of Environmental footprint impact:

Baseline vs. s.y. 2017/2018

- **Carbon footprint (kg CO₂eq per student)**
- Particulate matter (kg PM_{2.5} eq)
- Acidification (molc H⁺ eq)
- Water resource depletion (m₃ water eq)

These are the indicators the Partners decided to analyse because they are the most known and most easily communicable

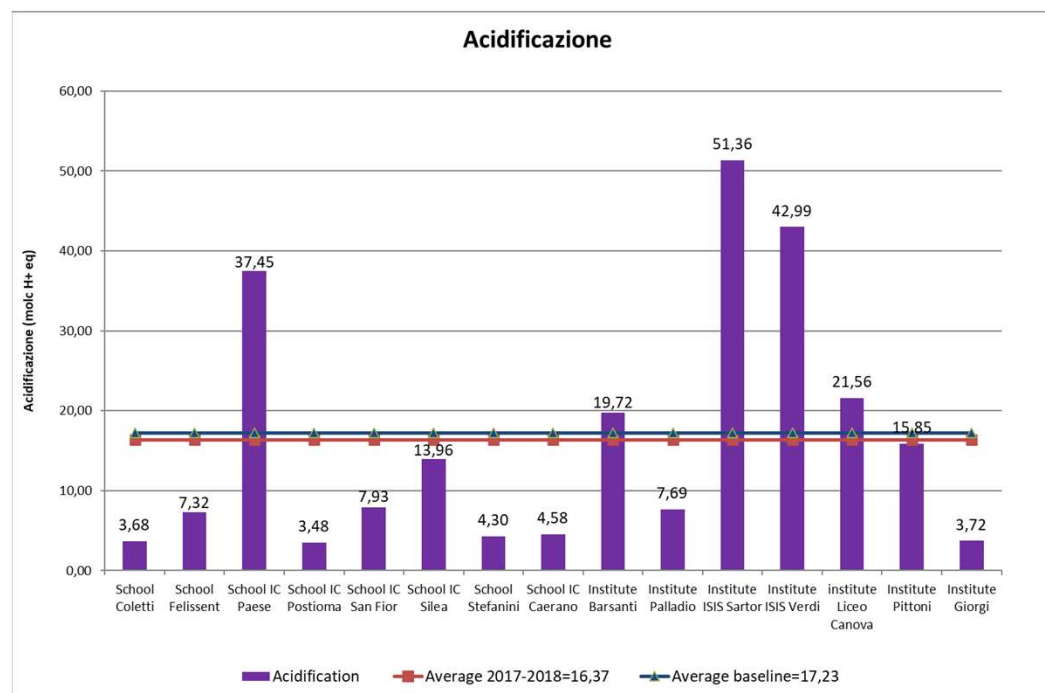
Interreg
Mediterranean

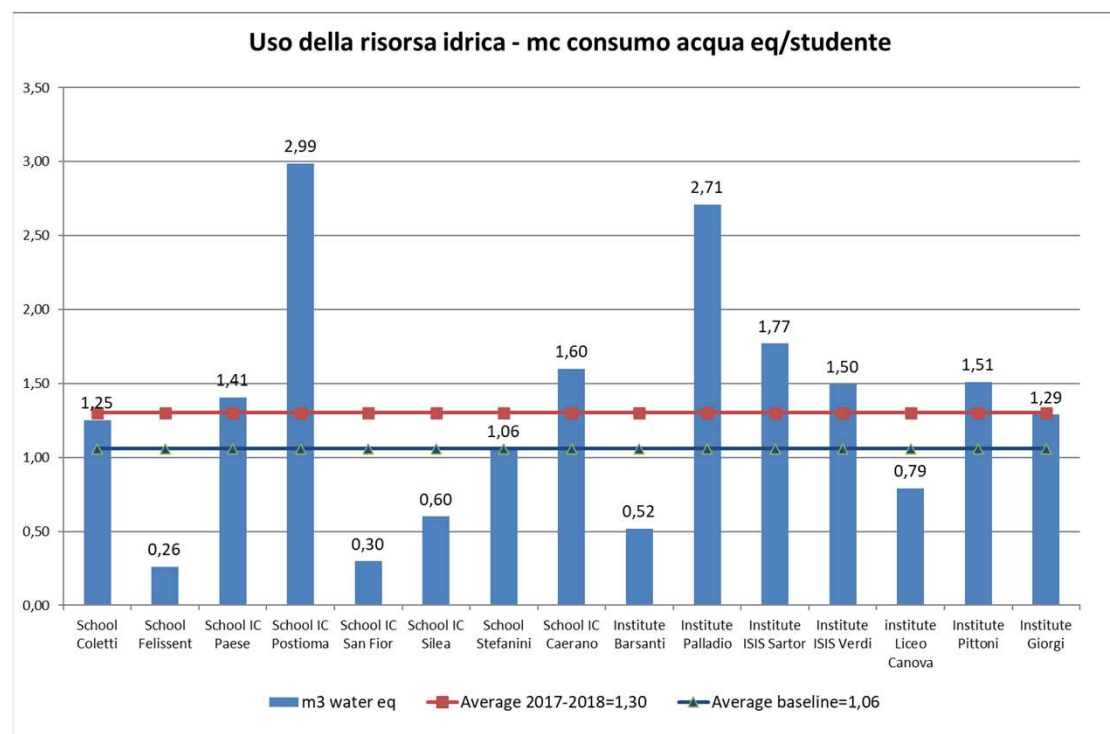


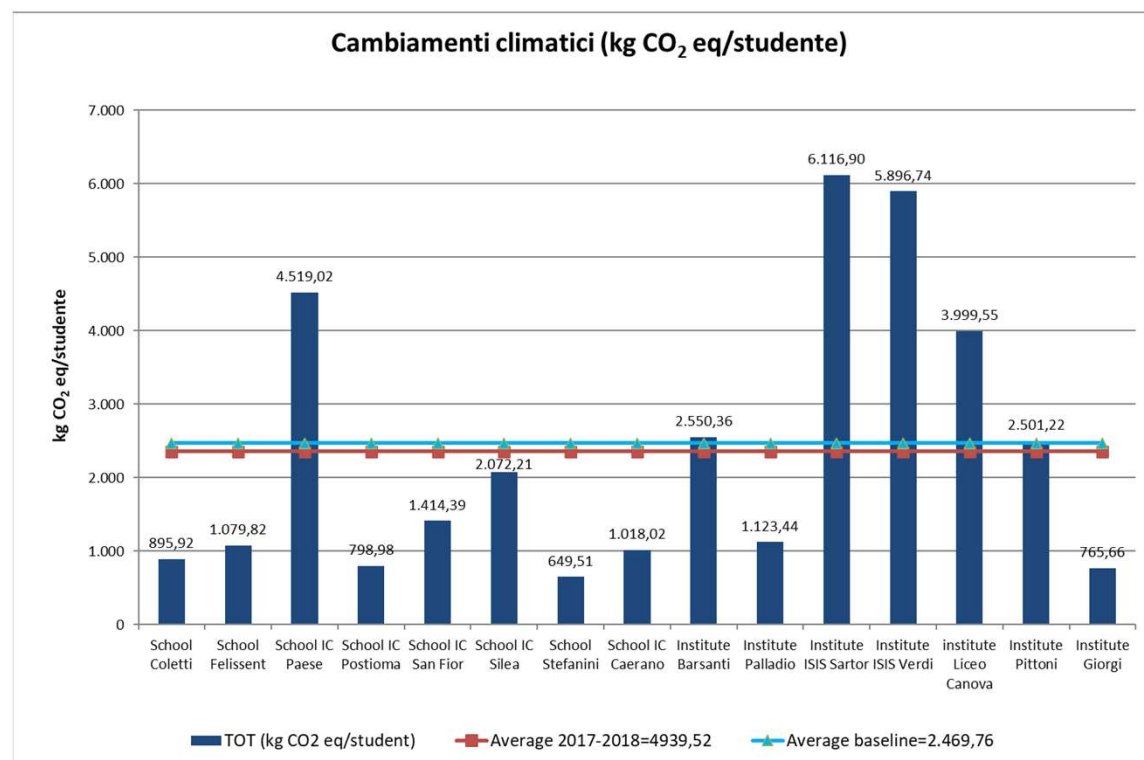
EduFootprint

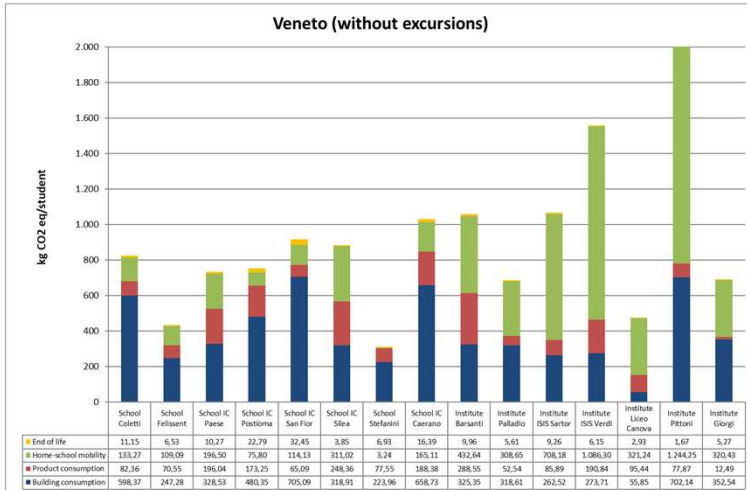
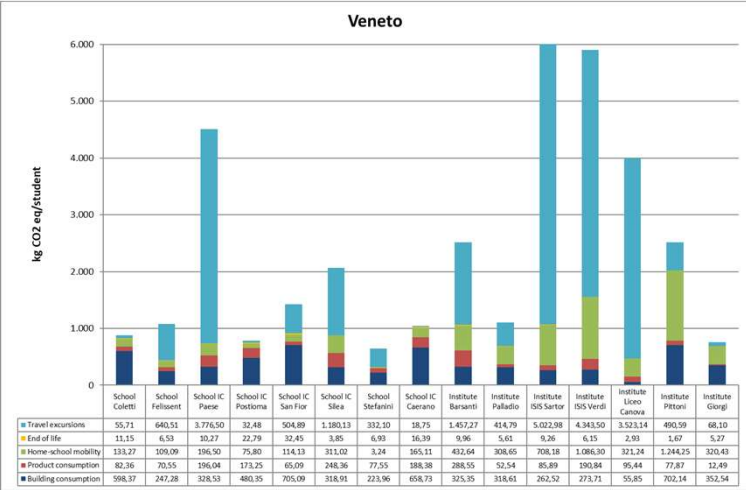
Project co-financed by the European
Regional Development Fund

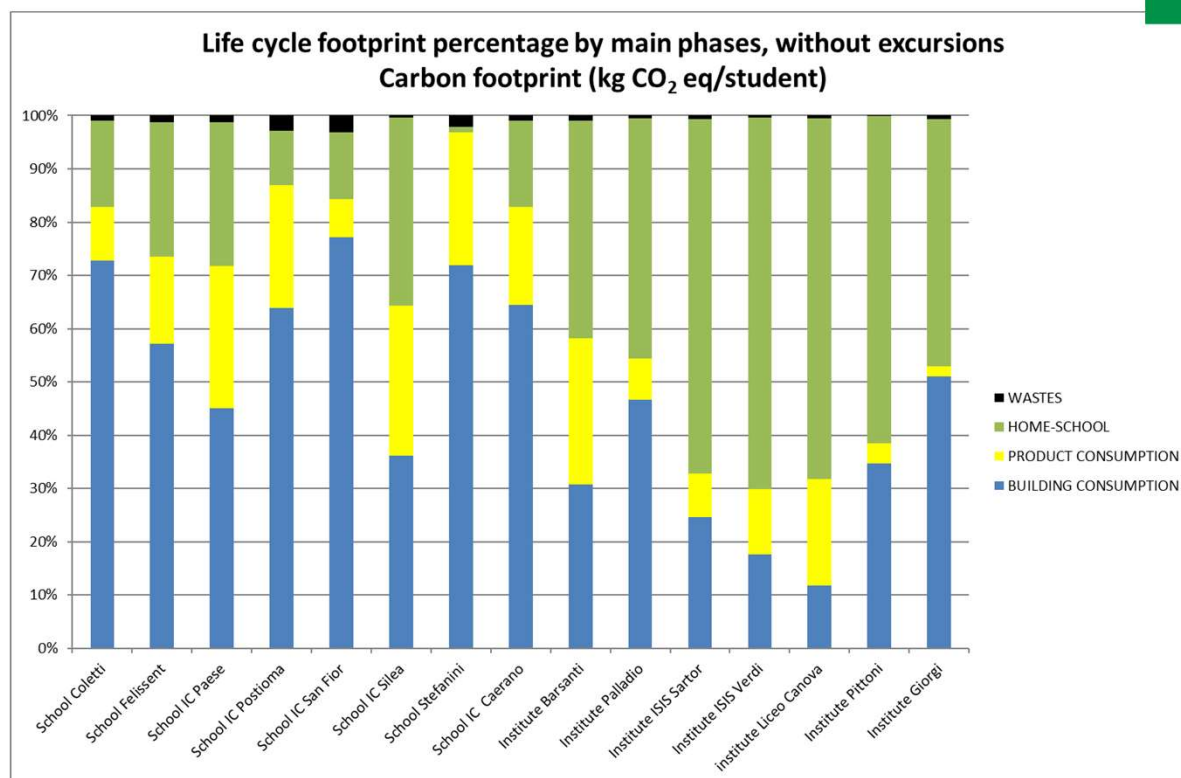


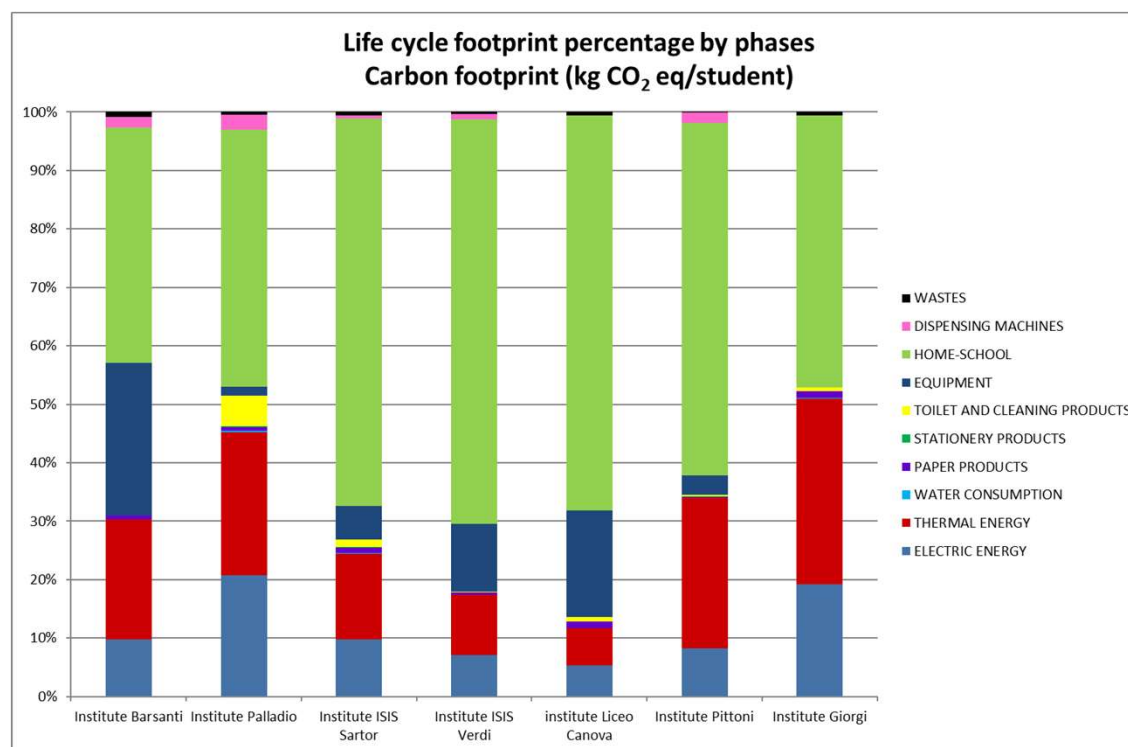


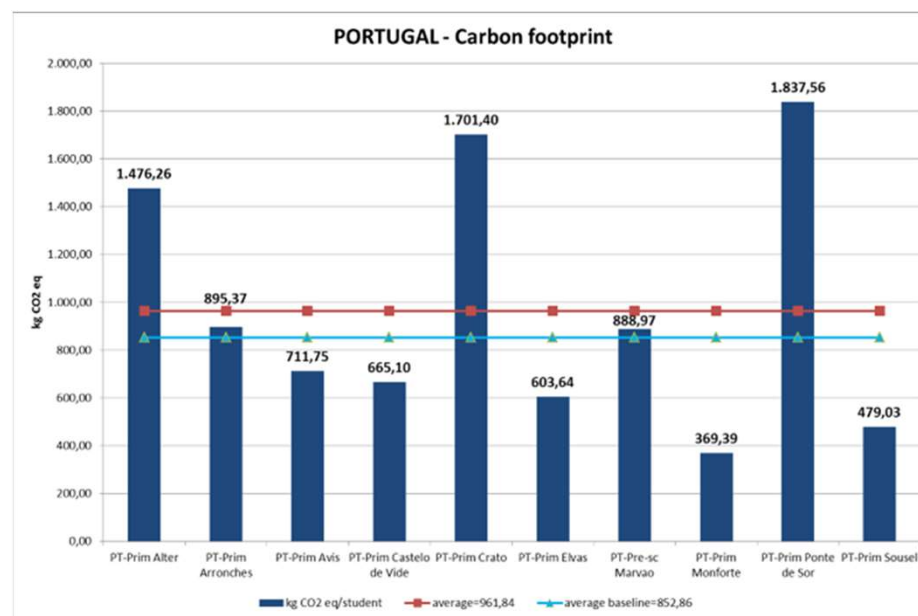


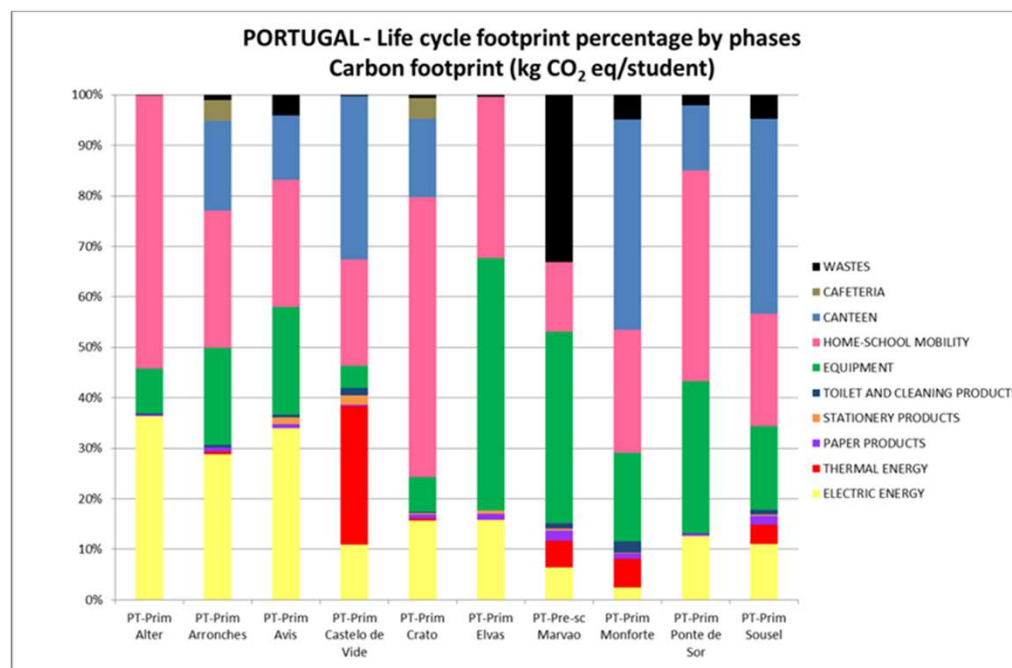


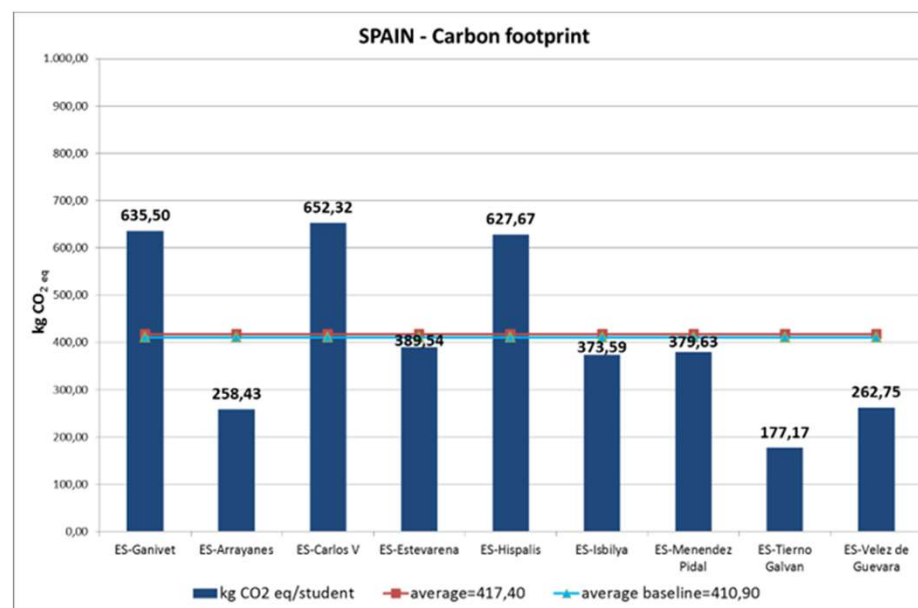


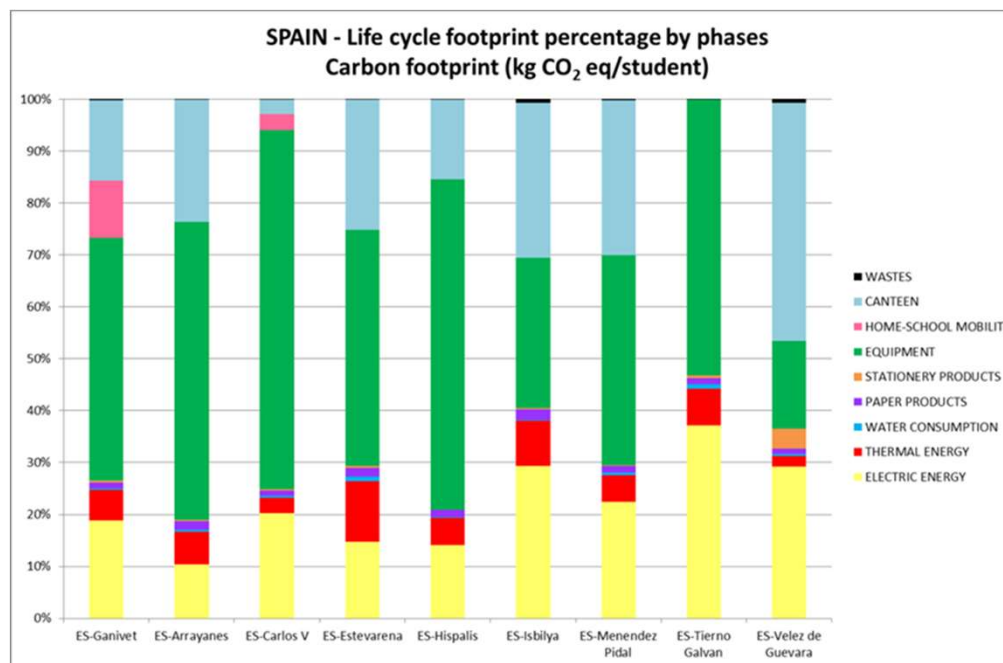






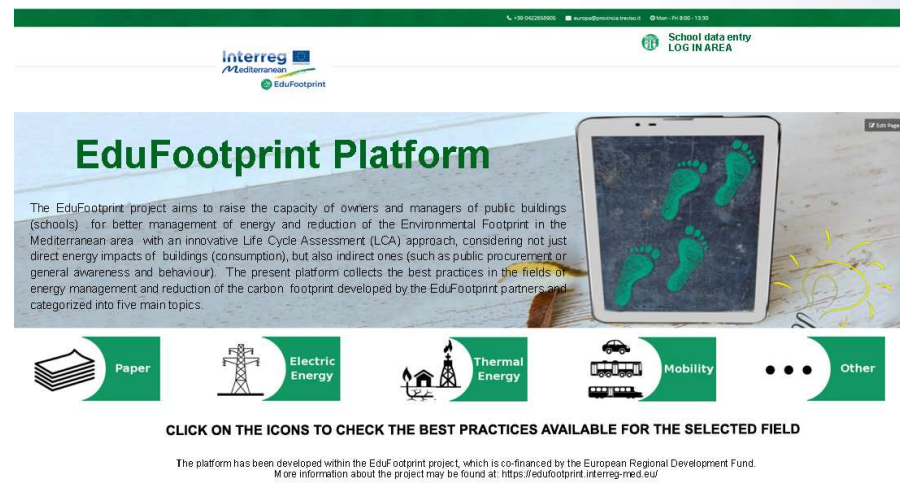






EduFootprint Platform: a common environment

A transnational
EduFootprint
schools' network
available online from
the exchange of
experiences
between schools and
owners/managers of
school buildings.



[EduFootprint platform](https://edufootprint.interreg-med.eu/)

Interreg
Mediterranean



EduFootprint

Project co-financed by the European
Regional Development Fund

Thanks for your attention!

CONTACTS:

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Interreg
Mediterranean



EduFootprint

Project co-financed by the European
Regional Development Fund



SEACAP 4 SDG project

Training on Selected Reference projects
outcomes

10 October 2022



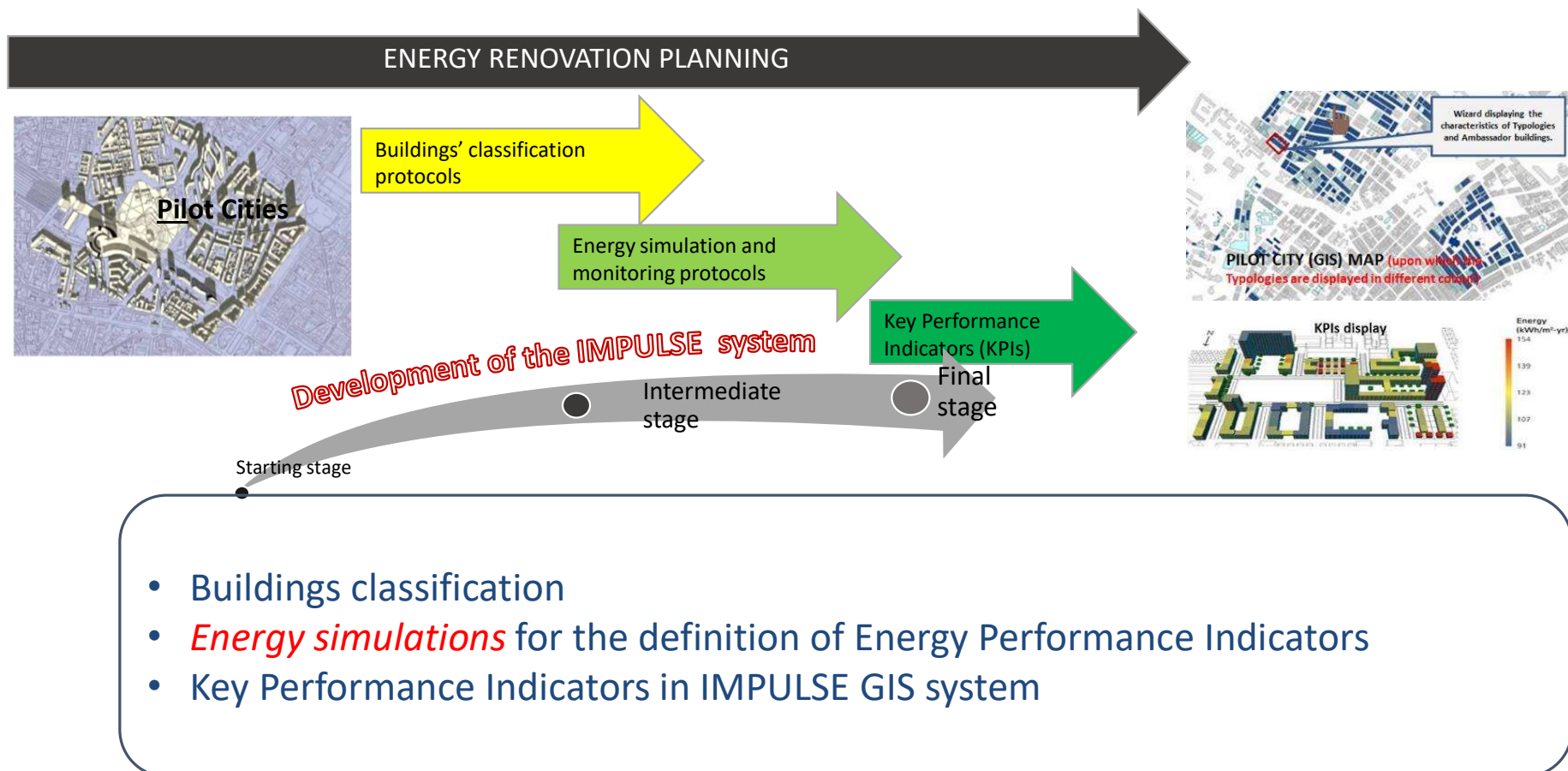
Focus

IMPULSE introduces an integrated **GIS-based management support system** for planning reliable and affordable energy renovation projects for public buildings at local level.

The approach builds on the testing of advanced energy analysis methods and protocols in **6 Mediterranean pilot Cities**.

IMPULSE PROJECT KEY PERFORMANCE INDICATORS (KPIS) PROCESSOR

Action Plan



KPIS FOR THE BASE CASE SCENARIOS

A	B	C	D	E
KPIs for the base-case scenario				Ambassador_PBT1
Building name				
Building floor area (m ²)				
Energy Performance Indicators		Total annual primary energy consumption	kWh/m ² /yr	
			kWh/yr	0
		Annual final energy consumption for space heating	kWh/m ² /yr	
			kWh/yr	0
		Annual final energy consumption for space cooling	kWh/m ² /yr	
			kWh/yr	0
		Annual final energy consumption for domestic hot water	kWh/m ² /yr	
			kWh/yr	0
		Annual final energy consumption for lighting	kWh/m ² /yr	
			kWh/yr	0
		Annual electricity consumption	kWh/m ² /yr	
			kWh/yr	0
		Annual consumption of fossil fuel	kWh/m ² /yr	
			kWh/yr	0

For all the ambassador buildings for the base case scenario

- ENERGY PERFORMANCE INDICATORS
- ENVIRONMENTAL INDICATORS
- COST INDICATORS

ENERGY RENOVATION SCENARIOS

Energy Analysis for Ambassador buildings

Gradual upgrade of public buildings



Minor Retrofit
Up to 35,000.00€
Reduction of EPI $\geq 15\%$

Medium Retrofit
Up to 100,000.00€
Reduction of total primary energy $\geq 25\%$

Major Retrofit
Minimum energy performance requirements

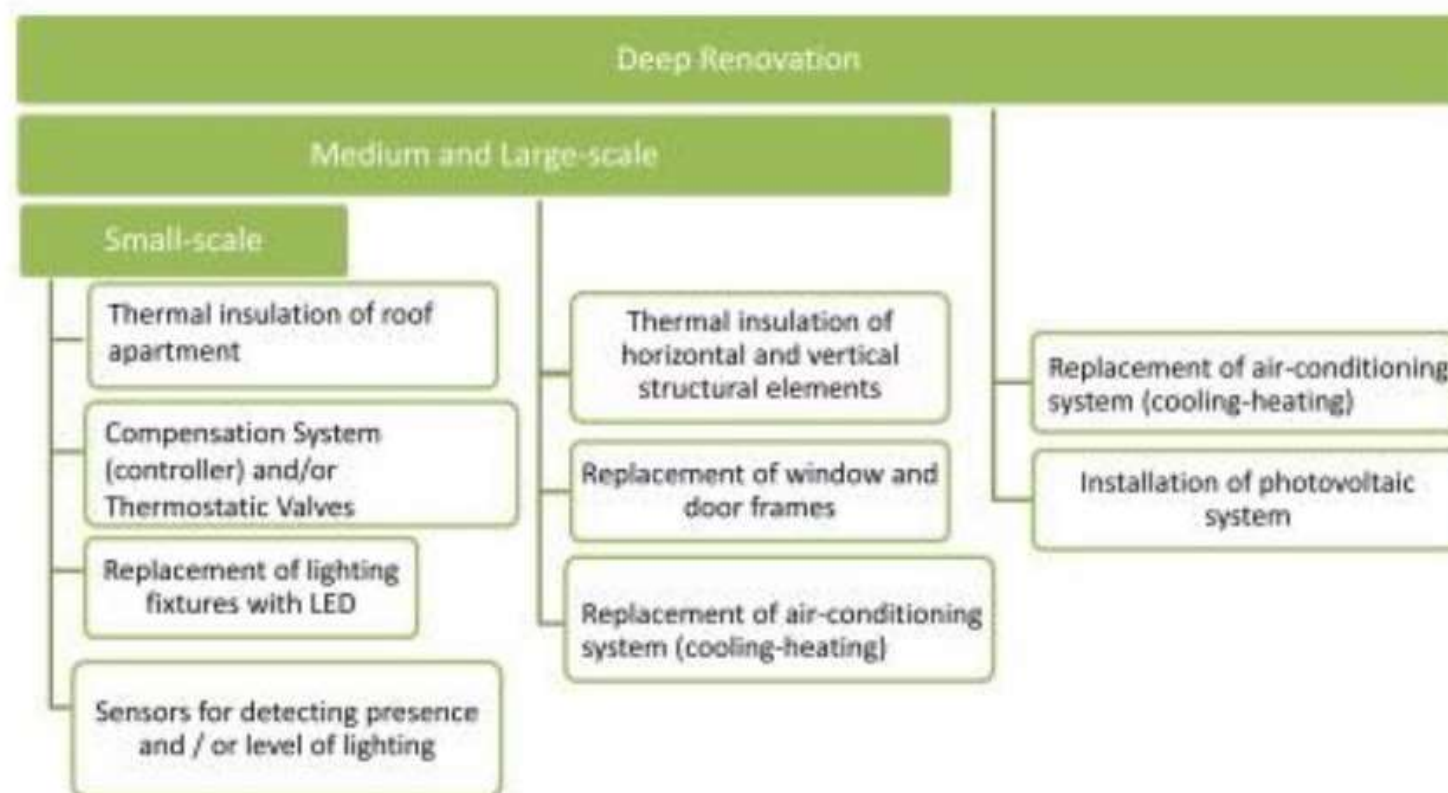
Deep renovation
Integration of RES



ENERGY RENOVATION SCENARIOS

Common Scenarios tested

Perspective of gradual energy upgrade



KPIS FOR ENERGY RENOVATION SCENARIOS

A	B	C	D	E
KPIs for the base-case scenario				Ambassador_PBT1
Building name				
Building floor area (m ²)				
Energy Performance Indicators		Total annual primary energy consumption	kWh/m ² /yr	
			kWh/yr	0
		Annual final energy consumption for space heating	kWh/m ² /yr	
			kWh/yr	0
		Annual final energy consumption for space cooling	kWh/m ² /yr	
			kWh/yr	0
		Annual final energy consumption for domestic hot water	kWh/m ² /yr	
			kWh/yr	0
		Annual final energy consumption for lighting	kWh/m ² /yr	
			kWh/yr	0
		Annual electricity consumption	kWh/m ² /yr	
			kWh/yr	0
		Annual consumption of fossil fuel	kWh/m ² /yr	
			kWh/yr	0

For all the ambassador buildings for the renovation scenario

- ENERGY PERFORMANCE INDICATORS
- ENVIRONMENTAL INDICATORS
- COST INDICATORS

KPIS FOR THE BASE CASE
SCENARIO



KPIS FOR THE **MINOR**
RETROFIT SCENARIO

KPIS FOR THE **MEDIUM**
RETROFIT SCENARIO

KPIS FOR THE **MAJOR**
RETROFIT SCENARIO

KPIS FOR THE **DEEP**
RENOVATION SCENARIO

*In one unique platform we have all the
KPIs of all ambassador buildings
✓ For the base case
✓ For all retrofit scenarios*

SEACAP 4 SDG proje

KPIs for the deep-retrofit scenarios				Ambassador_PBT1			Ambassador_PBT2			Ambassador_PBT3			Ambassador_PBT4		
Retrofit scenario				Scenario1_PBT1	Scenario2_PBT1 (optional)	Scenario3_PBT1 (optional)	Scenario1_PBT2	Scenario2_PBT2 (optional)	Scenario3_PBT2 (optional)	Scenario1_PBT3	Scenario2_PBT3 (optional)	Scenario3_PBT3 (optional)	Scenario1_PBT4	Scenario2_PBT4 (optional)	
Building name				0			0			0			0		
Building floor area (m ²)				0			0			0			0		
Short description															
	Costs	Annual fossil fuel cost	National Currency/m ² /yr												
			National Currency/yr	0	0	0	0	0	0	0	0	0	0	0	
			Total investment cost	National Currency											
Indicators impacts	Total annual primary energy savings	kWh/m ² /yr	0	0	0	0	0	0	0	0	0	0	0	0	
		kWh/yr	0	0	0	0	0	0	0	0	0	0	0	0	
		%													
		Annual final energy savings for space heating	kWh/m ² /yr	0	0	0	0	0	0	0	0	0	0	0	0
			kWh/yr	0	0	0	0	0	0	0	0	0	0	0	0
			%												
		Annual final energy savings for space cooling	kWh/m ² /yr	0	0	0	0	0	0	0	0	0	0	0	0
			kWh/yr	0	0	0	0	0	0	0	0	0	0	0	0
			%												
		Annual final energy savings for domestic hot water	kWh/m ² /yr	0	0	0	0	0	0	0	0	0	0	0	0
			kWh/yr	0	0	0	0	0	0	0	0	0	0	0	0
			%												

► ...

Base-case

Minor retrofit

Medium retrofit

Major retrofit

Deep retrofit

Prioritization

Prc ...

+

:

◀

Base-case Minor retrofit Medium retrofit Major retrofit **Deep retrofit** Prioritization Prc ...

In one unique platform we have all the KPIs of all ambassador buildings

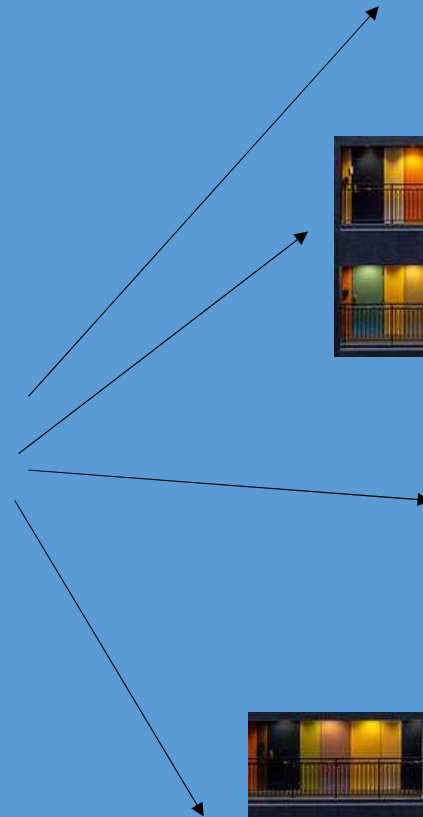
- ✓ For the base case
- ✓ For all retrofit scenarios

SEACAP 4 SDG project

ADVANTAGE 1

Based on the analysis for the ambassador buildings, extrapolation of results to all the building stock!!!

Ambassador



Buildings of
the same
typology

REFERENCE COST INDICATOR:

Total investment cost per total annual energy saved
(Cost - National Currency/(kWh of energy saved))

ADVANTAGE 2

Automated prioritization of retrofit levels and scenarios in terms of investment cost and energy savings for each typology

REFERENCE COST INDICATOR: Total investment cost per total annual energy saved (National Currency/(kWh of energy saved))	Minor retrofit			Medium retrofit			Major re	
	Scenario1	Scenario2 (optional)	Scenario3 (optional)	Scenario1	Scenario2 (optional)	Scenario3 (optional)	Scenario1	Scenar (option
Ambassador_PBT1	3,24	2,90	2,80	9,80			18,54	
Ambassador_PBT2	1,03	0,98	17,70	9,89			9,89	
Ambassador_PBT3	0,91			0,34			0,34	
Ambassador_PBT4	0,53	1,27	0,56	3,88			3,88	
Ambassador_PBT5	2,84	2,57		6,17			10,04	
Ambassador_PBT6	0,62	0,60	0,65	0,92			3,41	
Ambassador_PBT7	1,31	1,86	2,03	3,22			3,22	
Ambassador_PBT8	0,39	0,53	1,03	1,13			1,54	
Ambassador_PBT9	1,25	0,90	2,42	9,09			9,09	
Ambassador_PBT10	0,18	0,20	0,53	2,35			2,35	
Ambassador_PBT11								
Ambassador_PBT12								

ADVANTAGE 3

Automated prioritization of buildings in terms of investment cost and energy savings for each typology

REFERENCE COST INDICATOR:

Total investment cost per total annual energy saved
(Cost - National Currency/(kWh of energy saved))

REFERENCE COST INDICATOR: Total investment cost per total annual energy saved (National Currency/(kWh of energy saved))	Minor retrofit			Medium retrofit			Major re	
	Scenario1	Scenario2 (optional)	Scenario3 (optional)	Scenario1	Scenario2 (optional)	Scenario3 (optional)	Scenario1	Scenar (option
Ambassador_PBT1	3,24	2,90	2,80	9,80			18,54	
Ambassador_PBT2	1,03	0,98	17,70	9,89			9,89	
Ambassador_PBT3	0,91			0,34			0,34	
Ambassador_PBT4	0,53	1,27	0,56	3,88			3,88	
Ambassador_PBT5	2,84	2,57		6,17			10,04	
Ambassador_PBT6	0,62	0,60	0,65	0,92			3,41	
Ambassador_PBT7	1,31	1,86	2,03	3,22			3,22	
Ambassador_PBT8	0,39	0,53	1,03	1,13			1,54	
Ambassador_PBT9	1,25	0,90	2,42	9,09			9,09	
Ambassador_PBT10	0,18	0,20	0,53	2,35			2,35	
Ambassador_PBT11								
Ambassador_PBT12								

AUTOMATED PRIORITISATION

REFERENCE COST INDICATOR:

Total investment cost per total annual energy saved

(Cost - National Currency/(kWh of energy saved))

REFERENCE COST INDICATOR	Minor retrofit		
	Scenario1	Scenario2 (optional)	Scenario3 (optional)
Ambassador_PBT1	3,24	2,90	2,80
Ambassador_PBT2	1,03	0,98	17,70
Ambassador_PBT3	0,91		
Ambassador_PBT4	0,53	1,27	0,56
Ambassador_PBT5	2,84	2,57	
Ambassador_PBT6	0,62	0,60	0,65
Ambassador_PBT7	1,31	1,86	2,03
Ambassador_PBT8	0,39	0,53	1,03
Ambassador_PBT9	1,25	0,90	2,42
Ambassador_PBT10	0,18	0,20	0,53

THE TOOLS ARE AVAILABLE IN IMPULSE WEBSITE

D3.4.1_KPIs_PILOT CITY_rev2.xlsx

KPIs per typology and per retrofit scenario

https://impulse.interreg-med.eu/what-we-achieve/deliverable-database/detail/?tx_elibrary_pi1%5Blivvable%5D=3123&tx_elibrary_pi1%5Baction%5D=show&tx_elibrary_pi1%5Bcontroller%5D=Frontend%5Clivvable&cHash=661c222449fa8c5ae7eea9b1d0696d9f



THE TOOLS ARE AVAILABLE IN IMPULSE WEBSITE

D3.4.1_KPIs_Heraklion_GR_rev1.xlsx

The example of Heraklion

https://impulse.interreg-med.eu/what-we-achieve/deliverable-database/detail/?tx_elibrary_pi1%5Blivvable%5D=3167&tx_elibrary_pi1%5Baction%5D=show&tx_elibrary_pi1%5Bcontroller%5D=Frontend%5Clivvable&cHash=691291ce60531eb9a0aba6e6b1e51766



KPIs for the base-case scenario				Ambassador_PBT1	Ambassador_PBT2	Ambassa
Building name	Total annual CO ₂ emissions	kg/m ² /yr	7,42	9,80		
Building floor area (m ²)	kg/yr	9470,18	11066,10			
Energy Performance Indicators	Total annual primary energy consumption	Annual CO ₂ emissions from electricity consumption	kg/m ² /yr	5,69	8,22	
	Annual final energy consumption for space heating	Annual CO ₂ emissions from fossil fuel consumption	kg/m ² /yr	5,69	8,22	
	Annual final energy consumption for space cooling	Annual total energy-related operational cost	Building name	Heraklion Primary School building		
	Annual final energy consumption for domestic hot water	Annual electricity cost	Building floor area (m ²)	127		
	Annual final energy consumption for lighting	Annual electricity cost	Annual electricity cost	National Currency/m ² /yr	1,29	
	Annual electricity consumption	Annual electricity cost	Annual electricity cost	National Currency/yr	1651	
	Annual consumption of fossil fuel	Annual electricity cost	Annual electricity cost	National Currency/yr	0,80	
	Annual generation of Renewable Energy	Annual electricity cost	Annual electricity cost	National Currency/yr	1025	
	Energy class	Annual electricity cost	Annual electricity cost	National Currency/yr	0,49	
		Annual electricity cost	Annual electricity cost	National Currency/yr	626,0	

Now we are ready to explore the xls platforms....

Thank you for your attention!

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tel.: +30 210 6603216