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Interreg Balkan-Mediterranean PRO-ENERGY

PROJECT

PRO-ENERGY – PROMOTING ENERGY EFFICIENCY IN PUBLIC BUILDINGS OF THE BALKAN MEDITERRANEAN TERRITORY

Work Package:	3. Joint Regional Analysis, Strategy and Framework
Activity:	3.2 Joint Regional Analysis, Strategy and Framework - Good practices selection
Activity Leader:	Cyprus Energy Agency- CEA
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Interreg
EUROPEAN UNION
Balkan-Mediterranean
PRO-ENERGY


Cyprus
Energy
Agency
Department of
Electrical and
Mechanical Services


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INTRODUCTION

PRO-ENERGY is a transnational cooperation project, co-financed by the Cooperation Programme "Interreg V-B Balkan Mediterranean 2014-2020", under Priority Axis 2, Specific Objective 2.2 Sustainable Territories. The project aims at promoting Energy Efficiency in public buildings in the Balkan Mediterranean territory and to create a practical framework of modelling and implementing energy investments interventions, through specific ICT monitoring and control systems, as well as through energy performance contracting (EPC). The specific objective of PRO-ENERGY is to reduce by more than 20% the energy spending in public buildings of the participating entities in one year after the implementation of pilot actions.

Based on the above, Work Package 3 (WP 3) "Joint Regional Analysis, Strategy and Framework" aims at formulating a Joint Strategy and Action Plan for the whole Balkan Med area regarding energy efficiency through behavioural change based on the analysis of the existing situation regarding energy efficiency in participating territories incorporating mapping of policies, identify good practices and perform benchmarking, define Joint Strategy and Action Plan for the promotion of energy efficiency and prepare for energy interventions in public buildings.

More specifically, Activity 3.2."Good practices selection" aims for the identification of good practices in relation to energy efficiency interventions, focus on public buildings and behavioural change.

Section 1

1. Executive Summary

"What is a "good practice"? why it is important? How it can choose and assessed?" are some of the questions that this part is about to answer regarding good practices on energy efficiency interventions.

According to the Knowledge Forum of FAO - UN, "Good Practice is simply a process or a methodology that represents the most effective way of achieving a specific objective" or another way of defining a good practice is "one that has been proven to work well and produce good results, and is therefore recommended as a model". The essence of identifying and sharing good practices is to learn from others and to re-use knowledge. The biggest benefit consists in well-developed processes based on accumulated experience.

The criteria that can be used for the identification for an initiative as a good practice are:

- Effective and successful (produce tangible results)
- Improvement of the environment (protecting the environment)
- Improvement in the socio-economic environment of the area / region.
- Socially acceptable (not offend or disturb social attitudes)
- Technically practicable (usable by people in their everyday life)
- Cost effectiveness (affordable alternative of other practices)
- Inherently participatory (common participation of stakeholders, community, partners)
- Replicable and adaptable
- Innovation
- Preservation / sustainability (economic development, social development, and environmental protection)

But what is the aim of a Good practice?

First, it aims at evolving become better as improvements are discovered. Moreover, it aims at following a standard way of doing things as well as at maintaining quality as an alternative to mandatory legislated standards and can be based on self-assessment and benchmarking.

Regarding the identification of good practices, their aim is to highlight several local / regional / national / European / International good practices related to the energy efficiency interventions in public buildings.

Energy-saving and energy efficiency in the public sector can significantly change with many initiatives and actions. Most of the good practices that the partners selected among the EU Countries are focused on the implementation of Energy Efficiency measures and the change of users' energy behaviour. According to the table below, 65% of the practices were funded by the European Union programs, especially at schools and Municipalities. The main axes of the practices were the promotion and awareness of Energy Savings through the change of behavioural and the renovation measures regarding the energy efficiency [replacements of glazing, lighting ,green roof,etc.].

FIGURE 1: THE TWO AXES FOR ENERGY SAVINGS

The majority of these good practices focused on the link between users behaviour and the consumption of energy. The potential for energy savings from behavioural measures has significantly influenced the user's behaviour and reduce energy consumption in the public sector. The table shows that successful uptake of technical solutions often relies on behavioural change. Users could only realise the mechanical systems' full energy-saving potential (HVAC, heating and ventilation) using correct settings and maintenance.

The EU program Euronet 50/50 MAX is strong evidence for schools to alter the school's students' energy consumption habits by educating them on how to achieve energy savings in their school environment. Evidence shows that the most effective interventions for encouraging employees and students to save energy in the short term are energy-saving competitions (energy teams) and providing publicly visible feedback comparing their energy consumption to their colleagues and classmates' energy use. (Euronet MAX 50/50, C4S). Also, measures such as feedback, social comparison and setting a goal could reduce energy consumption.

Furthermore, some of the good practices presented in the table below, have tackled the challenges related to construction and renovation technologies in the public sector. Particularly, with the implementation of the Energy Performance Contracting and energy efficiency construction measures manage to increase their energy savings.

Potential Measures from Behavioural Measures and Energy Efficiency Techniques

- Installation of energy efficiency measures
- Installation of Renewable Energy Sources
- Reduce energy use at work
- Encourage the purchase of energy-efficient appliances.
- Encourage change the way of using the heating, cooling, ventilation systems.
- Provide recommendations provided by energy audits
- Provide feedback to the users on their energy use.
- Assign Energy Teams
- Encourage for Energy Saving Competition
- Implement Energy Audits
- Implement Energy Management Systems

- Include a baseline and monitoring measures of energy use at least every year

Reviewing the deliverable 3.2 from each partner indicates a considerable improvement relevant to Energy Efficiency is increasing across the EU. In order to reduce the energy consumption among the public sector, EU funding programs and initiatives of the countries are tackled the challenges with the implementation of energy efficiency measures and change consumers' behaviour to an energy behaviour,

TABLE 1: EXECUTIVE SUMMARY OF GOOD PRACTICES

Country	Funded by Europe	Type of Buildings	Practice	Evidence
Greece	Intelligent Energy Europe Programme of the European Union / EURONET 50/50 MAX	Primary School	Promoting Energy Saving via behavioural actions	Energy Savings 68.93%
Greece	Interreg Europe/ Support Project	Municipal Buildings in the City of Edessa [City Hall and the Municipal Cultural Centre]	Renovation Works [replacement of glazing,lighting, green roof]	Energy Savings 153.559 kWh/year
Greece	Interreg Europe / Rebus Project	Town Hall in Gournes, Municipality of Hersonissos, Greece	Green Roof installation	20% reduction of energy consumption
Czech Republic	Interreg Europe/ Finerpol Project	National Theatre of Prague	EPC Project for National Theatre of Prague	Energy savings more than 50% of the original energy costs
Malta	-	Xrobb l-Għaġin Sustainable Development Centre	Refurbishment of an abandoned radio station to serve as a Sustainable Development Centre and the creation of a Nature park	PV system installed: Energy savings: 23,500 kWh/year Wind System installed: Energy savings: 16,000 kWh/year SWH system installed: Energy savings: 20,075 kWh/year
Greece	Interreg Europe/ Rebus Project	Technical University of Crete (TUC),	Green University Strategy for TUC	Reduced electricity consumption from 4,350 MWh in 2012 to 3,702 MWh in 2014.

Greece	Yes	Centre of Architecture and Municipal Library, City of Thessaloniki	Energy upgrade of the Centre of Architecture and the Central Municipal Library Buildings	Energy savings are estimated at approximately 366 MWh per year
Greece	Intelligent Energy Europe Programme of the European Union / EURONET 50/50 MAX	3rd Primary School of Rethymno, Greece	Use of Internet in the 3rd Primary School of Rethymno	Energy Savings 13.92%
Poland	Interreg Europe/ Enerselves Project	Nursing Home in Zochcinek,	Thermo-modernization of public buildings in the Poviat of Opatow	Reduction of carbon dioxide emissions (66%)
Italy	Interreg Europe/ Support Project	Municipal Public Building in Tivoli Municipality	Energy refurbishment of public building according to environmental minimum criteria.	Primary Energy equivalent consumption, 72% of reduction
Cyprus	European project Compete4SECAP energy	Four Municipalities [3 public buildings/Municipality]	Energy Saving Competitions for local authorities	2,6% [one year, the amount represents only the 6 buildings]
Cyprus	ENERGEIN" project	Legislation Department Building - EMS	Thermal insulation of the roof and demonstrative application of a green roof	n/a
Cyprus	Interreg Med/ TEESCHOOLS	Five Primary Schools in Cyprus	Energy Audits in School Buildings	67% reduction of Primary Energy [total for 5 schools]
Cyprus	No	n/a	Financial incentives for the restoration and rehabilitation of listed buildings	3500 buildings have been restored up-to-date [since 1987 up today]
Cyprus	Interreg Med program ENERJ	8 Buildings of Local authorities	Joint Procurement for Energy Upgrading	Excpected energy savings
Bulgaria	Educational infrastructure – construction and renovation of	Lyuben Karavelov" Secondary School, Plovdiv	Implementation of construction works for the renovation	Energy saved per year: 43.21 MWh / year

	schools, kindergartens and nurseries in Plovdiv			CO2 emissions saved 16.40 tons / year
Bulgaria	Funded by the National Trust Ecofund / NTEF	Language high school, Plovdiv	Construction and installation work for Increasing the energy efficiency	Energy saved per year: 1048.21 MWh / year.
Bulgaria	Under Operational Programme Regional Development 2014-2020.	University of Food Technologies	Energy efficiency, improving access for disadvantaged people at the University of Food Technology - Plovdiv and modernization of information services	Energy Saved ,84.06% per year [average per year]
Bulgaria	Under Operational Programme Regional Development 2014-2020.	Medical University – Plovdiv	Providing accessible and cost-effective infrastructure of the Medical University - Plovdiv by improving the energy efficiency of buildings and modernization of the library and information centre	n/a
Bulgaria	Under Operational Programme Regional Development 2014-2020.	Vocational High School of Food Technology and Equipment	Modernization of the infrastructure and improvement of the quality of the educational environment in the Vocational High School of Food Technologies and Equipment - Plovdiv	n/a

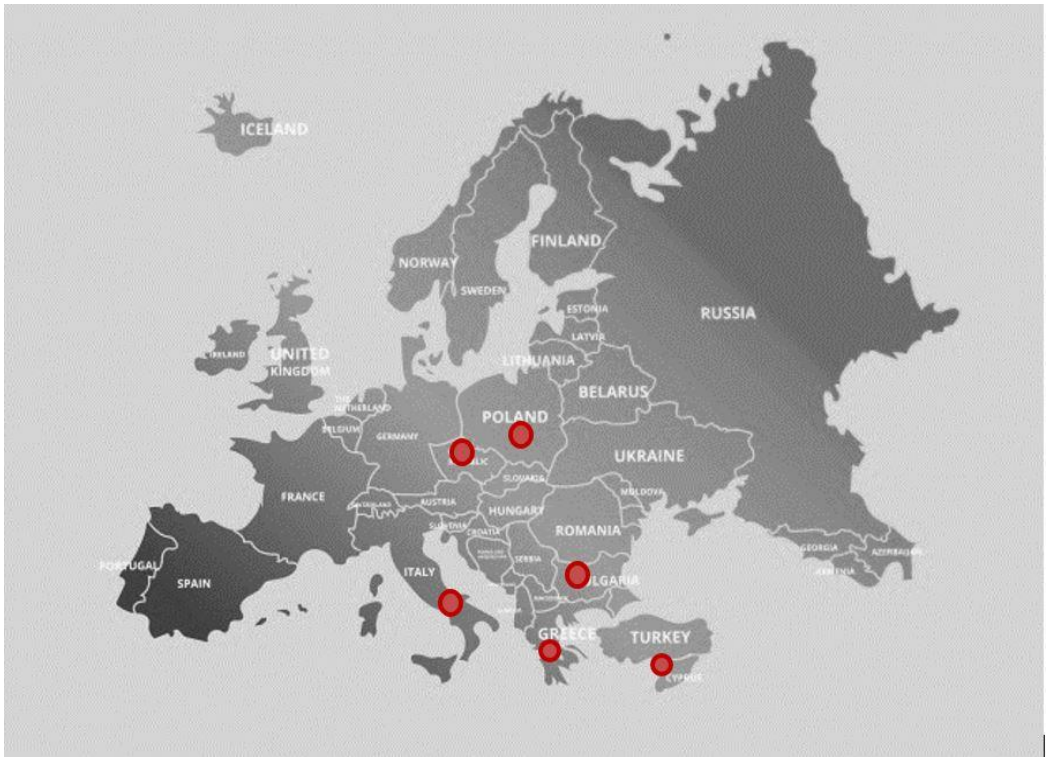


FIGURE 2: COUNTRIES OF THE GOOD PRACTICE

- *Greece*

Most of the implementation of good practices based on the deliverables of the Region of Epirus and Regional Unit of Thesprotia and the Region of Sterea Ellada and Regional Unit of Thesprotia are referred to Primary Schools, University and Municipalities. By raising awareness of the students, teachers, and the public employees, with the implementation of a wide range of activities, a methodology of energy-saving tackles user's behaviour.

Moreover, the refurbishment interventions that refurbishment interventions implemented at municipalities buildings showed a reduction in energy consumption. During these projects, the interventions that were considered were the replacement of glazings and old frames, heating systems, and lightings. Another good practice suggested and implemented through the projects was installing a green roof of a specific waterproofing model to keep the structure safe and undamaged.

From the data gathered, it was concluded that the improving of the energy efficiency and raising awareness on sustainable and climate change challenges, increasing the knowledge about the behaviour of how to use and maintenance the electrical appliances, but also maintaining the green roof, can lead to significant changes of the energy consumption.

Another ambitious practice that the National Theatre of Prague adopted was the Energy Performance Contracting method to modernise the theatre's energy systems. The measures included the increase and the use of RES, where these actions reduced energy by more than 50%.

- *Cyprus*

In Cyprus, the good practices gathered from schools and municipalities where funded mostly from the EU programs. The project Compete4SECAP set a goal to enable local authorities to develop their

Sustainable Energy Action Plan, further by reflecting additional climate mitigation aspects and adaptation issues due to climate change. For the first time, municipalities used Energy Management Systems as an analytical tool to identify appropriate energy actions and study energy-related vulnerabilities and risks that demand adaption actions.

The knowledge gained through the C4S project will be a good opportunity for the energy transition of the involved municipalities and across the island. Besides, energy competition is considered a good practice by encouraging public employees to meet challenges supporting reducing energy consumption and adopting more energy behaviour.A best practice to tackle thermal loss and reduce energy consumption is implementing a green roof with thermal insulation. With the combination of technical energy efficiency measures, this action was implemented on the Legislation Department of EMS through the program “Energein”. The main Imain objectives of the program “Teeschools” was to involve the political actors of the school buildings and other key actors for related policies.

The open lessons took place in pilot and other schools for each in Cyprus and included short presentations, energy games, video projection on energy issues.A 52 hours, freely accessible e-learning course on the efficient management of energy in buildings and on TEESCHOOLS methodology is one of the main project outputs. Professionals, researchers and students are the main target groups of 13 e-modules.Following the project requirements, a renovation plan for the pilot school buildings was presented as an outcome of the energy audits implemented during the testing phase of the TEESCHOOLS project.

- Bulgaria

The Deliverable of Bulgaria referred to most of the good practices to municipalities, schools and universities implementation. Implemented energy efficiency measures for the renovation of schools, followed by energy audits to utilise renewable energy sources and refurbishments. Also, these measures included actions such as the construction of thermal insulation systems and façade plaster of external walls, replacement of glazings and internal heating installation, and installation of solar panels for domestic hot water.

Furthermore, the project "Energy efficiency, improving the access of disadvantaged people in UFT - Plovdiv and modernisation of information services" is considered as a great practice that aimed to improve the conditions for providing educational services at the University of Food Technology - Plovdiv by improving the energy efficiency of buildings, modernisation of the library and ensuring equal access to education for disadvantaged people. A similar action of providing accessible and cost-effective infrastructure by improving buildings' energy efficiency was implemented at the Medical University of Plovid.

1.1. Methodology and Structure of the report

Pro Energy partners created this synthesis report base on the response of four national reports developed from Greece, Cyprus, and Bulgaria partners. The following table [Table 1] provides details of the institutions that led to the development of the good practices on public sector regarding energy savings in relation to energy efficiency interventions.

TABLE 2: INSTITUTIONS FOR INPUT REPORTS

Existing Situation Analysis of Energy Efficiency in Public Buildings for:	Institutions
Greece	Regional Unit of Tesprotia, Development Agency of Evia S.A
Cyprus	Cyprus Energy Agency, Electromechanical Services [Ministry of Transport, Communications and Works]
Bulgaria	RDA with Business Support Centre for SMEs

SECTION 2

2. Identification of good practices in relation to energy efficiency interventions

2.1. Region of Epirus and Regional Unit of Thesprotia

○ Good Practice 1

Name of the building: Primary School of Boroi, Greece
Title of the good practice Posters and official letters to school principle and local officials in Primary School of Boroi
Does this practice come from a European funding program? **Intelligent Energy Europe Programme of the European Union / EURONET 50/50 MAX**
Short Summary of the practice The Primary School of Boroi has done a remarkable job in promoting the issue of energy saving both in the very school environment as well as in buildings other than school facilities. In particular, the students who participated in the program created a best practice poster for energy saving, along with information leaflets and various thematic posts that have been uploaded on the school blog. In addition, a series of official letters have been sent to both the school management and the mayor of Phaistos Municipality, proposing a full toolkit of behavioural actions to enhance energy saving and therefore minimize relevant costs.
Detailed information on the practice The thematic area of the intervention was Energy Awareness Raising through the change of behaviour. The main aim of the action was to alter energy consumption habits of the school's students by educating them on how to achieve significant energy savings in their school environment and to communicate them why this is important for the natural environment and for the people's overall quality of life. In that respect, the participating teachers followed the EURONET 50/50 MAX guidebook to familiarize both themselves and the designated students' energy teams with the energy-related intricacies of their school building. They also worked to make the students ponder on the repercussions of illogical energy expenditures and challenge them to think of economically viable solutions to the detected energy-related problems. The methodology that has been followed consists of 9 steps, namely: - Setting up energy teams - Organizing an "insider" energy tour, involving the project management team, the participating teachers and the maintenance personnel, in school's heating and energy facilities - Enrichment of students' (members of energy teams) knowledge and awareness on energy issues - Energy tour/inspection conducted by the energy teams

- Gathering Data
- Creation of the school's action plan
- Broadcast of results to all school-related agents
- Report measures which require small investments
- Use and report the money saved by the school with its efforts

Within this framework, the actions undertaken by the energy teams included -among others- energy inspections, measurements over consumption data and the installation of a solar oven as well as a solar water heater.

Then, the students' energy teams involved in the project decided to convincingly promote these solutions as a set of student-generated suggestions both to the school's officials and the local authorities. These suggestions were best communicated to all relevant parties via best-practice poster, thematic flyers and school blog entries. To achieve the aforementioned goals set by the energy teams, a variety of materials and tools were used, namely – among others:

- An energy saving poster (along with informative flyers) was created, detailing simple and effective energy saving practices. The poster was also presented to the students not involved directly in the project.
- Official letters were written by the members of the energy teams in order to inform both the school's officials and the local authorities on the merits of energy saving in the building and on cost- effective ways of achieving it.
- The school's blog was used as a promotional platform to report on all the energy saving actions and educational activities performed by participating teachers and students.

Involved acting parties included -on teacher's part - the Primary School Director and some of the teachers personnel, as well as – on students' part - energy teams comprising of students from classes E and F of the Primary School of Boroi (academic years 2013 – 2014, 2014 – 2015, 2015 - 2016).

Moreover, the Regional Authorities of Crete, the Municipality Authorities of Phaistos, involved students'
families and the non-participating students shall also be considered as additional project stakeholders.

Last but not least, it is noted that in other types of public building the methodology is very similar, although specific purpose and use of the building needs to be strongly considered when establishing the energy team and planning optimization measures.

- The 50/50 methodology can help local authorities demonstrate their role in energy saving and in reaching local climate & energy targets.

Evidence of success

The following table depicts the energy savings achieved during the years 2014 and 2015, when the EURONET 50/50 MAX program was actively implemented in the Primary School of Boroi:

	Energy savings achieved			
Year of program implementation	in kW	in %	in EUR	in t CO2
2014	2,215	41.82	243.65	1.02
2015	1,436	27.11	157.96	0.66

Challenges encountered

The participating students were really enthusiastic about the project and - guided by the supervising teachers - managed to significantly alter their own behaviour and mindset regarding energy saving. It was reported by many of the pupils, that they tried to convince their families and friends to adjust their energy spending habits and make them more in tune with the EURONET 50/50 MAX guidelines.

Although sceptical at first, several families seem to have gradually adapted to this novel approach in daily energy saving, a development that has given to the participating students an additional degree of satisfaction and fulfilment regarding their involvement within the project.

Potential for learning or transfer

As it is apparent, the very action is considered a best practice as there were significant energy savings achieved by this school, as depicted in the table above. However, the school is worth of being promoted as "best practice" not only for this.

Another reason is that its students took seriously the core principle of the program (i.e. making students conscious regarding the issue of energy saving in school and how to achieve it) and tried to promote the energy-saving message to the wider audience.

This was done by using all means at their disposal (e.g. the Internet) and appropriately prepared materials (e.g. the best practices energy saving poster and the official letters regarding energy saving practices) to reach out to the school's officials and the local community/authorities.

Essentially, the fact that they convinced locals to take notice on the issue of energy saving, question their energy consumption ways and be open to suggestions, is the greatest achievement of the participants.

Hence, the case of Primary School of Boroi has been included as a best practice in the EURONET 50/50 MAX methodology guidebook, thus enhancing transferability of projects results.

Given the poor energy-efficiency current state of play characterizing the vast majority of school facilities in Greece, as well as the need for setting up a holistic approach on the level of local communities, there is severe potential for replicating such kind of actions in various regions, aiming at both increasing energy efficiency in school buildings but also streamlining awareness on energy savings over local communities stakeholders.

In addition, the 50/50 methodology can be implemented in any public building, provided that its energy bills are covered from municipal budget (therefore achieved savings mean savings both for the Local Authorities and the building itself).

The methodology for calculating energy and financial savings is very simple (yet includes all important aspects, like weather conditions in a given year) and can be applied to any kind of buildings. The calculations can be based on the data gathered from invoices or energy meters, so no sophisticated energy monitoring systems are necessary.

Large part of the methodology is focusing on capacitating building users to optimise energy use. A lot of useful methodological and educational material is gathered on the project website.

The model contract on the 50/50 implementation (signed between the local authority and the building manager) is available on- line and can be adapted to different local conditions.

Further information

http://www.euronet50-50max.eu/en/

https://blogs.sch.gr/dimvoron/

Photos

Photo of the best practice poster

Photo of the public building

○ Good Practice 2

Name of the building:
City Hall and the Cultural Center of Edessa Municipality, Greece

Title of the good practice

Energy Saving Projects in Municipal Buildings in the City of Edessa

Does this practice come from a European funding program?

The practice came from Interreg Europe/ Support Project

Short Summary of the practice

A series of refurbishment interventions have been implemented in two (2) public buildings in the Municipality of Edessa, namely the City Hall and the Municipal Cultural Centre, aiming at enhancing energy efficiency and increasing awareness of employees and citizens on sustainability issues.

Detailed information on the practice

The reasons behind selecting the buildings of the City Hall and the Municipal Cultural Center for implementing the refurbishment works are directly connected with the increased energy consumption they recorded, as well as because of the high-circulation numbers of people in them and the interaction with the general public.

The interventions that have been implemented include a series of actions, namely:

- **The replacement of old glazing and window frames (in both buildings) by new opening-type ones (406 m^2), with reclining features, having a coefficient U=-2.5 W/(m K^2). The new glass panels have a double thermal insulation, blocking out the noise. In addition, they are reflective, with low-emissivity (low-e) and they present a U=1.4 W/(m K^2) versus 3.4 W/(m K^2) of the old ones. Windows are now electrically opened, while a sun-protection system has been placed (shading), with adjustable aluminum shades, through the electrical mechanism. Furthermore, internal insulation was placed in the office area of the Cultural Centre.**
- **Both buildings are now heated using weather compensation sensors and independent indoor temperature control through a central heating system that consists of of a gas boiler and steel radiators (III 905) at each room.**
- **As long as the City Hall is concerned, replacement of lighting fixtures by new ones, with electronic ballast, reflector and sensor has taken place.**
- **Moreover, a Green Roof-extensive type has been installed in the City Hall building. The system consists of the following materials:**
  - **New waterproofing membrane, of modified polyolefin bags certified for root-growth protection.**
  - **Special protective membrane sheet of high strength.**
  - **Drainage/water storage system**
  - **Special geo-textile separator**
  - **Special soil substrate**
  - **Plants**
  - **A drip irrigation system**

The project's total construction budget equals to 411,472.14 € and was funded by the Municipal Energy Savings Program "Exoikonomo".

Evidence of success

Annual energy savings recorded after the interventions:

- Replacement of luminaries in the City Hall: 38,458 kWh/year
- Installation of green roof in City Hall: 5,302 l oil or 53,075 kWh. The coefficient of thermal permeability of the un-insulated roof before planting is estimated at 3.2 W/m^2K and after planting at 1.2 W/m^2K
- Replacement of old glazing and window frames of the City Hall: 3,791 l oil or 37,950 kWh

Replacement of old glazing and window frames of the Cultural Centre: 2,405 l oil or 24,076 kWh

Challenges encountered

The main challenge encountered was the installation of the Green Roof in the City Hall building. The fact, however, that the Head of the pertinent municipal department was an Agricultural engineer, specialized in such activities, helped to bring the project to a successful conclusion.

Potential for learning or transfer

- Improved energy-efficiency education and awareness raising on sustainability issues, as the building of the City Hall is open to visitors and to interested schools. In fact the visitors' record includes an educational visit by a school from Spain.
- Increase in the percentage of greenery of the City of Edessa
- Improvement of knowledge about the behavior of endemic plants on roofs and properties of the climatic conditions of Edessa
- Increased sense of pride of employees and executives since they work in a refurbished building with attractive and sophisticated outlook - not many public buildings in Greece have planted roof terraces.

Further information

https://www.interregeurope.eu/policylearning/good-practices/item/1813/energy-saving-projects-in-municipal- buildings/

Photos

Photo of the City Hall

Photo of the Cultural Centre

○ Good Practice 3

Name of the building:

Town Hall in Gournes, Municipality of Hersonissos, Greece

Title of the good practice

Green Roof installation on the Town Hall of Gournes

Does this practice come from a European funding program?

Interreg Europe / Rebus Project

Evidence of success

A pilot application of a green roof to demonstrate the building insulation and landscape enhancement.

Short Summary of the practice

A pilot application of a green roof to demonstrate the building insulation and landscape enhancement.

Detailed information on the practice

Following the obligations and commitments arising from the Covenant of Mayors regarding the energy efficiency improvement of the municipal buildings, the Municipality of Hersonisos has decided to use all the available funds towards that direction (national funds, own recourses, European projects).

During the implementation of the E2STORMED European project that deals with urban stormwater sustainable management, the Municipality of Hersonissos proceeded with the implement the green roof project on the Town Hall.

The Town Hall is an old and bad maintained building, providing low-quality temperature and insulation conditions. Its roof covers a total surface of 30 m^2.

Following the successful green roof implementation on the Treasury building of the Ministry of Financial Affairs in Athens – Greece, the project has been designed as a pilot application of a green roof to demonstrate the building insulation and landscape enhancement.

The design uses an innovative technique designed for Mediterranean climatic conditions, which constitutes of a light-weight construction, which - even when wet - can keep water and maintain vegetation. This technique is a combination of geo-membranes, soil and geocellular pillows, which form the base of the green roof and upon which the plants, that are endemic aromatic species, are planted.
The green roof is self-maintained, demonstrates significant energy saving, it has improved comfort conditions for the building users and is also used by the Municipality to disseminate the idea of energy efficiency to the public. The total amount of invested capital expenditures equals to 4,000 Euros, while there are no management or maintenance costs. The human resources involved for the successful project implementation included one (1) agronomist and two (2) workers.

Evidence of success

There has been a severe increase in energy efficiency status of the Town Hall through the improvement of comfort conditions inside the building regarding heating and cooling. As a result, an approx. 20% reduction in electricity consumption has been recorded.

Moreover, the project has significant impact in terms of raising awareness as the Town Hall constitutes a demonstration site that supports dissemination and public awareness on energy

efficiency measures. Furthermore, the project has innovation characteristics, as it combines a series of materials and measures resulting in a low budget, self-maintained, energy efficiency improving application.

Challenges encountered

The project was easily implemented without any difficulties.

Potential for learning or transfer

- Successful implementation of energy efficiency application that does not require additional works on the building (construction enhancement, watering and drainage system)
- The applied technique creates an environment with minimum to none management requirements
- Easy to replicate to Mediterranean countries
- Demonstration site to disseminate the idea of energy efficiency to the public

Further information

https://www.interregeurope.eu/policylearning/good-practices/item/1228/green-roof-of-the-municipality-s-town-hall- in-gournes/
https://www.interregeurope.eu/rebus/ https://www.hersonisos.gr/

Photos

○ Good Practice 4

Name of the building:
National Theatre of Prague, Czech Republic

Title of the good practice

EPC Project for National Theatre of Prague

Does this practice come from a European funding program?

The practice came from Interreg Europe/ Finerpol Project

Short Summary of the practice

Czech monumental building of the National Theatre successfully used financial instrument in form of energy performance contracting (EPC).

Detailed information on the practice

The EPC (energy performance contracting) method was used to modernize the energy systems of the National Theatre in Prague.

It was an ambitious project aiming at a significant and lasting reduction in the consumption of natural gas, electricity and water, as well as involving the use of renewable energy sources (solar energy and energy contained in the Vltava river).
The problem addressed by this method was big energy losses in this old monumental building. The modernization, which took place in 2007, brought a reduction in energy of more than 50%.

The goal was not only to replace obsolete technology, but through interlacing and tuning of the whole technological system to gain maximum savings from the modernization.
Originally waste heat now heats up domestic water. The refrigeration machine can be used as a heat pump (depending on the weather and the needs of the user), but it can automatically re-heat the heat from the sunny rooms to colder rooms.

Warm air from the auditorium is used to heat the fresh air supplied, the amount of which regulates CO2 sensors in halls.

Main beneficiary is the National Theatre that saves on energy, its employees who have ensured optimal comfort as well as the visitors of the theatre.

In addition, there are positive externalities in savings of energy and CO2 emissions for all inhabitants of Prague.

Approximately 3 million Euros have been invested in order to accomplish the energy refurbishment of the building. Investment is paid by the guaranteed savings for this project, that amount to 400,000 Euros on an annual basis.
The duration of the project is 10 years and was funded on a commercial basis by the EPC.

Evidence of success

Since 2011, savings have been more than 50% of the original energy costs, while the Energy Services Company (ESCO) ENESA guarantees savings of at least 400,000 Euros per year.

The practice was so successful that, after the initiation of the first round energy efficiency measures that resulted to 800,000 Euros of energy savings within 3 years' time (approximately 260,000 Euros per year), the project was further enhanced with additional energy efficiency measures which raised total savings to 400,000 Euros per year.

Challenges encountered

Energy refurbishment Interventions had to be applied only in a way that shall not negatively affect the monumental outlook of the building, as it is located in Prague's historical city center.

Potential for learning or transfer

The National Theater is a historical building in the center of Prague and its energy intensity was perceived as a necessary tax for the protection of monument protection.

Through this very project, it is clear that even historic buildings without major interventions can provide a set of appropriate measures to reduce energy consumption using appropriate financial instruments – in this case the EPC tool.

Furthermore, an additional benefit of the project is that the life of the installed measures is at least twice the time required to repay the input costs. After the installments are terminated, the customer will remain in the budget for the entire savings achieved. Environmental benefits are an accompanying effect for EPC projects - Economics and ecology are not in a contradictory position here.

Moreover, the monumental nature of the building and the permanent interaction with several groups of stakeholders belonging to general public (visitors, citizens, audience) may lead to raising awareness on energy efficiency and sustainability issues.

Further information

https://www.interregeurope.eu/policylearning/good-practices/item/385/epc-project-for-national-theatre-in-prague-czech- republic/

Photos

Photo of the National Theatre

Photo of solar system used

○ Good Practice 5

Name of the building:
Xrobb l-Għaġin Sustainable Development Centre, Malta

Title of the good practice

"Refurbishment of an abandoned radio station to serve as a Sustainable Development Centre and the creation of a Nature park"

Does this practice come from a European funding program?

The practice came from Interreg Europe/ Support Project. However, the refurbishment project was not funded by EU funds.

Short Summary of the practice

The practice involved the refurbishment and the restoration of a former – and currently abandoned - German radio station building to serve as a Sustainable Development Centre, along with the creation of a Nature park of more than 15,500 trees. Within this framework, and besides the energy upgrade interventions, open spaces for general public and educational facilities have been created aiming at raising public awareness for sustainability issues.

Detailed information on the practice

The Xrobb l-Għaġin Nature Park and Sustainable Development Centre consists of over 155,000 square metres on a
jutting peninsula with scenic views in the south east of Malta within the locality of Marsaxlokk.

The purpose of the project is education, demonstration and research in sustainable environment solutions with the overall objective of increasing the use of renewable energy, wastewater management and safeguarding biodiversity.

- Renewable Energy: The site will serve as a research area on renewable sources of energy whilst producing energy from wind turbines and photovoltaic panels on site.
- Water and Wastewater: There will be optimal rainwater harvesting and practical use of both treated wastewater and collected rainwater.
- Biodiversity: Protection of existing natural habitats, namely garigue, steppe and endemic cliff communities as well as afforestation of over 15,000 trees with indigenous trees and shrubs within degraded areas.
- Energy efficiency measures and use of natural daylight and ventilation within the buildings to ensure that sustainable living is further promoted.
- Environmental education facilities including equipped conference and classroom facilities, hostel facilities on site, fully interpreted walking routes, information boards and lesson plans for organized day visits and overnight stays on environmental education.
- Promotion of eco-tourism within the south east of Malta including walking and cycling routes.

The Nature Park project development consisted of two schedules, namely:

- **The restoration of a historical building (the abandoned radio station)**
- The planting of more than 15,500 trees

A series of specific objectives have been set, including:

- The energy refurbishment of the building
- The protection of an area of high ecological value
- The demonstration of the benefits occurring from renewable energy sources installation
- The finetuning of wastewater treatment
- The creation of green open spaces, open for the general public
- The creation of scientific and educational facilities

The RES systems installed consist of both photovoltaics (PVs) and micro-wind turbines. As long as PVs are concerned, three different types of technologies were put in place, namely, mono-crystalline, poly-crystalline and thin-film PV panels. Moreover, two types of wind turbines have been installed, engaging micro turbines of both vertical and horizontal axis.

The PV and wind system of inverters was designed in a way that allows electricity generation both in grid connection mode as well as in "controlled" stand-alone mode. This means that, in the case of electrical grid failure, the aforementioned inverters system makes it possible to power the building to a limited extent - as long as the PV and wind devices are still generating electricity.

Once installed, the stand-alone inverter was programmed with a load shedding program to provide electricity only to the building's high priority loads. Both PV and micro-wind technologies are connected to a data-logging system, which can be used to monitor various environmental parameters. The solar water heating has been intended to provide hot water supply to toilets and showers.

The sum of energy savings and electricity production data are displayed in the building's lobby in real time, thus,
contributing in raising awareness on sustainability issues.

Financial resources (724.641€) used for planting of trees and restoration of building breakdown is as follows:

- EEA Financial mechanism: 261.728 €;
- Norwegian financial mechanism: 373.997 €;
- **Nature Trust Malta: 88.916€**

Evidence of success

Annual energy savings recorded after the interventions:

- PV system installed: Energy savings: 23,500 kWh/year; Reduction of CO_2: 20.5 tns/year.
- Wind System installed: Energy savings: 16,000 kWh/year; Reduction of CO_2: 14 tns/year.

SWH system installed: Energy savings: 20,075 kWh/year; Reduction of CO_2: 17.5 tns/year.

Challenges encountered

No challenges were encountered during project's implementation.

Potential for learning or transfer

The project results have shown many benefits and potentials for future projects, namely:

- better economy for stakeholders
- practical use of Renewable Energy Sources and use of treated wastewater
- development of ecotourism in the area
- showcase of the Nature Park and Sustainable Development Centre
- environmental education facilities
- possible future funding for other conservation projects
- education for Sustainable Development (ESD) through outdoor learning.
- **holistic education across the curriculum for all ages**

Further information
https://www.interregeurope.eu/policylearning/good-practices/item/2708/xrobb-l-ghagin-sustainable-development-centre/ *https://www.xrobblghagin.org.mt/*

Photos

2.2. Region of Sterea Ellada Regional Unit of Evia

○ Good Practice 1

Name of the building:
Technical University of Crete (TUC), Greece

Title of the good practice

Green University Strategy for TUC

Does this practice come from a European funding program?.

The practice came from Interreg Europe/ Rebus Project

Short Summary of the practice

Creation of a Green University which shall act as an "open lab" for research and technology according to sustainable development. In addition, a series of energy refurbishment interventions have taken place in order to increase energy efficiency scores of the institution and deteriorate relevant costs. Energy reduction measures focused on two directions, namely:

- Analyze energy data in order to assess potential savings and
- Implement actions towards energy saving direction.

Detailed information on the practice

The idea of a “Green University” emerged as a necessity in the TUC community, both because of the economic impasse caused by the economic crisis in Greece but also because of the capacity and the will to sustainably transform the Campus.

TUC’s Sustainable Development Plan aims at measurable results, promoting the creation of an "open lab" for research and technology in sustainable development.

This process will raise awareness in the TUC community and in the local society.

The TUC Campus is one of the best in Greece, with modern lecture halls and research facilities.

TUC’s operational budget for 2015 was approx. 60% lower than 2008, corresponding to 1.2 mn €.

Energy related expenses for 2012 were 762 k €, which corresponded to 30% of the institution’s total OPEX (operating expenses).

Furthermore, freshmen students increased by 25% in 2014 and by 15% in 2015. Given the cumulative effect of the students increase on the OPEX, it has been estimated that the problem would intensify in the next 5 years, so it was urgent to deploy a plan for energy saving and cost reduction.

As a result, a viability action plan was introduced, focusing on the mid-term target to decrease energy consumption by 20%.

The plan included actions towards Reduction of energy and water consumption, paper usage reduction and recycling.
Energy reduction measures focused on two directions: that of measuring and analyzing energy consumption data in order to come up with potential savings and that of undertaking immediate actions towards energy saving and establishing quick wins.

The total procurement and installation cost for the acquired equipment – including, among others, measure devices, heat pumps, upgraded lighting equipment, air conditioning units, new doors and windows, amounted to 470,000 €, while maintenance costs equal to 5.500 €/year.

The cooperation among the University's Administration, the Institution's Technical Services, the staff (professors' personnel and supporting employees) and the students has been a sine qua non parameter for the project's successful implementation.

Evidence of success

- Minimized heating oil expense from 133,389 € in 2012 to 44,135 € in 2014.
- Reduced electricity consumption from 4,350 MWh in 2012 to 3,702 MWh in 2014.
- **Total energy expenditure decreased by 17.6% from €762,668 in 2012 to €628,352 in 2014.**

Challenges encountered

The successful implementation of the Green strategy was based on the cooperation among the involved stakeholders (Administration, Technical Service, staff and students).

To this purpose, a series of means have been used in order to increase the users' awareness and to provide them with proper guidelines for energy saving. The relevant toolkit included Web campaigns, banners, student contests etc.

Potential for learning or transfer

- Energy saving targets: Aiming at reducing the total energy consumption by 20%, all parties involved made a bid to minimize oil consumption and reduce electricity consumption.
- Simple and feasible actions: Public awareness, Upgraded lighting equipment, Reconstruction of student residence, new water heaters, heat pump for DHW supply and solar thermal utilization, new air-conditioning units, thermally interrupted aluminium windows with low thermal transmission glass, new heat pumps, automatic control system of central air-conditioning units.
- Transferability: The TUC strategy can be easily replicated. The engagement of everyone involved is of major importance. Building a database is also crucial. All actions related to monitoring the action plan are applicable to every public building.

Creating databases-Innovation in monitoring: Electricity consumption is being recorded, using a software that produces an energy map depicting energy consumption of all its main units.

Further information

https://www.interregeurope.eu/policylearning/good-practices/item/1235/green-university-strategy-for-tuc/ https://www.interregeurope.eu/rebus/

Photos

○ Good Practice 2

Name of the building:
Centre of Architecture and Municipal Library, City of Thessaloniki, Greece

Title of the good practice

Energy upgrade of the Centre of Architecture and the Central Municipal Library Buildings

Short Summary of the practice

The good practice consists of implementing a series of energy refurbishment actions in the Centre of Architecture as well as the Municipal Library in Thessaloniki.

Does this practice come from a European funding program?

The practice came from Interreg Europe/ Support Project, while project implementation was funded through EU structural funds.

Detailed information on the practice

The project was implemented the period between March 2015 – October 2016.

It refers to the renovation and energy refurbishment of two (2) municipal buildings in the City of Thessaloniki in Central Macedonia, namely the Centre of Architecture – which is a mainly office building – and the central Municipal Library. The total heating area for both public building equals to more than 5,000 sq. meters.

In particular, the implemented actions aiming at improving the buildings' energy efficiency include:

- The replacement of the window frames with new pieces of increased efficiency
- The installation of roof and wall insulation in order to upgrade temperature conditions within both buildings
- The replacement of old technology light bulbs with LED lighting combined with the installation of occupancy sensors
- The full replacement of HVAC systems, along with the installation of HVAC controls

The Municipality of Thessaloniki is the main beneficiary of the project, since the buildings remain at its disposal.

The construction budget amounted to 1,680,350 €. The implementation was financed by the National Strategic Reference Framework 2007-2013 (the program under which EU structural funding is being implemented in Greece).

Evidence of success

According to the energy study and the relevant energy audits, the energy savings are estimated at approximately 366 MWh per year and the CO2 reduction at approximately 258 tns per year.

Challenges encountered

Such projects depend on funding sources, which are directly relevant to regional policies and state programs. The Operational Programs (OP) provide opportunities to use these funds in line with the pertinent OP policies.

Potential for learning or transfer

The project is integrated to the implementation of the Sustainable Energy Action Plan of the Municipality. The overall intervention constitutes a good practice for similar intervention at other public buildings, since the municipal building accumulates important public activities.

Furthermore, the constant interaction with citizens may lead to spreading energy efficiency awareness to general public.

Further information

https://www.interregeurope.eu/policylearning/good-practices/item/1812/energy-upgrade-of-the-centre-of-architecture- and-the-central-municipal-library-buildings/

Photos

Photo of the Centre of Architecture

Photo of the Municipal Library

○ Good Practice 3

Name of the building:

3rd Primary School of Rethymno, Greece

Title of the good practice

Use of Internet in the 3rd Primary School of Rethymno

Does this practice come from a European funding program?

Intelligent Energy Europe Programme of the European Union / EURONET 50/50 MAX

Short Summary of the practice

The students implemented a wide range of activities, from homework during the lessons, such as creating subjects paintings and posters promoting energy saving, up to extracurricular activities, such as educational trips to waste treatment facilities and participation in thematic energy saving events.

The school showed excellent performance in raising the awareness of the students and teachers, as well as that of the wider society, on the importance and methodology of energy saving, by intelligently using popular social networking tools such as Blogging, YouTube and Pinterest in order to convey the message of efficient energy saving to the general public.

Detailed information on the practice

The main goal of this action was to raise energy awareness of participating students and teachers.

To this point, energy teams were set up and energy inspections have taken place, using the EURONET 50/50 MAX methodology and equipment.

The members of the energy teams recorded the state of play of their school regarding energy consumption and identified problematic issues.

Having understood the energy consuming peculiarities of their school building, the participating students started thinking about the best ways to promote the message of energy saving and improve energy consumption habits of the building users.

Moreover, having realized that a significant change in the energy output of the school can be achieved with cost-effective ways, they took their promotional campaign one step further by using all means available to them (mainly popular Internet applications and social media) to raise public awareness on energy-saving issues.

Within this very framework, the set of materials and tools that have been used, include – among others:

- A thematic YouTube video comprising of students' drawings and accompanied by appropriate informative text. YouTube link: *https://youtu.be/xzQgKugC1n8*
- A Pinterest account where among other educational posts one can access thematic information tables, relevant to the protection of the environment and energy saving. Pinterest link: *https://gr.pinterest.com/iliasteacher/*
- Thematic posters and essays regarding environmental protection and energy saving tactics displayed on the school corridors to raise awareness of non-participating parties. All the materials were published on the participating class' website. Class website link: *http://iliasfarmakisefimerida.weebly.com*

Involved acting parties included a member of the teachers' personnel as well as – on students' part - energy teams comprising of students from classes D2 and E2 of the 3rd Primary School of Rethymno (academic years 2014 – 2015, 2015 – 2016).

Moreover, the Regional Authorities of Crete, involved students' families and the non-participating in the energy teams pupils shall also be considered as additional project stakeholders.

Last but not least, it is noted that in other types of public building the methodology is very similar, although specific purpose and use of the building needs to be strongly considered when establishing the energy team and planning optimization measures.

The 50/50 methodology can help local authorities demonstrate their role in energy saving and in reaching local climate & energy targets.

Evidence of success

The following table depicts energy savings achieved during the year 2015, when the EURONET 50/50 MAX program was actively implemented in the 3rd Primary School of Rethymno:

	Energy savings achieved			
Year of program implementation	in kW	in %	in EUR	in t CO2
2015	1,424	13.92	156.64	0.66

Challenges encountered

One of the challenges encountered was the fact that a great variety and combination of information sessions (either in the form of indoor sessions or external educational visits) and creative activities were necessary to keep the interest and motivation of the students and their focus on program's objectives.

Once the students, however, realized the importance of the project, they tackled it passionately, thinking of creative ways to achieve energy saving in the school building, as well as to promote the message of energy saving outside their school.

In addition, a further challenge was the development of promotional tools concerning the raise of environmental awareness using a limited budget.
The participants involved, however, showed great ingenuity and flexibility in finding clever and cost – effective ways to streamline their environmental campaign by making use of social media platforms, thus spreading their message beyond their institution's environment.

Potential for learning or transfer

As presented above, there were significant energy savings achieved by this school during the project's implementation. However, the best practice so far was the way that involved energy teams spread the message of energy saving using a variety of on-line tools and media, expertly exerting their enthusiasm and creativity along the way.

Various actions of the energy teams, who are using appropriate internet tools, constitute a good communication model that other schools could replicate to promote the concept of energy saving to the wider audience. Hence, the case of the 3rd Primary School of Rethymno has been included as a best practice in the EURONET 50/50 MAX methodology guidebook, thus enhancing transferability of project's results.

In addition, the 50/50 methodology can be implemented in any public building, provided that its energy bills are covered from municipal budget (therefore achieved savings mean savings both for the Local Authorities and the building itself).

The methodology for calculating energy and financial savings is very simple (yet includes all important aspects, like weather conditions in a given year) and can be applied to any kind of buildings. The calculations can be based on the data gathered from invoices or energy meters, so no sophisticated energy monitoring systems are necessary.

Large part of the methodology is focusing on capacitating building users to optimise energy use. A lot of useful methodological and educational material is gathered on the project website. The model contract on the 50/50 implementation (signed between the local authority and the building manager) is available on- line and can be adapted to different local conditions.

Further information

http://www.euronet50-50max.eu/en/ ***http://3dim-rethymn.reth.sch.gr/***

Photos

Photo of the public building

Photo of the energy team

○ Good Practice 4

Name of the building:
Nursing Home in Zochcinek, Poland

Title of the good practice

Thermo-modernization of public buildings in the Poviat of Opatow - Nursing Home in Zochcinek

Does this practice come from a European funding program?

The practice came from Interreg Europe/ Enerselves Project

Short Summary of the practice

Thermo-modernization of public buildings in the Poviat of Opatow: House of Social Assistance in Zochcinek, building A, B and 5.

Detailed information on the practice

The practice concerns the modernization of four buildings of the Nursing Home in Zochcinek, Poland.

Building "A" was established in 1992. Due to the fact that external walls do not meet the requirements in the field of thermal standards, their insulation is planned by gluing styrofoam boards. In the case of walls in the attic, it is planned to protect the wool with PE foil.

The ceiling under unheated attic is planned to be insulated with mineral wool and secured with PE foil. As part of thermo-modernization projects, it is planned to replace the window frames in the basement with a new one on PVC profiles. As part of the planned works, the construction of a gas absorption heat pump and central heating installation is also planned.

As a result of thermal modernization, the facilities will be supplied from the gas installation.

Building "B" comes from 2002. The building is planned to replace the oil boiler and replace the central heating system, replace the CWU installation and the construction of new heat storage tanks, external insulation of external walls by gluing polystyrene boards and replacement of window frames for new ones on PVC profiles. Building "5" was created in 1994.

Due to the fact that the ceiling under an unheated attic does not meet the requirements in the field of thermal insulation, it is planned to be insulated with mineral wool and protected with PE foil. In addition, it is planned to perform the modernization of the heating system.

According to the project, about 1 mn Euro was allocated to construction works. The works were co-financed from
the funds of the Regional Operational Program of the Świętokrzyskie Voivodeship for the years 2014-2020, Measure
3.3 "Improvement of energy efficiency in the public and residential sector"

Evidence of success

Construction works are being carried out as part of this task.

Performed, among others insulating ceilings, external walls, window carpentry has been replaced.

Works related to the installation of photovoltaic panels, heat pumps and the installation of a gas installation are in progress.

Additional effects: significant reduction of carbon dioxide emissions (66%) and an increase in the share of renewable energy sources in the overall balance of energy demand, reaching 10.2%.

Challenges encountered

In the course of the contract, there were doubts of contractors whether for installation of gas heat pumps and other construction works outside the outline of the building should apply 23% VAT rate and whether for works within the building should apply an 8% VAT rate.

Potential for learning or transfer

The described investment, which will be implemented under the project called "Thermo-modernization of public buildings in the Poviat of Opatów", shows that thermomodernization should be approached comprehensively, interfering with both in the central heating installation, installation for preparing hot tap water, window and door woodwork, insulation of walls or ceiling, but taking into account social factors.

The Social Welfare Home in Zochcinek supports people in need, supports families, strives for a dignified standard of living, and acts as a center of cultural activity.

The area organizes events and events covering the residents of not only the inhabitants of the village of Zochcinek
or the Opatów Commune, but also the whole of the Opatów district.
The thermo-modernization carried out will contribute to achieving the desired ecological and economic effects and will significantly improve the standard of living of the charges of the center and the staff.

Further information

https://www.interregeurope.eu/policylearning/good-practices/item/877/thermo-modernization-of-public-buildings-in-the- poviat-of-opatow-nursing-home-in-zochcinek/

Photos

○ Good Practice 5

Name of the building:
Municipal Public Building in Tivoli Municipality, Italy

Title of the good practice

Energy refurbishment of public building according to environmental minimum criteria.

Does this practice come from a European funding program?

The practice came from Interreg Europe/ Support Project. In addition, the refurbishment project was funded by structural EU funds.

Short Summary of the practice

Energy efficiency interventions on public building. Pilot project to define invitation to tender "Product specification" to Environmental Minimum Criteria.

Detailed information on the practice

The practice was born as eligible projects under the Call for proposals "Energia Sostenibile 2.0" Por Fers Lazio 2014- 20 Asse 4, Azione 4.1.1. and it was made by the Tivoli Municipality and Regione Lazio gave technical support.

As outcome of Energy audit and cost/benefit analysis, that was made by the Water Resources and Soil Protection Department of Regione Lazio, the following interventions were defined:

- Heating and lighting system: replacement of existing boiler with modular condensing one, fitting thermostatic valves on radiators, replacement of lamps with LED lightning system;
- Intervention on the building envelope: replacement of windows;
- Intervention for renewable energy production: photovoltaic modules installation;
- Further interventions: electric and thermic consumption monitory system, external display and remote monitory system of photovoltaic plant.

Regione Lazio supported the Tivoli Municipality for the drafting of technical and administrative documents required to conform the invitation to tender to CAM (environmental minimum criteria) in accordance to Directives 2004/17/EC and 2004/18/EC, as implemented in national law D.M. 11/10/2017: Special Terms of Contract and "Product specification" .

The intervention has been able to guarantee 50% of reduction of energy cost estimated in € 20.444,00 per year.

Sources and amount of funding: The project's budget was 536.858,00 Euros, it was financed by EU structural funding under the Regione Lazio's call "Energia Sostenibile 2.0" Por Fers Lazio 2014-20 Asse 4, Azione 4.1.1.

Human resources: Tivoli Municipality and Regione Lazio technical office.

Evidence of success

The monitoring results confirmed the estimated energy saving:

- Upgrade of the building from category F to B.
- Global energy performance ratio KWh (mq x year) reduced from 204,00 to 85,03.
- Heating consumption m^3/year reduced from 35.04 to 20.33.
- Illumination and electric consumption KWh/year reduced from 39.359 to 10. 949
- Energy production KWh/year 8.010
- Primary Energy equivalent consumption KWh (conversion factor =2,17) from 85.409 to 23.759, reduction of 72%.

Challenges encountered

The intervention has fostered a positive relation between different public administration: Regione Lazio supported the local municipality's lack of Knowledge.

Potential for learning or transfer

The main success factors of the practice (which can be transferred to other contexts) can be thus synthesized to (a) good use of EU funding, as the two steps call helped the small municipality to programme first feasibility studies (Energy audit included) and then (b) the realization of works adequate to new environmental law.

Further information

https://www.interregeurope.eu/policylearning/good-practices/item/2367/energy-refurbishment-of-public-building-in- according-to-environmental-minimum-criteria/

Photos

2.3. Cyprus

- Good Practice 1

Name of the building:

1. Municipality of Strovolos [Town Hall, Municipal Theatre, Cultural Centre] 2. Municipality of Lakatamia[Town Hall, Town Hall and extra offices, Multifunctional Centre of Lakatamia, 3.Municipality of Aradippou[Town Hall, Cultural Centre, Municipal Infirmary 4.Municipality of Agios Athanasios[Town Hall, Municipal Playroom, Laboratory of Steel Structures]

Title of the good practice

"Energy Saving Competitions for local authorities"

Does this practice come from a European funding program?

Energy competitions between the energy teams of municipalities are one of the objectives of the European project Compete4SECAP (C4S). The project promotes the adoption of standardized energy management systems in municipalities through the coordination of national competitions and peer-to-peer exchanges which steer the attention and involvement of local to national authorities in 8 European countries. The project also helps facilitate the upgrade of SEAPs into Sustainable Energy and Climate Action Plans (SECAPs), as per new planning approaches promoted by the Covenant of Mayors.

Short Summary of the practice

The public sector has an exemplary role in energy efficiency, as well as in adapting to climate change. Public sector workers are taking action on climate change and promoting energy-efficient behavior in their buildings. The Municipalities of Aradippou, Agios Athanasios, Lakatamia and Strovolos take part in the competition, with three buildings each. Each building created its own Energy Team, which was responsible for completing the day-to-day challenges of recognizing significant energy consumption in their buildings, saving energy through behavioral measures, and reducing the carbon footprint of building users. for a total of 7 weeks.

Detailed information on the practice

People tend to think that offices are not really problematic from an environmental point of view – in comparison to industry, transport as well as households surely they do not contribute so much to pollution and, in the case of climate change, GHG emissions. As an increasing number of people work in offices, it is of great importance that attention is paid to energy consumption and use there. Research and experience suggest that up to 20% energy saving can be achieved through activities focusing on behaviour change.

(Source: European Environment Agency (EEA) (2013) Achieving energy efficiency through behaviour change: what does it take? Copenhagen, Denmark. 52 p. Available from: http://www.eea.europa.eu/publications/achieving-energy-efficiency-throughbehaviour)

The Energy Competitions reached their objectives by targeting every day, often routine behaviour such as turning lights on and off, setting the temperature for the heating and cooling system, using office equipment, maintaining the different systems (heating, lighting, etc.) and equipment, organizing events, eating and drinking, travelling, etc.

As part of the energy competitions, a guidebook was created that contains best practice examples of office buildings, case studies and tips for the Energy Teams in the participating buildings on how to help, organize and motivate people for a more energy efficient behaviour in the workplace.

The Energy Saving Competition gathered participants from the Cypriot municipalities of Strovolos, Lakatamia, Aradippou, and Ayios Athanasios, from 12 public buildings, including the 4 Town Halls, cultural centres, a public theatre, a public playroom, and more. The Energy Teams followed a 7-week challenges period, where they were challenged on daily basis, competing for the weekly prize, which was later awarded by the Cypriot coordinator of the project, the Cyprus Energy Agency. The gifts provided included desk LED lights, lemon trees, water bottle thermos and stand-by killers.

CEA created private messaging groups for each energy team, where the teams could demonstrate their actions by sending pictures or by just describing the actions they have taken. A point award system was created by CEA and the Energy Teams were gaining points per action taken, with additional points being given if they managed to demonstrate extra actions beyond the predefined challenges. Extra actions refer to the adoption of the energy management and saving practices by the participants in their daily life -other than at their workplace- and the engagement of more people at their work or in their life, to practice such actions and adopt them.

Taking this into account, CEA rewarded those extra willing members outside of the 'winning team of the week', with a special trophy named 'The Energy Saver of the Week', focusing on the person that went the extra mile to ensure the energy efficiency of his/her working place.

Also, Energy Teams had to complete several tasks like:

- Poster design and internal electronic newsletters to remind people of energy saving practices in the office and to promote this habit to all staff
- Short informative trainings lasting 30'-60' (Information through tools such as: videos, short presentations)
- "Energy police officers" : During the day, municipal employees can identify points where energy is being wasted and report them
- Completion of a questionnaire

Main stakeholders and beneficiaries:

- Energy Team members
- Colleagues
- People/customers visiting the offices
- People in the municipality

Evidence of success

In the table below the final results in the Energy Saving Competitions are given. A total of 26.89MWh of energy was saved, which corresponds to 2,6% of the energy consumption.

Name of the building	Energy savings, MWh	Energy savings, %
Strovolos Town Hall	Not achieved	
Strovolos Town Hall Theatre		
Agios Athanasios Municipal Playroom/ Children Care Unit		
Lakatamia Multifunctional Center		
Lakatamia Town Hall		
Aradippou Warehouses		
Agios Athanasios Town Hall	0.36	0.3
Lakatamia Municipal Storage Offices	0.2	0.8
Aradippou Town Hall	5.78	8.2
Strovolos Cultural Center and Municipal Library	16.6	12.7
Agios Athanasios Laboratory of Steel Structures	0.43	49.4
Aradippou Museum	3.52	54.9

Table 1: Final results of the Energy Saving Competitions

Challenges encountered

People are really good with excuses when it comes to changing their everyday habits and lifestyle especially, if they are not so much on the green side. Therefore, the biggest challenge was to persuade as many people as possible to take part in the energy competitions.

Potential for learning or transfer

The example of the Energy Competitions is considered as a good practice because it can be easily adopted by other local authorities and public services which are housed mainly in office buildings. In addition, many of the practices applied in the Energy Competitions can be included in the Sustainable Energy and Climate Action Plans (SECAPs) of the local authorities.

The buildings and municipalities that participated in these competitions are also encouraged to meet other challenges in support of other areas of energy efficiency, such as green public procurements

Moreover, employees are encouraged to continue in their homes what they have already done during the Energy Competitions.

Further information

Compete4Secap project website (https://compete4secap.eu/kypros/)

Photos

Awarding prizes to the winners of Energy Competitions

○ Good Practice 2

Name of the building:

Legislation Department Building - EMS

Title of the good practice

"Thermal insulation of the roof and demonstrative application of a green roof"

Does this practice come from a European funding program?

The energy renovation of the Legislation Department Building of the Department of Electromechanical Services (EMS) was one of the deliverables of the Strategic Project called "ENERGEIN". The "ENERGEIN" project aimed to implement real demonstration projects of Energy Saving & Renewable Energy Sources (RES), in buildings, premises and facilities of the public sector, as well as in the preparation of strategic development plans.

The project had a duration of 2 years and a total budget of 4.000.000 euros. It concerned the promotion of RES and energy saving in public buildings and is part of the Cross-border cooperation program "Greece - Cyprus 2007-2013" funded by Community Resources (ERDF 80%) and national resources (20%). For Cyprus the budget was 1.600.000 euros and 4 Buildings have been selected one of which was the Legislation Department building of EMS.

Short Summary of the practice

The Legislation Department Building is an office complex with a total useful area of approximately 480 m^2, consisting of Ground Floor and 1st Floor. The energy upgrade measures implemented in this building were:

- Installation of wall thermal insulation,
- Replacement of the existing external frames with new high thermal efficiency frames,
- Installation of waterproofing, thermal insulation of the roof and creation of a green roof of extensive type (planted roof).
- Replacement of existing luminaires (fluorescent lamps) with new high efficiency (LEDs).
- Installation of human presence detectors for the automatic deactivation of local lighting and air conditioning units
- Installation of a 6 kW photovoltaic system (panels and inverter) connected to the EAC network.

From the above measures the green roof was considered as the good practice for the specific project.

Detailed information on the practice

The term "green roof" means a roof that has been converted into a garden, which grows in controlled conditions, with many environmental and economic benefits. For the installation of "green roof", firstly all existing coatings were removed in the old part of the Building roof and a new waterproofing was installed. Then, the roof was thermal insulated with 50 mm thick stone wool slabs and with a thermal conductivity (λ) of 0,036 W / mk. Finally, an extensive green roof was formed.

Before the installation of the green roof, the existing roof has a U-value of 2 W/m^2K and after the installation the U-value was calculated to be < 0,2 W/m^2K.

Evidence of success

With the application of the green roof, it is expected to significantly reduce the consumption of electricity and oil for the cooling and heating needs of the building. The green roof can function as an additional thermal insulation to the roof achieving more than 50% of energy reduction and can extends the life of the thermal insulation. In addition, it limits the steep flow of rainwater in rainfall, filters and improves the city air by retaining particles and dust, absorbs noise and solar radiation and reduces the phenomenon of "urban thermal island". Finally, a beautiful recreation and rest area was created for the building staff.

Challenges encountered

n/a

Potential for learning or transfer

The pilot construction of a green roof in the EMS' building was very innovative for Cyprus. The benefits of this type of roof insulation were significant and proved that it can be easily applied in the buildings of Cyprus even when there are such high temperatures, especially in summer. Therefore, it is a good example so that this alternative way of thermal insulation can be promoted and applied in other buildings. .

Further information

Website: www.energein.gov.cy

Video: https://youtu.be/vpXO_T9uEGs

Photos

Installation of the green roof in EMS's building

Source: Photos obtained from the Presentation of Elena Anastasiadou, Department of Public Works

Good Practice 3

Name of the building:

(a) St. Andrew's Elementary School (CA & KB), (b) Lakatamia Elementary School, (c) Hatzigeorgaki Kornesiou Elementary School, (d) Livadia Elementary School, and (e) Elementary School Voroklini school.

Title of the good practice

"Energy Audits in School Buildings"

Does this practice come from a European funding program?

One of the main results of the Interreg Med program is the transfer of energy efficiency to the Mediterranean schools "TEESCHOOLS", through the implementation of five Energy Audits at selected public school buildings. TEESCHOOLS which is co-financed by the European Regional Development Fund, began its implementation in 2017 and is due to be completed by 2020. Its objective is to provide technical and financial support to local and / or national authorities for the implementation of actions related to the energy upgrading of Mediterranean school buildings into Nearly Zero Energy Buldings.

Short Summary of the practice

A total of five primary school buildings were selected from the provinces of Nicosia and Larnaca based on predefined criteria. The schools selected are representative examples of a typical school facility located in the territory of Cyprus. The implementation of an energy audit aims at assessing the current energy consumption of schools and proposing actions and measures that will lead to energy savings and exploitation of renewable energy sources.

Detailed information on the practice

The energy audits in the five schools, includes extensive reports on all the necessary elements, which must be taken into account during the energy upgrade of a school building. These includes the legal framework, the existing energy consumption of the building, the evaluation of its individual characteristics (building envelop, electromechanical equipment), as well as the climatic data of the area under consideration.

Based on these data and following the Life Cycle Cost Assessment methodology, various proposals and solutions were considered, which concerned two basic scenarios: (a) the energy upgrade of individual components of each school building and (b) the total energy upgrade to NZEB, as defined in the existing national legislation [KDP 366/2014].

The individual measures for energy upgrade mainly concerned:

- thermal insulation of the roof,
- replacement of the lighting system,
- installation of a photovoltaic [PV] system for electricity generation,
- adjustment of the oil boiler to increase its efficiency and,
- thermal insulation of the piping of the heating system.

Apart from the above measures, the installation of wall thermal insulation, the replacement of the window frames and the installation of PV system to cover at least 25% of the primary energy consumption of the building, were also implemented in order to convert these buildings into NZEB.

It is noted that recommendations were given to individual schools regarding passive heating and cooling strategies, as well as to improve air quality and reduce relative humidity in areas with increased problems.

Main stakeholders and beneficiaries:

- Technical services of the Ministry of Education, Culture, Sport and Youth
- Energy Auditors
- School Boards
- Local Authorities
- Teachers & Students

Evidence of success

The estimated reduction of the primary energy consumption for the five pilot schools is 66% (or 80,685 kWh/year). As shown in table below, the NZEB scenario also has a significant environmental impact, as a reduction of about 22,450 $KgCO_2$/year was achieved, equivalent to 67% decrease compared to the baseline scenarios.

Schools	Baseline Annual Consumption			Total cost for the energy renovation to NZEB [€]	Post Renovation estimated Consumption - NZEB level		
	Primary Energy [kWh_{prim}/m^2year]	Carbon emissions [$KgCO_2$/year]	Average Energy Cost [€/year]		Primary Energy [kWh_{prim}/m^2year]	Carbon emissions [$KgCO_2$/year]	Average Energy Cost [€/year]
a	64,25	27,207	63,340	288,915	31,10 (-52%)	13,215 (-51%)	3,075
b	73,30	39,980	9,390	348,515	24,80 (-66%)	13,205 (-67%)	3,145
c	118,85	62,515	15,525	338,470	47,90 (-60%)	24,254 (-61%)	6,240
d	67,80	17,745	4,435	181,231	16,25 (-76%)	3,950 (-78%)	1,025
e	52,20	24,435	6,305	414,554	11,65 (-78%)	4,995 (-80%)	1,395

Indicators for before and post renovation (NZEB)

Challenges encountered

The energy audits conducted in the 5 schools showed that the NZEB scenario which has the highest environmental and energy impact is considered as unsustainable in terms of the techno-economic analysis. Therefore, the NZEB scenario is proposed for implementation only if a concrete financial mechanism is in place.

Potential for learning or transfer

The example of the Energy Audits in schools is considered as a good practice because the methodology used can also be applied to other public buildings.

In addition, based on the results of the energy audits, the central government may announce measures (either financial or legislative) which will aim at the energy renovation of the schools.

Further information

TEESCHOOLS project website (https://teeschools.interreg-med.eu/)

Energy Audits in School Buildings - Results of a European Project TEESCHOOLS (2019) (http://www.cea.org.cy/en/teeschools/)

Photos

Energy audit in oil boiler

Good Practice 4

Name of the building:
n/a

Title of the good practice
"Financial incentives for the restoration and rehabilitation of listed buildings"

Does this practice come from a European funding program?
This practice does not come from a European funding program.

Short Summary of the practice
Financial incentives for sustainable construction fall into three categories (a) Financial incentives, which is the direct sponsorship given by the Government to the owner for the complete maintenance of the building under construction. No incentives are granted for partial building maintenance. (b) Transfer of Building Factor, which is on the one hand the utilization of development rights that are not used in the protected part by selling a remaining building factor and on the other hand securing additional sponsorship in the maintenance cost by selling a given building factor. (c) Tax incentives, which are the tax exemptions that can be taken by the owner of a listed building that has maintained it according to the Conservation Principles.

Detailed information on the practice
Starting from 1987, the 1st economic incentive programme was provided according to the provisions of the Law on Listed Buildings. This concerned a complex system of low interest loans and a grant for the preservation based on criteria according to the owners' income.
By 1992, the Programme was developed to form part of the Listed Buildings Act. The new Programme included, apart from low interest loans, direct grants, tax incentives and transfer of Development Rights, an innovative initiative even for today's standards. The aim of the new Programme was clearly the preservation of the architectural heritage, as it did not include income criteria in relation to the grant and loan. Later, the Programme was revised to offer significant increase of the grant-in-aid and of the architectural study and supervision subsidy, while it excluded the provision of low interest loans.
In 2019, Cyprus Energy Agency made a very important step in terms of energy upgrading of listed buildings. It was suggested that declared buildings should NOT be excepted from having an EPC when they will be restored, sold or rented, or if they are public buildings, as this will enhance the creation of an EPC data base and increase the knowledge regarding the energy efficiency of heritage buildings. In addition, in the case of Listed Buildings or Ancient Monuments, it was suggested that the exception of meeting the Minimum Energy Efficiency Requirements, during restoration/renovation phase, to be only applied if the Director of the Town Planning and Housing Department, or the Director of the Antiquities Department, or the Competent Local Authority -where applicable-, certify that this action will unacceptable alter their nature or appearance. In this way, the listed buildings can be included in the Support Schemes issued by the Minister of Energy, Commerce and Industry and concern the energy upgrade of the buildings.
The above proposals, which were based on the regional and interregional activities of the Interreg Europe project VIOLET, were incorporated to the draft version of "The Regulation on the Energy Performance of Buildings (Amendment) Law of 2019".
Main stakeholders and beneficiaries:

- Preservation Sector
- Local authorities (especially in traditional settlements)
- Professionals (architects, urban planners etc)
- Owners of the listed buildings

Evidence of success
Thanks to the incentives 3500 buildings have been restored up-to-date. The declaration of Listed Buildings is steadily increasing (about 70 buildings are declared each year). Restoration works are on-going for about 350 buildings per year. During the last years measures for the improvement of the buildings' energy performance are also taken even though listed buildings are exempted from meeting the minimum requirements. This allows the rehabilitation of these buildings based on modern standards.

Challenges encountered

Incentives were originally inadequate and paid before the implementation of the restoration/maintenance works. Thus, they readjusted to serve the main aim which is the preservation of the architectural heritage irrespectively of the owner's income. Also the subsidies are now given after the works.

Potential for learning or transfer

The necessity for the financial assistance to owners of listed buildings is common, since the financial cost involved in the restoration of listed buildings is very high. Emphasis should be given to the transfer of development rights incentive. It gives extra financial assistance to the owner of a listed building to preserve and restore it, and it helps the urban development and regeneration in the 'receiver' areas (ie. urban centres). The TPHD's incentives concern listed buildings to protect cultural and architectural heritage. They do not directly address the energy performance of buildings, which usually leads to noncompliance with the today's standards for energy efficiency. Energy upgrade interventions are not excluded, but the overall financing is considered too low to include these as well, therefore it is not a priority.

Further information

INTERREG EUROPE good practice (https://www.interregeurope.eu/policylearning/good-practices/item/2085/financial-incentives-for-the-restoration-and-rehabilitation-of-listed-buildings/)

Photos

Building before and after the renovation (Thesis RESTORATION OF PRESERVED BUILDINGS, Maria Nikodimou, Limassol 2016)

Good Practice 5

Name of the building:
n/a

Title of the good practice

"Joint Procurement for Energy Upgrading"

Does this practice come from a European funding program?

The practice comes from the Interreg Med program ENERJ. The activities of the ENERJ project aim at supporting local governments in achieving energy efficiency targets in their own municipal building stock through joint actions in a multi-level governance approach. Joint actions are intended as multiple local authorities joining forces for implementing their energy retrofit goals at centralized level, optimizing resources and boosting effectiveness.

Short Summary of the practice

The initiation of the Joint Actions was a joint procurement for 8 buildings of the 6 local authorities for the provision of energy audits and energy performance certificates for the identified buildings. This provided the baseline for the future definition of the joint actions, identifying common areas that need addressing and common upgrading solutions.

Detailed information on the practice

The ENERJ project helps the local authorities to see energy consumption and its reduction as a joint target that areas will need to tackle together. The Cyprus Energy Agency as a partner to the ENERJ project, mobilizes one Municipality (Pegeia) and five Communities (Drousia, Pano Arodes, Kato Arodes, Kathikas and Neo Chorio) that are part of the Akamas Peninsula, to identify the potential for energy upgrading.
One of the large consumers of energy is the buildings owned by these local authorities and therefore targets were set for upgrading those buildings. The most effective way to identify the energy consumption and the savings potential is through energy audits.
The energy audits provided the building owners with knowledge of the energy savings potential of their buildings and facilities. The legislation in Cyprus allows a group of public bodies to collectively procure with one public entity to be the procurer and therefore the joint action will take advantage of this and have one local authority with the technical capacity, to become the procurer. The procurements will be focused on one energy efficiency measure in more than one building. The measures will include installation of PV systems, lighting upgrading to LED and thermal insulation both rooftop and thermal.
Main stakeholders and beneficiaries:

- Local Authorities
- Energy Service of the Ministry of Energy, Commerce, Industry and Tourism
- Ministry of Insights (which funds the Communities budget)
- Energy Auditors
- ESCOs

Evidence of success

The table below presents the energy upgrade measures that have resulted from the energy audits in the 8 buildings of the local authorities and the expected savings.

Intervention	Description	Installation cost	Energy Savings	Money Savings	Payback time
1	Lighting replacement, installation of LED lighting in 4 buildings (Drousia primary school, Pegeia sports arena, Pano Arodes Community offices and Kato Arodes community offices)	9,733.00 EUR	8,899 kWh	1,334.92 EUR	7 years
2	Installation of 5kW PV system on the roofs of the Primary School of Drousia Community and the Multipurpose building of Peyia Municipality	13,000.00 EUR	18,000 kWh	2,700.00 EUR	5 years
3	Installation of roof insulation at the Pano Arodes Community offices, the Kato Arodes Community offices, the Neo Chorio Community offices and the Multipurpose building of Peyia Municipality	6,614.00 EUR	13,200 kWh	1,980.00 EUR	3 years
4	Installation of external thermal insulation at the Pano Arodes Community offices, the Kato Arodes Community offices and the Multipurpose building of Peyia Municipality	17,436.00 EUR	6,941 kWh	1,041.00 EUR	17 years

Table 3: Energy upgrade measures

Challenges encountered

The reports shown that without a governmental grant the complete energy upgrading will be difficult for the small communities.

Potential for learning or transfer

The joint actions between the local authorities are a very good example that shows that with the cooperation and a common strategy the solution of the problems related to the reduction of the energy consumption and the energy upgrade becomes easier.

In addition, the 6 local authorities agreed to join the Covenant of Mayors and submit a Joint Sustainable Energy and Climate Action Plan (SECAP). Their Joint SECAP will include the joint actions resulting from their collaboration on the ENERJ project.

Further information

ENERJ project website (https://enerj.interreg-med.eu/)
ENERJ Deliverables N 2.2.1 - Summary of project results
ENERJ Deliverables N 3.3.2. Report on the Joint Actions for Energy Efficiency
ENERJ Deliverable 4.1.1. – Evaluation report

Photos

Kato Arodes community council
Pegeia Town (JOINT SECAP)

2.4. Bulgaria

○ Good Practice 1

Name of the building:

"Lyuben Karavelov" Secondary School, Plovdiv

Title of the good practice

Implementation of construction works for the renovation of secondary school "Lyuben Karavelov" within the project "Educational infrastructure – construction and renovation of schools, kindergartens and nurseries in Plovdiv "

Does this practice come from a European funding program?

Procedure BG16RFOP001-1.001-039 "Implementation of Integrated Urban Reconstruction and Development Plans 2014-2020", Priority Axis 1 "Sustainable and Integrated Urban Development" under OP "Regions in Growth" 2014-2020.

Short Summary of the practice

The project of the Municipality of Plovdiv "Implementation of construction and installation works related to major repairs, reconstruction, improvement and implementation of energy efficiency measures in two buildings and their adjacent yards of "Lyuben Karavelov" Secondary school in two separate positions: Lot №1 - Renovation of "Lyuben Karavelov" Secondary School, building 1, located at 2 Lyutiche Str., Plovdiv; Construction of a new multi-functional building.

The implementation of the construction works is carried out in accordance with the approved investment project involving all energy saving measures prescribed in the energy audit including Measures for utilization of renewable energy sources that lead to compliance of the building with the statutory requirements for energy efficiency and have direct environmental effect.

- An energy audit has been performed - prescribed measures: thermal insulation of walls, thermal insulation of the roof and measures to increase energy efficiency
- Financing: Operational Programme "Regions in Growth" and the Municipality of Plovdiv
- Investments: BGN 271.52 thousand
- Energy saved per year: Electric energy 12.98 MWh / year; Thermal energy / TPP /30.23 MWh / year Total: 43.21 MWh / year
- CO2 emissions saved 16.40 tons / year

Detailed information on the practice

The good practice is under a project of the Municipality of Plovdiv "Educational Infrastructure" - construction and renovation works of schools, kindergartens and nurseries in the city under axis 1 "Sustainable and integrated urban development" of the Operational Programme "Regions in Growth" 2014-2020.
The funds are intended for the construction of a new kindergarten on Bogomil Street, major repairs and reconstruction, implementation of energy efficiency measures, improvement of yards, construction of sports grounds and facilities. The various measures affect "Lyuben Karavelov" Secondary School, "Snezhanka" Kindergarten, "Children's Laughter" Nursery, and "Perunika" Kindergarten.

The good practice includes the design of major repairs and reconstruction, implementation of energy efficiency measures, as well as reconstruction and improvement of the adjacent yard of "Lyuben Karavelov" Secondary School - building 1, located on 2 Lyutiche Str., Regulated plot of land - 1-school .

The building is massive with three above-ground and one semi-underground floor. It consists of two separate bodies built at different times.

The main building of "Lyuben Karavelov" Secondary School was built in 1935 - 1936. In 1964 a second building was built, functionally connected with the existing one. The roof is flat, made of reinforced concrete plate with a double-sided slope.

In 2008 the wooden windows of the building were completely replaced with PVC windows without a certificate for thermal conductivity.

The construction is carried out in accordance with the approved investment project, including all energy saving measures prescribed in the energy efficiency survey, including measures for utilization of renewable energy sources, which lead to compliance of the building with the regulatory requirements for energy efficiency and have a direct environmental effect.

Investor: Plovdiv Municipality: code NUTS: BG421

Contractor ST "Metallic - Ivan Mihailov" from Plovdiv, determined by an open procedure under the Public Procurement Act.

The activities for implementation are: major repairs and reconstruction, implementation of energy efficiency measures, as well as reconstruction and improvement of the adjacent yard, construction of a new multifunctional hall with a swimming pool at "Lyuben Karavelov" Secondary School, building 1, located on Lyutiche Str. "№ 2, Regulated plot of land I - school, quarter 445 according to the plan of the First part of the city - north, Plovdiv.

- Total area - 5208.25 sq. m.
- Total school area - 2680.00 sq. m.
- Total sports hall - 2429.44 sq. m.
- Total heating connection - 98.81 sq. m.
- According to Art. 137 of the Spatial Development Act, the site is Third Category,
- Value excluding VAT: BGN 3,659,480.02 or BGN 4,391,376.02 including VAT

The main activities include:

Renovation of the existing building:

- Replacement of facade windows with PVC with double glazing
- Thermal insulation - renovation of facade walls: facade thermal insulation system with EPS base plates, finish, silicone plaster is a plinth of granitogres tiles
- Rehabilitation of roofs - roof thermal insulation system with base plates of stone wool, etc.
- Thermal insulation - renovation of the basement - internal thermal insulation of walls with EPSM internal thermal insulation of floors and ceilings with XPS
- Energy efficient optimization of the electrical installation: installation of energy saving lamps; replacement of internal lighting installation; replacement of power installation; construction of new site lighting and networks
- Internal repair works
- Construction of a new multi-functional building .

Subproject: Multifunctional hall with pool

The building with a multi-functional hall with a swimming pool is located in the eastern part of the yard, providing the necessary easements. A connection between the two buildings is provided.

Additional information:

- information about the survey/ investigation - prescribed measures: insulation walls, roof insulation
- Implemented measures to increase energy efficiency: thermal insulation walls, thermal insulation roof, replacement of windows
- Ownership: Public-municipal
- Sources of funding: OP " Regions in Growth " and the Municipality of Plovdiv
- Investments: BGN 271.52 thousand
- Energy saved per year: El. energy 12.98 MWh / year; Thermal energy / TPP / 30.23 MWh / year Total: 43.21 MWh / year.
- CO2 emissions saved: 16.40 tons / year.
- CO2 emissions saved: 16.40 tons / year.

Specifically:
Solar installation for DHW at "Lyuben Karavelov" Secondary School Installed power 5,152 kW; Energy saved per year - El. energy 3334 kW / year.
Savings BGN 666.8 / year ; CO2 emissions saved 2.730546 tons / year; Investments total BGN 8,948 .

"Lyuben Karavelov" Secondary School has 2 buildings on 2 sites.
Information for building 2:
This building is not included in the good practice.
Overhaul and reconstruction, implementation of energy efficiency measures, a Secondary as well as reconstruction and improvement of the adjacent yard of "Lyuben Karavelov" Secondary School - building 2, 37 Mara Gidik Str., Regulated Plot of Land I - 520,383, School, quarter 501 according to the plan of First city part - south, Plovdiv
The implementation of the construction will be realized in accordance with the approved investment projects. The planned activities include: major repairs and reconstruction, implementation of energy efficiency measures, as well as reconstruction and improvement of the adjacent yard of "Lyuben Karavelov" Secondary School, building 2, located at 37 Maragidik Street, Regulated Land I - school, quarter 501 according to the plan of the First city part - south, Plovdiv.
Total area of the building - 1805.23 square meters; BGN 2,389,114.85
According to Art. 137 of the Spatial Development Act, the site is the Fourth category It is performed separately from building № 1.

Building No 1 together with the construction of a new multi-functional building is subject to the good practice.

Evidence of success

The evidence for success is:
An energy audit was carried out - prescribed measures: thermal insulation of walls, thermal insulation of the roof
Measures have been taken to increase energy efficiency: thermal insulation walls, thermal insulation roof, replacement of windows
Ownership: Public-municipal
Sources of funding are: OP "Regions in Growth" and the Municipality of Plovdiv Investments: BGN 271.52 thousand
Energy saved per year:
El. energy 12.98 MWh / year; Thermal energy / TPP / 30.23 MWh / year Total: 43.21 MWh / year.
CO2 emissions saved: 16.40 tons / year.

Specific for the solar installation :
Solar installation for domestic hot water at “Lyuben Karavelov” Secondary School
Installed power 5,152 kW; Energy saved per year - El. energy 3334kW/year
Savings BGN 666.8 / year; CO2 emissions saved 2.730546 tons / year; Investments total BGN 8,948.

Challenges encountered

The Municipal energy efficiency projects are implemented in accordance with regulations, development of investment projects, public announcement in the Public Procurement Agency and conducting a procedure for selection of contractor and conclusion of a contract and implemented in accordance with the Operational Programme „Regions in Growth ".
The project "Educational Infrastructure" of the Municipality of Plovdiv covers 6 schools and kindergartens.
The implementation of the individual projects increases the competence of the municipal employees and of the managements of the schools and kindergartens. The lessons learned are a good basis for future projects and initiatives.

Potential for learning or transfer

This practice has been developed and implemented in accordance with the Operational Programme "Growing Regions", priority axis "Educational infrastructure" activities: Construction, reconstruction, renovation and equipment of municipal schools;

Priority Axis 2 "Support for energy efficiency in peripheral support centers"

The activities that can receive funding under it include: Implementation of energy efficiency measures in residential buildings, in administrative buildings of the state and municipal administration, and in municipal public buildings of the educational, cultural and social infrastructure.
This practice and others similar are reported in the annual analyses of the implementation of municipal and regional energy efficiency programmes by regions of economic planning in Bulgaria by the Agency for Sustainable Energy Development..

The Operational Programme „Regions in Growth” „2014-2020 (OPRG) is co-financed by the EU through the ERDF. The implementation of Energy Efficiency (EE) projects and major renovations of existing buildings is an investment priority "Providing support for energy efficiency, smart energy management and the use of renewable energy in public infrastructure, including public buildings and the housing sector" - within the following priority axes:

- Priority Axis 1: Sustainable and integrated urban development;
- Priority Axis 2: Support for energy efficiency in support centres in peripheral areas

The Municipality of Plovdiv also implements other projects such as: Repaired and reconstructed building stock with implemented energy efficiency measures, landscaped yard of Kindergarten “Snezhanka”; Repaired and reconstructed building stock with implemented energy efficiency measures, landscaped yard of the nursery "Children's Laughter"; Repaired and reconstructed building stock with implemented energy efficiency measures, landscaped yard of the Secondary School "Lyuben Karavelov" - building 2; Repaired and reconstructed building stock with implemented energy efficiency measures, landscaped yard of kindergarten "Perunika"; A new kindergarten was built on Bogomil Street.

Further information

https://www.plovdiv.bg/item/projects/energyefficiency/

http://op.plovdiv.bg/?q=page&idd=index&porachkaid=20180412wQtP6359456

http://www.aop.bg/ng/form.php?class=F02_2014&id=842105&mode=view

http://www.aop.bg/case2.php?mode=show_doc&doc_id=842101&newver=2
http://op.plovdiv.bg/?q=page&idd=index&porachkaid=20180412wQtP6359456

Photos

- Good Practice 2

Name of the building:
Language high school, Plovdiv

Title of the good practice

Construction and installation work for Increasing the energy efficiency of Plovdiv Language High School under a project funded by the National Trust Ecofund / NTEF /

Does this practice come from a European funding program?

Funding is from:
The National Trust Ecofund (NTEF) was established in October 1995. The fund manages funds provided by the state budget, including under swap transactions to replace "Debt against the environment" and "Debt against Nature"

Evidence of success

"Construction and installation work for increasing the energy efficiency of" Plovdiv Language High School" under a project funded by the National Trust Ecofund / NTEF /" is a project of the Municipality of Plovdiv

The increase of energy efficiency includes the following types of construction and installation works in the educational building, a dormitory for boys and a dormitory for girls:

- Construction of thermal insulation system and facade plaster on external walls:
- southern, eastern facade and staircase of the educational building;
- All facades of dormitories for boys and girls, with already about 1/3 of the thermal insulation on the walls of the dormitory for girls;
- Thermal insulation of floors to unheated rooms: gym, warm connection and part of the corridor first floor of School educational building;
- Thermal insulation of bay windows/ jetties; Thermal insulation of ceilings - laying of mineral wool on cold roofs;
- Replacement of non-replaced windows;
- Replacement of internal heating installation;
- Construction of a solar installation for domestic hot water;
- Built-up area by subprojects: Educational building - 1770 sq.m., Dormitory for boys- 552 sq.m, Dormitory for girls - 552 sq.m.

Detailed information on the practice

The good practice "Carrying out construction and installation work to increase the energy efficiency of "Plovdiv Language High School" under a project funded by the National Trust Ecofund / NTEF /" is a project of the Municipality of Plovdiv.
The project includes construction and installation works to increase energy efficiency in the Language High School Plovdiv, namely: Educational building of the Language School Plovdiv, dormitory for boys of the Language High School Plovdiv, dormitory for girls of the "Language School Plovdiv, construction of thermal insulation system and facade plaster on external walls: south, east facade and stairwell of the school building, all facades of the dormitories for boys and girls, with already about 1/3 of the thermal insulation on the walls of the dormitory for girls; thermal insulation of floors to unheated rooms; gym, warm connection and part of the corridor of the first floor of Educational building; Thermal insulation of bay windows; thermal insulation of ceilings - laying of mineral wool on cold roofs; replacement of non-renewed joinery; Replacement of internal heating

installation;
Construction of a solar installation with DHW, Built-up area by subprojects: Educational building 1770 sq.m.; Dormitory for boys. 552 sq.m., Dormitory for girls -552 sq.m. The total quantity and volume is in accordance with Quantitative Value Account and technical specifications, an integral part of the documentation.
Assignor: Municipality of Plovdiv
Public procurement Directive 2014/24/EC/ЗОП – № 000471504

Total value of the contract BGN 980,000, 25
Performed activities on the three buildings of Plovdiv Language High School:

1. Name of the building Language High School Plovdiv - educational building; Total area 3947 sq. m.
   - Information for performed inspection - thermal insulation of walls, floor, roof thermal insulation, replacement of joinery, installation of new heating and solar installations
   - Implemented measures to increase energy efficiency: thermal insulation walls, floor, thermal insulation roof, replacement of windows, installation of new heating and solar installations
   - Ownership: Public-municipal
   - Sources of funding: NTEF and the Municipality of Plovdiv
   - Investments: BGN 363.97 thousand
   - Energy saved per year: Thermal energy / TPP / 479.63 MWh / year Total: 479.63 MWh / year.
   - CO2 emissions saved 139.09 tons / year

2. Name of the building Plovdiv Language High School - Plovdiv Language High School - Boys' dormitory; Total area 3,015.0 sq. M.
   - Information about the performed inspection - thermal insulation of walls, floor, thermal insulation of roof, replacement of joinery, installation of new heating and solar installations
   - Implemented measures to increase energy efficiency: thermal insulation walls, floor, roof insulation, replacement of windows, installation of new heating and solar installations
   - Ownership: Public-municipal
   - Sources of funding: NTEF and Plovdiv Municipality
   - Investments: BGN 319.17 thousand
   - Energy saved per year: Thermal energy / TPP / 287,712 MWh / year Total: 287,712 MWh / year.
   - CO2 emissions saved 83.44 tons / year

3. Name of the building Plovdiv Language High School - Plovdiv Language High School - Girls' dormitory; Total area 3,015.0 sq. M.
   - Information about the performed inspection - thermal insulation of walls,floor, thermal insulation of roof, replacement of joinery, installation of new heating and solar installations
   - Implemented measures to increase energy efficiency: thermal insulation walls, floor, roof insulation, replacement of windows, installation of new heating and solar installations
   - Ownership: Public-municipal
   - Sources of funding: NTEF and Plovdiv Municipality
   - Investments: BGN 297.10 thousand
   - Energy saved per year: Thermal energy / TPP / 287,712 MWh / year

Total: 280,87 MWh / year.

- CO2 emissions saved 81.45 tons / year

Evidence of success

The evidences for success is as follows :

1. **Name of the building Language High School Plovdiv - educational building; Total area 3947 sq. M.**
   - Information for performed inspection - thermal insulation of walls, floor, roof thermal insulation, replacement of joinery, installation of new heating and solar installations
   - Implemented measures to increase energy efficiency: thermal insulation walls, floor, thermal insulation roof, replacement of windows, installation of new heating and solar installations
   - Ownership: Public-municipal
   - Sources of funding: NTEF and the Municipality of Plovdiv
   - Investments: BGN 363.97 thousand
   - Energy saved per year: Thermal energy / TPP / 479.63 MWh / year Total: 479.63 MWh / year.
   - CO2 emissions saved 139.09 tons / year

2. **Name of the building Plovdiv Language High School - Plovdiv Language High School - Boys' dormitory; Total area 3,015.0 sq. m.**
   - Information about the performed inspection - thermal insulation of walls, floor, thermal insulation of roof, replacement of joinery, installation of new heating and solar installations
   - Implemented measures to increase energy efficiency: thermal insulation walls, floor, roof insulation, replacement of windows, installation of new heating and solar installations
   - Ownership: Public-municipal
   - Sources of funding: NTEF and Plovdiv Municipality
   - Investments: BGN 319.17 thousand
   - Energy saved per year: Thermal energy / TPP / 287,712 MWh / year Total: 287,712 MWh / year.
   - CO2 emissions saved 83.44 tons / year

3. **Name of the building Plovdiv Language High School - Plovdiv Language High School - Girls' dormitory; Total area 3,015.0 sq. m.**
   - Information about the performed inspection - thermal insulation of walls, floor, thermal insulation of roof, replacement of joinery, installation of new heating and solar installations
   - Implemented measures to increase energy efficiency: thermal insulation walls, floor, roof insulation, replacement of windows, installation of new heating and solar installations
   - Ownership: Public-municipal
   - Sources of funding: NTEF and Plovdiv Municipality
   - Investments: BGN 297.10 thousand
   - Energy saved per year: Thermal energy / TPP / 287,712 MWh / year

Total: 280,87 MWh / year.

- CO2 emissions saved 81.45 tons / year

Challenges encountered

Municipal energy efficiency projects are implemented in accordance with regulations, development of investment projects, public announcement in the Public Procurement Agency and conducting a procedure for selection of contractor and conclusion of a contract and in accordance with the funding program / institution.

The implementation of the individual projects increases the competence of both the municipal employees and the managements of the schools and kindergartens. The lessons learned are a good basis for future projects and initiatives.

Potential for learning or transfer

The National Trust Ecofund (NTEF) with its Investment Programme for Climate - Energy Efficiency finances energy efficiency measures in many municipalities of Plovdiv region and South Central region - Rakovski Municipality, Sadovo Municipality, Maritsa Municipality, Parvomay Municipality, Devin Municipality, Momchilgrad Municipality, Haskovo.
The current good practice can be transferred to other high schools and vocational schools in the city of Plovdiv , in all 5 districts (NUTS 3) of South Central Region (NUTS 2).

Further information

https://www.plovdiv.bg/item/projects/energyefficiency/

http://op.plovdiv.bg/?q=page&idd=index&porachkaid=20181001Bioh7070694

http://www.aop.bg/ng/form.php?class=F02_2014&id=870555&mode=view

http://www.aop.bg/case2.php?mode=show_doc&doc_id=870552&newver=2

Photos


ЕЗИКОВА
ГИМНАЗИЯ
„ПЛОВДИВ"


1
2

○ Good Practice 3

Name of the building:
University of Food Technologies - Plovdiv

Title of the good practice

Energy efficiency, improving access for disadvantaged people at the University of Food Technology - Plovdiv and modernization of information services

Does this practice come from a European funding program?

Procedure BG16RFOP001-1.001-039 "Implementation of Integrated Plans for Urban Reconstruction and Development 2014-2020", Priority Axis 1 "Sustainable and Integrated Urban Development" under Operational Programme Regional Development 2014-2020.

Short Summary of the practice

The project "Energy efficiency, improving the access of disadvantaged people in UFT - Plovdiv and modernization of information services" is to improve the conditions for providing educational services at the University of Food Technology - Plovdiv by improving the energy efficiency of buildings, modernization of the library and ensuring equal access to education for disadvantaged people.

The project is implemented with the financial support of the Operational Programme "Regional Development" 2007-2013, co-financed by the European Union through the European Regional Development Fund. ", Grant scheme BG161PO001 / 1.1-07 / 2009, "Support for providing adequate and cost-effective infrastructure of higher education institutions in urban agglomerations".
It includes:
2.1 The introduction of energy efficiency measures in educational buildings № 4, № 3 and № 1
2.2 Ensuring equal access of disadvantaged groups to the educational service in the educational building № 1;
2.3. Modernization of the information service in the university library in the academic building №

Detailed information on the practice

This good practice is under Project BG161PO001 / 1.1-07 / 2009/010 "Energy efficiency, improving access for disadvantaged people at the University of Food Technology - Plovdiv", which is implemented with the financial support of the Operational Programme "Regional Development" 2007 -2013, co-financed by the European Union through the European Regional Development Fund ", Grant scheme BG161PO001 / 1.1-07 / 2009, "Support for the provision of appropriate and cost-effective infrastructure of higher education institutions in urban agglomerations in three separate positions:
Lot № 1 - Construction and installation work - implementation of energy efficiency measures in educational buildings No 1,3 and 4;
Lot № 2 - Repair of a heating plant and replacement of a boiler room in a educational building No 4;
Lot № 3 - Creating an accessible architectural environment for people with disabilities in a school building No 1;
Regarding:

1. The introduction of energy efficiency measures in educational buildings No 4, No 3 and No1
2. Ensuring equal access of disadvantaged groups to the educational service in the educational building No 1;

3. Modernization of the information service in the university library in the academic building No 1;

The performed activities under the project are as follows:

1. Implementation of energy efficiency measures in educational buildings No 1,3 and 4;
2. Works on facades
3. Educational building 1 - replacement of joinery 1836 m2, waterproofing of the roof 2520 m2 • educational building 3 - replacement of joinery 1017 m2, waterproofing of the roof 1700 m2, thermal insulation of walls and roof 4587 m2
4. educational building 4 - replacement of joinery 1089 , 50 m2, waterproofing of the roof 2097 m2, thermal insulation of walls and roof 4420.23 m2
5. Repair of a heating plant with a pipe network and replacement of a boiler room in educational building No 4;
6. Complete replacement of the pipe network of the educational building No 4delivery and installation of a condensing boiler - set with burner, circulating pumps
7. Heat exchange equipment
8. Vertical and horizontal pipe network for educational building No 4, condensing boiler complete with burner and circulating pumps
9. Creating an accessible architectural environment for people with disabilities in the educational building No1;
10. Delivery and installation of hydraulic elevator system for people; Load capacity 600 kg; Capacity - 8 people; Glazed panoramic cabin; Double sliding door; Three stops

The following results have been achieved:

- Three of its buildings were renovated by the University of Food Technology in Plovdiv under the project Energy Efficiency, Improving Access for Disadvantaged People and Modernization of Information Services;
- Energy efficiency measures have been implemented, leading to the reduction of consumption and the related harmful emissions of gases and to the improvement of learning comfort;
- Reduction of the costs for maintenance of the building stock and the heating facilities;
- Modernization of the information service in the library of UFT has been performed to support the learning processes and ensure free access to information;
- An accessible architectural environment is provided for the population, including people with disabilities;
- The main building I of the university was built in the 60s of the last century by a project of arch. Zhelyazko Stoykov - a complete replacement of the windows has been made; the current renovation also affects the northern part of building I, in front of the existing main entrance; put a new suspended facade of aluminium profiles with interrupted thermal bridge;
- An elevator with hydraulic drive and three stops was installed, corresponding to the main levels of the foyers of the building; A ramp for access of people with limited mobility was built to the entrance area;
- Complete renovation was performed on III and IV buildings; The changes in building III are mainly on the facades, where there is an installation of a thermal insulation

layer of HRS panels;

- In building IV a complete replacement of the heating system and the joinery has been carried out, and on the facade the same thermal insulation system has been laid;
- New shelf units in the entire library, including in the branch located in the student dormitories; installed fire alarm system.

Financing: a total of BGN 2,748,129, 85% from European funds under the Operational Programme Regional Development, 10% national co-financing and 5% from the University of Food Technologies – Plovdiv

The investments in the completed project will extend the life of the building and significantly improve its microclimate, as well as reduce energy costs for heating.

Evidence of success

The evidences for success are the following:
Three of the buildings were renovated by the University of Food Technology in Plovdiv. It was found that after the introduction of Energy Saving Measures the average heat savings for the year was achieved in the amount of 84.01% of the base energy consumption, and the energy saved for the three heating seasons after the project is 1514,079 MWh. The achieved environmental effect is 305,844 t of saved CO2 emissions. It
has been proven that as a result of the saved heat for the studied period (2012-2015) after the introduction of the ESM UFT, 130,165 white certificates will be available.

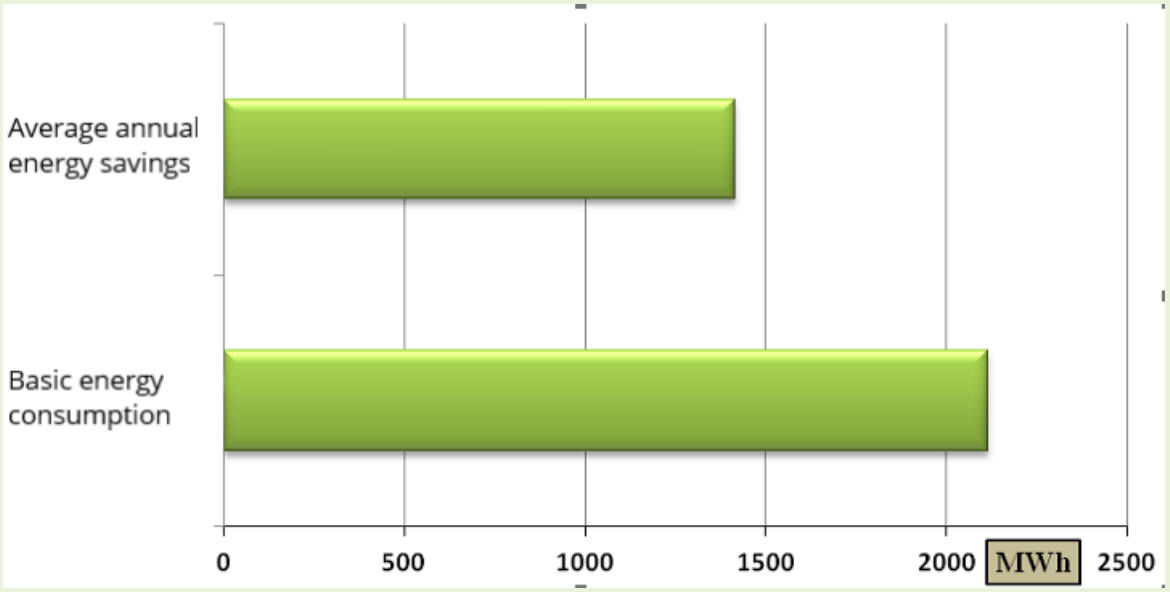
As a result of the project, we now have a beautiful and energy efficient building with a comfortable microclimate and a modern heating system. The latter is also used to train students.
Modernization of the information service in the library of UFT has been carried out to support the learning processes and ensure free access to information.
An accessible architectural environment is provided for the population, including people with disabilities.

According to the project, complete renovation was carried out on the III and IV building of the University of Food Technology: installation of a thermal insulation layer of HRS panels; complete replacement of the heating system and the windows with a thermal insulation system; supplied natural gas, which is the new source of fuel for the renovated heating boiler; new styling of the entire library, including the branch in the student dormitories; fire alarm system;

Energy saved for heating compared to the baseline

Indicator	Basic energy consumption, MWh	Energy consumption after ESM, MWh	Energy saved, MWh	Energy saved, %
Average per year	600,734	95,75	504,984	84,06
Average for heating season	600,734	96,041	504,693	84,01

Average annual energy savings relative to the baseline



Challenges encountered

The project is implemented under the Operational Program Regional Development 2007 - 2013, co-financed by the EU through the European Regional Development Fund in accordance with regulations, development of investment projects, public announcement in the Public Procurement Agency and conducting a procedure for selection of contractor / and concluding contracts.
The implementation of the project increases the competence and skills of the specialists and associates at the university. The lessons learned are a good basis for future projects and initiatives.

Potential for learning or transfer

This practice was implemented under Procedure BG16RFOP001-1.001-039 "Implementation of Integrated Plans for Urban Reconstruction and Development 2014-2020", Priority Axis 1 "Sustainable and Integrated Urban Development" under Oerational Programme Regional Development 2007-2014.

The project "Energy efficiency, improving access for disadvantaged people at the University of Food Technology - Plovdiv and modernization of information services" is implemented with the financial support of the Operational Programme "Regional Development" 2007-2013, co-financed by the European Union through the European Fund for Food. Regional Development. "Grant scheme BG161PO001 / 1.1-07 / 2009," Support for providing adequate and cost-effective infrastructure of higher education institutions in urban agglomerations. The project is implemented under the Operational Programme Regional Development 2007 - 2013, co-financed by the EU through the European Regional Development Fund in accordance with regulations, development of investment projects, public announcement in the Public Procurement Agency and conducting a procedure for selection of contractor / and concluding contracts.

This practice can be transferred under the other Operational Programme "Regions in Growth" 2014-2020, as well as during the programming period 2021 - 2027 in higher education institutions/universities in Plovdiv, South-Central region and in the country.

Further information

http://www.aop.bg/case2.php?mode=show_doc&doc_id=420640&newver=2

http://umispublic.government.bg/srchProjectInfo.aspx?id=35325

http://uft-plovdiv.bg/OLd_Site/?act=show_page&id=744

Photos

○ Good Practice 4

Name of the building:

Medical University – Plovdiv

Title of the good practice

Providing accessible and cost-effective infrastructure of the Medical University - Plovdiv by improving the energy efficiency of buildings and modernization of the library and information centre

Does this practice come from a European funding program?

European Regional Development Fund ==> Operational Programme "Regions in Growth" 2014-2020

Short Summary of the practice

The project under contract № BG161PO001 / 1.1-07 / 2009/011 is to provide accessible and cost-effective infrastructure of the Medical University - Plovdiv, by improving the energy efficiency of buildings and modernization of the Library and Information Centre, which is funded by Operational Programme "Regional Development" 2007 - 2013 through the European Regional Development Fund, the state budget of the Republic of Bulgaria and through the university's own funds.
The project is funded under the Grant Scheme BG161PO001 / 1.1-07 / 2009 "Support for providing appropriate and cost-effective infrastructure of higher education institutions/universities in urban agglomerations" under Operational Programme "Regional Development".
The activities are aimed at achieving the following three goals:

- Introduction of energy efficiency measures in the Academic Building of the Medical College.
- Ensuring equal access of disadvantaged groups to educational services.
- Modernization of the Library and Information Centre (LIC).

Detailed information on the practice

The good practice is the successful implementation of the project "Providing accessible and cost-effective infrastructure of the Medical University - Plovdiv by improving the energy efficiency of buildings and modernization of the Library and Information Centre" worth BGN 2,701,358.57. The project is funded by the Scheme for providing of grants BG161PO001 / 1.1-07 / 2009 "Support for providing appropriate and cost-effective infrastructure of higher education institutions in urban agglomerations" under OP "Regional Development". The financial framework includes co-financing from the European Regional Development Fund in the amount of BGN 2,265,901.92, national co- financing of BGN 249,249.22 and BGN 186,207.43 own contribution of MU - Plovdiv.

The project under contract № BG161PO001 / 1.1-07 / 2009/011 is to provide accessible and cost-effective infrastructure of the Medical University - Plovdiv, by improving the energy efficiency of buildings and modernization of the Library and Information Centre, which is funded by Operational Programme "Regional Development" 2007 - 2013 through the European Regional Development Fund, the state budget of the Republic of Bulgaria and through the university's own funds.
The ten main activities of the project were carried out in the period June 2010 - March 2013 and were aimed at achieving the following three goals :

• Introduction of energy efficiency measures in the Academic Building of the Medical College.
• Ensuring equal access of disadvantaged groups to educational services.
• Modernization of the Library and Information Centre (LIC).

BGN 1,466,966.10 have been invested in the infrastructural and technological modernization of the LIC. The subject of intervention under the project is 4 libraries - the Central and its branches in base 1, the Medical College and the Student Dormitory. The target group includes over 6,500 Bulgarian and foreign students, postgraduates, doctoral students, lecturers, administrative staff and users of LIC.

The performed activities under the project are as follows:

- Construction and installation work for providing accessible and cost-effective infrastructure of the Medical University of Plovdiv by improving the energy efficiency of buildings and modernization of the Library and Information Centre - separate position No 5 "construction and installation work / subproject: energy saving measures of medical college;
- Implementation of energy efficiency measures in the Medical College;
- Carrying out construction and installation activities in the LIC;
- Delivery and installation of equipment for protection and preservation of the library fund;
- Delivery and installation of specialized library equipment and furniture

The renovated library will be used for training and research by students, postgraduate students, teachers and employees of higher medical school.
From implemented activities will benefit 4533 Bulgarian and foreign students who are studying here in undergraduate and graduate programs and 104 graduate students.

Energy efficiency measures in the Medical College through the renovation of the buildings, the replacement of the joinery and the renovation of the installations realize savings in the amount of BGN 193 thousand.

The total budget of the project is BGN 2,701,358, provided under the Grant Scheme BG161PO001 / 1.1-07 / 2009 - "Support for providing appropriate and cost-effective infrastructure of higher education institutions / universities in urban agglomerations".

In mid-October 2014, the Medical University of Plovdiv was awarded in the category "Best University Library" for 2014 in the international competition "Science and Education", organized in Oxford. The competition is held under the auspices of the Rectors' Club of Europe and the Socrates Committee in Oxford and aims to honour the significant achievements of universities, libraries, scientists and students.
The award is an international recognition for the dynamic development of the Library and Information Center and for the European level of information technology infrastructure, resources and services in the following areas:

- Creativity in developing and delivering services and programmes that can be used by other libraries, including those accessible to people with disabilities and special needs
- Use of technologies to increase the interest in the library
- Electronic access
- Innovations in providing public access to computers and the Internet

From a technical point of view, the modernization of the Library and Information Centre is large-scale and includes the construction of local networks, WiFi, video surveillance, Kyocera peripherals, and some of the devices have MyQ for user identification, which students can use on their own identifying and print the content they want. Secure connectivity and identification to online registers and databases with relevant information is provided. NComputing terminal workstations are integrated in a system, a digitalization studio with a book scanner is built. Specialized equipment and software for disadvantaged people, mainly people with reduced or impaired vision, have been delivered. A centralized system for protection and automation in borrowing and returning books based on 3M solutions has been built.

Evidence of success

The evidences of success are:
One of the main activities of the project is the implementation of energy efficiency measures in the Medical College. According to the calculations of the project team, through the renovation of the buildings, the replacement of the windows and the renovation of the installations, savings in the amount of BGN 193 thousand will be realized annually.

The renovated library will be used for teaching and research activities by students, doctoral students, postgraduates, lecturers and employees of the higher medical school. In October 2014, the Medical University of Plovdiv was awarded in the category "Best University Library" for 2014 in the international competition "Science and Education", organized in Oxford. The competition is held under the auspices of the Rectors' Club of Europe and the Socrates Committee in Oxford and aims to honour the significant achievements of universities, libraries, scientists and students.
The award is an international recognition for the dynamic development of the Library and Information Center and for the European level of information technology infrastructure, resources and services in the following areas:

- Creativity in developing and delivering services and programes that can be used by other libraries, including those accessible to people with disabilities and special needs
- Use of technologies to increase the interest in the library
- Electronic access
- Innovations in providing public access to computers and the Internet

Challenges encountered

The project is implemented under the Operational Program Regional Development 2007 - 2013, co-financed by the EU through the European Regional Development Fund in accordance with regulations, development of investment projects, public announcement in the Public Procurement Agency and conducting a procedure for selection of contractor / and concluding contracts. The implementation of the project increases the competence and skills of the specialists and associates at the university. The lessons learned are a good basis for future projects and initiatives.

Potential for learning or transfer

This practice project under contract № BG161PO001 / 1.1-07 / 2009/011 is to provide an

affordable and cost-effective infrastructure of the Medical University - Plovdiv, by improving the energy efficiency of buildings and modernization of Library and Information Centre, which is funded by Operational Programme Regional Development 2007 - 2013 through the European Regional Development Fund, the state budget of the Republic of Bulgaria and through the university's own funds.

The project is funded under the Grant Scheme BG161PO001 / 1.1-07 / 2009 "Support for providing appropriate and cost-effective infrastructure of higher education institutions in urban agglomerations" under Operational Programme "Regional Development".
This practice can be transferred under the other Operational Programme" Regions in Growth"2014-2020, as well as during the programming period 2021 - 2027.

The project is implemented under the Operational Program Regional Development 2007 - 2013, co-financed by the EU through the European Regional Development Fund in accordance with regulations, development of investment projects, public announcement in the Public Procurement Agency and conducting a procedure for selection of contractor / and concluding contracts.

This practice can be transferred under current and next operational programmes in higher education institutions / universities in Plovdiv, South-Central region and in the country.

Further information

http://umispublic.government.bg/srchProjectInfo.aspx?id=35326

https://www.pc-tm.eu/portfolio-posts/mu-plovdiv/

http://www.aop.bg/case2.php?mode=show_case&case_id=255452

Photos

The Library

○ Good Practice 5

Name of the building:
Vocational High School of Food Technology and Equipment (VSFTE)

Title of the good practice

Modernization of the infrastructure and improvement of the quality of the educational environment in the Vocational High School of Food Technologies and Equipment - Plovdiv

Does this practice come from a European funding program?

European Regional Development Fund ==> Operational Programme “Regions in Growth” 2014-2020

Short Summary of the practice

The project "Modernization of the infrastructure and improvement of the quality of the educational environment in VSFTE - Plovdiv", under Procedure BG16RFOP001-3.002 "Support for vocational schools in the Republic of Bulgaria", under the Operational Programme "Regions in Growth’ 2014-2020, Grant Agreement № BG16RFOP001-3.002-0034-C01.
The physical educational environment of VSFTE has improved.

- The building stock Modernized, including - introduction of energy efficient measures in accordance with European standards;
- The material and technical base of the school has been updated;
- The attractiveness of vocational education and training for young people was increased;
- The number and employment of young professionals with specific skills and qualifications corresponding to the needs of the regional sector increased.

The implementation of the Project has created an opportunity for a better and quality educational environment, which increases the attractiveness of the school, respectively - the professional fields offered in it, which factors contribute to increasing interest in them by students and future employers.

Detailed information on the practice

The good practice is under a project of the Municipality of Plovdiv "Educational Infrastructure" - construction and renovation of schools, kindergartens and nurseries in the city under axis 1 "Sustainable and integrated urban development" of the Operational Programme "Regions in Growth" 2014-2020.
Under Priority Axis 3 "Regional Educational Infrastructure", the Municipality of Plovdiv implements the project "Modernization of the infrastructure and improvement of the quality of the educational environment in the Vocational School of Food Engineering and Equipment / VSFTE /".

A project is of the Municipality of Plovdiv, financed by the ERDF, Operational Programme "Regions in Growth and the national budget, with the beneficiary Vocational High School of Food Technology and Equipment, Plovdiv :
Procedure BG16RFOP001-3.002 "Support for vocational schools in the Republic of Bulgaria" Operational Programme "Regions in Growth" 2014-2020.

The implementation of the project led to the creation of a favorable corresponding to time educational environment through the designed complex activities contributed to improving the quality and conditions of education of young people in the city of Plovdiv, wishing to receive specialized training and specific expertise to help their future

realization on the labour market.

The implementation of the project provides an opportunity for a better and quality environment for education, corresponding to modern requirements. The material and technical base of the school has been improved in accordance with the modern and professional training that the students receive.

Within two years, the activities related to energy efficiency measures were implemented (hydro and thermal insulation, radiators and vertical heating pipes were replaced, providing an accessible environment, delivery, installation, equipment and furnishing of 4 laboratories - 1 microbiological , 2 physical-chemical, 1 in inorganic and organic chemistry, two rooms for practical training in quality control and food and beverage safety, training workshop on refrigeration, air conditioning and heating equipment.

Energy efficiency audit report on the investigation was carried out of the existing building to establish the technical performance of building on effect on subsequent execution technical inspection and made recommendations for building VSFTE - Plovdiv from 2015., Update technical passport and issued a valid certificate energy efficiency with a prescription for achieving energy class "B", according to Energy Efficiency Act.

The planned and implemented justified measures related to the overall implementation of the construction and installation works contributed to the complex renovation of the building, together with the previous repairs carried out by the school management, thus achieving synergy of interventions and overall modernization of the educational infrastructure of VSFTE - Plovdiv.

The Municipality of Plovdiv, as a conductor of policies of great public interest at the local level, responsibly accepts its commitment and in its role of a good manager planned to implement the prescribed measures in accordance with the deadlines and frameworks, as the applicable legislation and the requirements of Operational Programme "Regions in Growth“2014-2020.

Delivery and installation of equipment for VSFTE - Plovdiv to acquire relevant skills and competencies to serve their future life and professional realization, it provides a complete update of the material and technical base for the education of children in the following professional areas: ecology and environmental protection, food and beverage technology, food quality and safety control, heat engineering, refrigeration and air conditioning equipment in the food industry, technological and microbiological control of food, etc.

The aid in the form of targeted grants provided for the improvement of the educational infrastructure under the Grant Procedure BG16RFOP001-3.002 "Support for Vocational Schools in the Republic of Bulgaria", Operational Programme "Regions in Growth"2014 - 2020, will help not only to optimize and renew the training equipment and furnishing, but also for the release, in the future, of additional own financial resources, which, compensated by the measures taken under the scheme of the Program, will be redirected and invested in real educational activities, which will improve the daily training provided in VSFTE -gr. Plovdiv and will create an opportunity for the application of more complex and effective educational tools related to the essence of the professional fields taught at the school.

Tender procedure 1
"Delivery and installation of specific equipment for classrooms furniture for classrooms for VSFTE - Plovdiv" in three separate positions:
Lot 1: 1. Delivery and installation of specific equipment for

classrooms Lot 2: 2. Complement to an existing solar installation
Lot 3: 3. Delivery and installation of solar panels for domestic hot water

Tender procedure 2
"Delivery and installation of specific equipment for classrooms for VSFTE - Plovdiv", in 2 / two / separate positions:
Lot 1: 1. Complement to an existing solar installation
Lot 2: 2. Delivery and installation of solar panels for domestic hot water

Tender procedure 3
"Delivery and installation of specific equipment for classrooms furniture for classrooms for PGHTT - Plovdiv", in three separate positions
Lot 1: 1. Delivery and installation of specific equipment for classrooms Lot 2: 2. Complement to an existing solar installation
Lot 3: 3. Delivery and installation of solar panels for domestic hot water

Total value of the contract financed under the project:
Total value of the project: Grant is BGN 1,399,985.87 with VAT (including 85% ERDF financial contribution - BGN 1,189,987.99 with VAT, National co-financing 15% - BGN 209,997.88 with VAT).

Evidence of success

Evidence of success is as follows:
The school has been renovated; there is a new waterproofing of the roof and new PVC windows.
Delivered and installed specific equipment for classrooms: Contractor: "Gaia-99-Test" Ltd.
They are supplemented to an existing solar installation; Delivery and installation of solar panels for domestic hot water: Contractor: "Filkab Solar" Ltd.
Delivery and installation of solar panels for domestic hot water.
The implementation of the project led to the creation of a favorable, timely educational environment, which through the complex activities envisaged in the project contributed to improving the quality and conditions of training of young people in Plovdiv wishing to receive specialized vocational training and specific expertise to help their future realization on the labor market
The opening of the renovated building of the Vocational School of Food Technology and Equipment was on December 4, 2018.

Challenges encountered

The municipal energy efficiency projects are implemented in accordance with the regulations, development of investment projects, public announcement in the Public Procurement Agency and conducting a procedure for selection of a contractor and conclusion of a contract. In accordance with the Operational Programme “Regions in Growth".

The implementation of the project increases the competence of the municipal employees and the management of the vocational high school. The lessons learned are a good basis for future projects and initiatives.

Potential for learning or transfer

This practice was implemented under the Operational Programme "Regions in Growth" 2014-2020 (OPRG), co-financed by the EU through the ERDF, under Priority Axis 3 "Regional Educational Infrastructure", Procedure BG16RFOP001-3.002 "Support for vocational schools in the Republic of Bulgaria" , under OP " Regions in Growth 2014 - 2020", and aims to build a favorable environment in line with modern educational requirements, which, through relevant optimization, to help provide adequate training services in conditions consistent with national and European standards for quality, suitability and correspondence with the needs of students and stakeholders - business and future employers.

The project of the Municipality of Plovdiv, funded by the ERDF, OPRD and the national budget, with a beneficiary Vocational High School of Food Technology and Technics, Plovdiv with potential and opportunity for learning and transfer to other vocational high schools in Plovdiv, Plovdiv District, South Central region and in Bulgaria as a whole under the Operational Programmes and their measures in the next programming period 2021 - 2027.

Further information

http://2020.eufunds.bg/bg/0/0/Project/Procurements?contractId=iPTElwBwJo0%3D&isHistoric=False

https://www.plovdiv.bg/53109/

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