

# Environmental Sustainability and Regional Competitiveness: Innovative Steps by a Local Public Authority towards Energy Saving

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**Abstract:** Public local authorities are among the key players not only for assisting a nation to achieve its strategic energy goals but also for raising awareness towards relevant topics among its citizens. Yet, there has been little research on their role in this policy agenda. This paper aims to fill this gap by highlighting the significance of a local authority's outcomes, in the environmental sustainability sphere, by its participation in various projects and EU programs. The reference years are 2014 to 2019 and the focus area is energy savings in public buildings and raising awareness on energy issues and sustainable development. This article's aim is to outline the derived add value towards regional competitiveness and environmental sustainability from each action. Hersonisos Municipality's holistic approach aims to reduce its overall energy balance and to point out that local authorities can become both a beckon of sustainability and a regional development pillar.

**Key words:** Sustainability, energy saving, competitiveness, local authority, Crete.

## 1. Introduction

Local and regional authorities play a key role in the implementation of sustainable development [1] and energy saving strategies [2]. Moreover as local authorities have been placed at the forefront for coordinating energy reduction policies they have become the responsible actors for bringing together all the relevant stakeholders [3] and hence a major actor for enhancing regional and local competitiveness.

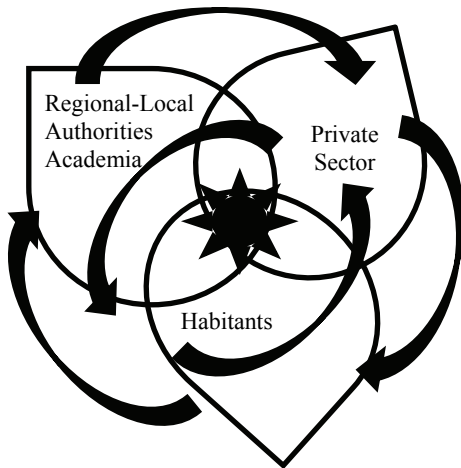
National competitiveness, according to the World Economic Forum (WEF), is the "set of institutions, policies and factors that determine the level of productivity of a country" [4, 5]. Applying the same concept to regions however, has given rise to criticism that a region cannot go out of business [6]. A region is neither a simple aggregation of firms nor a scaled

version of nations [7]. Thus a region is viewed by the authors as a "triple helix daffodil", consisted by the public sector (regional and local authorities, educational institutions etc.), private sector (firms, entrepreneurs etc.) and habitants (residents or visitors), as presented in Fig. 1. The intersection of these three components is considered by the authors, and in agreement with the literature review, as the appropriate area for the creation of the right conditions for regional growth and prosperity [8-10]. This collaborative space could thereupon be exploited by a regional local authority (LA) to enhance its competitiveness through appropriate innovative steps that could also assist the region's environmental sustainability. According to Sorensen, E. and Torfing, J. [9], a multi-actor collaboration (as also presented in Fig. 1) seems to offer a viable strategy in the public sector's efforts to spur regional competitiveness.

Consequently and after combining the definitions of Meyer-Stamer J. [11] and Dijkstra, L., et al., [12],

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**Fig. 1** A region as a Triple Helix Daffodil (source: authors).

competitiveness of a region will be considered throughout this article as “The Ability to Generate High and Rising Incomes and Improve the Livelihoods of the People Living There and in the Same Time to Offer an Attractive and Sustainable Environment for Both Firms and Residents”. Sustainability in this definition means a region’s capacity to provide an attractive environment in both the short and long term [6]. So how can a region improve its competitiveness and provide economic and social prosperity and in the same time environmental sustainability?

According to the EU Regional Competitiveness Index 2016, there are 11 pillars that could eventually improve a region’s competitiveness.

These pillars could be stimulated and promoted for assisting a region to improve its competitiveness by a local authority. It becomes obvious that a local authority navigates between and within all three groups. The role of the social system and the context within which a public authority operates could also assist the enhancement of the previously mentioned collaborative area (see Fig. 1), for enabling competitive processes and along the way knowledge creation. Public authorities could make the necessary innovative steps and involve not only its citizens but also local companies and entrepreneurs.

Tourism for example represents one of the most important industries worldwide and performs a

fundamental role in the development and competitiveness of many regions [13]. Tourism as a part of the private sector can provide a powerful economic incentive to regions for setting their strategic plans in motion. Hence, a major touristic region may use as an asset its “heavy industry” and thus incorporate it with the rest of the proposed in Table 1 pillars for improving not only its competitiveness but also its environmental sustainability. In the same time new initiatives and collaborations may also assist an LA to achieve its aims.

Hersonisos Municipality in the island of Crete has been very fortunate to have the local tourism industry, self-cautious regarding sustainable development, as a valuable supporter of this effort. The local hotels have been among the pioneers in sustainable development for many years, applying techniques such as PVs, energy efficient lighting and equipment and so forth, often engaging with the Municipality in a beneficiary dialogue inspiring and motivating each other. Furthermore, through the years, the hotels and other tourism businesses have been backing up sustainability initiatives in substantial ways improving in the same time the regions competitiveness and by creating new job opportunities. Thus in the next section one of the main touristic regions of the island of Crete, in Greece will be presented as the context area.

*1.1 Context Area*

The context area of this study is Greece and more specifically an LA on the island of Crete, Hersonisos Municipality. Crete is the biggest island of Greece covering 6.3% of the total extent of the country and is

**Table 1** The regional competitiveness index framework [6].

Basic group	Efficiency group	Innovation group
Institutions	Higher education	Technological readiness
Macroeconomic stability	Labor market efficiency	Business sophistication
Infrastructure	Market size	Innovation
Health		
Basic education		

comprised by four prefectures: Lassithi, Heraklion, Rethymno, and Chania. According to the National Statistical Service of Greece (NSSG), the population of the island reached 627,144 residents in 2011, which was 5.6% of the total population of the country. Hersonisos Municipality is one of the eight municipalities that constitute Heraklion prefecture and one of the biggest tourist destinations in the island. With more than 70,000 rooms Hersonisos hosts 35% of the total tourist on the island of Crete and 6.5% of the total tourist of Greece<sup>1</sup>. As a result its population increases dramatically, growing exponentially the human impact on the environment on every aspect creating thus many challenges.

Hersonisos Municipality was among the first municipalities in Greece to sign in April of 2011 the "Covenant of Mayors" [14]. In order to achieve the targets underlined in the European Strategy for climate change and energy efficiency, the so called 20-20-20 package, the European Commission launched the Covenant of Mayors to endorse and support the efforts deployed by local authorities in the implementation of sustainable energy plans, and at the same time contribute to greenhouse gases emissions mitigation [15]. True to its aim Hersonisos Municipality has been adopting and implementing basic principles of sustainable development on every aspect of its strategic development, aiming to become a financial, touristic and cultural pole, as stated on its 2014-2019 Development Plan. Hersonisos agreed to undertake all necessary steps and actions to reduce its energy consumption by 40% until 2030, a very ambitious incentive but also a very valuable guiding tool. Nonetheless as a local government, it does not have control over state legislation and energy production nor it has unlimited funds and resources. However, it has the flexibility and ability to plan and program, both in a Bottom-Up and a Top-Down manner, allowing it to incorporate on its strategic planning and

implementation of all those programs and projects that are deemed to help achieving its goals towards sustainability and regional competitiveness.

True to that, and in order to fulfill its obligations arising from the Covenant of Mayors and reduce its energy consumption, Hersonisos has been constantly participating in various schemes, some of which are E.U. programs, securing funding, exchanging knowledge and experience, adopting and demonstrating good practices and techniques. This has led into cooperating with other partners such as regional authorities, educational institutions, schools, private companies, various organizations and outermost citizens. This holistic approach enabled Hersonisos Municipality to plan and exploit all available funds and programs towards fulfilling its development strategy.

Consequently the aim of this article is to point out that a local authority can do more than just securing the required infrastructure for its citizens and its region. By highlighting the derived outcomes from each program, project or action the authors wish to present the true add value towards competitiveness, sustainability but also the significance of experiential education [16].

## **2. Programs Projects and Actions**

European Territorial Cooperation (ETC), better known as Interreg, is one of the two goals of cohesion policy and provides a framework for the implementation of joint actions and policy exchanges between national, regional and local actors from different Member States. The overarching objective of European Territorial Cooperation (ETC) is to promote a harmonious economic, social and territorial development of the Union as a whole. In 1990, Interreg was developed as a Community Initiative with a budget of just 1 billion euro covering exclusively cross-border cooperation. Later, Interreg has been extended to transnational and interregional cooperation. For 2014-2020 European territorial cooperation is one of the two goals of Cohesion Policy besides investment

<sup>1</sup> [www.hersonisos.gr/files/items/3/3509/summary\\_results.pdf?md=1401352767](http://www.hersonisos.gr/files/items/3/3509/summary_results.pdf?md=1401352767) (in language).

for Growth and Job.

Also during recent years, the EU has progressively intensified its coordinated efforts to finally achieve the so called 20-20-20 package. A number of dedicated programs and projects have therefore been funded in order to make progress toward the realization of five closely related and mutually reinforcing dimensions: energy security and diversification, a fully integrated internal energy market, energy efficiency, the decarbonization of the economy and the development of research, innovation and competitiveness [17]. Leveraging the presented opportunities Hersonisos Municipality participates in several EU programs and national projects exploiting every mean and mobilizing every action for improving local competitiveness and environmental sustainability. Within this section the main programs, projects and actions incorporated by the municipality of Hersonisos will be presented and analyzed in alphabetical order, even though these are in different stages and phases of materialization.

### *2.1 Euronet 50-50 Program*

Euronet 50-50 program started in April 2013 and its duration was three years. The project was supported by the European Commission through the Intelligent Energy Europe (IEE) program and in Greece and specifically in Crete the program was materialized in close collaboration with the Region Authority of Crete. The program aimed at mobilizing energy savings in public buildings through the implementation of the 50/50 methodology in 500 schools and nearly 50 other public buildings from 13 EU countries. The proposed methodology increased energy awareness of the building users and actively involved them in energy-saving actions. Achieved financial savings were shared equally between the building users and the local authority which covers the energy bills. In Hersonisos Municipality, the former Town Hall has been selected for this program. This 20-year-old three-store building, now housing various municipal services, such as the Department of Environment and

the Social Services has been designed with bioclimatic principles in mind, such as an internal courtyard, skylights with reflective membranes and so forth. Yet, it was considered that there was plenty of room for improvements in its energy performance. For this reason, specific steps were taken<sup>2</sup>. These steps included:

- the creation of an energy team by the building's users;
- educating and raising awareness on energy issues among the building's users;
- energy building inspection and surveying by both the users and the energy team;
- long term temperature measurements and energy consumption estimation;
- solution proposals by both the users and the energy team;
- information campaigns;
- listing the proposed solutions, pointing out the ones requiring low-cost investments and
- communicating and making use of the money saved.

At the moment, the building is on the long term measurement phase with the appropriate measuring equipment having been purchased and installed. The municipality therefore now has a more environmentally friendly building, as energy is saved and thus resources, public awareness is raised and a source of extra funding for the building and its users is available. But what perhaps is the most important regarding this program is the fact that through their participation, the occupants of this building gained a substantial level of knowledge to pass on to the rest of the people creating a very good practice along with a critical mass of citizens that with the continues effort can only keep growing.

### *2.2 Net Metering Virtual*

Greece's net metering policy was introduced in

<sup>2</sup> [www.euronet50-50max.eu/en/about-euronet-50-50-max/the-50-50-methodology-9-steps-towards-energy-savings](http://www.euronet50-50max.eu/en/about-euronet-50-50-max/the-50-50-methodology-9-steps-towards-energy-savings).

December 2014, with the country accepting applications a few months later. In 2017 the scheme was expanded by legislation, to allow virtual net metering for certain stakeholders, including farmers, and city and regional councils. While it was conceived to boost the country's renewables sector after the feed-in tariffs (FITs) were slashed in 2014, according to the latest official statistics published by Greece's Electricity Distribution Network Operator (HEDNO), by the end of 2017, just 14 MW of solar PV had been installed. Of this, says HEDNO, 6.5 MW were installed in 2017, while the two years prior saw 5.7 MW and 1.8 MW added, respectively [18].

Since the new millennium, even though there has been a growth of photovoltaic (PV) producing directly electricity, as the photovoltaic energy produced is not dispatch able a counter motive for investing in solar-produced electricity has been created. Also in the case of Crete, as the island is not connected to the National Grid, there are limits to the power that can be produced with renewable energy and thus with PVs. However one cannot also ignore the fact that with over 2,700 of hours annually<sup>3</sup>, Crete is a place where solar energy is in abundance. This fact resulted in the exploitation of this renewable energy for many decades, mostly in the form of solar panels heating water for households. The new legislation framework nonetheless introduced in 2017 and 2018 highlighted Virtual Net Metering to a promising initiative and in the same time a research program hosted in the island of Crete by the Regional Authority of Crete, involving the majority of the Island's Municipalities and supported by the Technological Institution (TEI) of Crete.

Virtual Net-Metering is a scheme that will allow consumers to counterbalance the amount of the photovoltaic electricity they produce with the amount they consume, giving also a powerful motive for further development of PV use. Hersonisos Municipality was one of the first participants that

entered the project aiming Virtual Net-Metering to allow the counterbalance of energy production and consumption from schemes based on different locations. The project is currently on-going as the Cooperation Agreement between the Region of Crete (as the project's coordinator), the Participant Municipalities (as the project's stakeholders) and TEI of Crete (as the project's contractor) has been signed but the deliverables are yet to be submitted first to the coordinator and then to the stakeholders. The project is divided in three phases<sup>4</sup>:

- First Phase. With the assistance from Municipality's Technical Service, the contractor will record and analyze all electrical loads of the municipal buildings and infrastructures, by retrospectively optimizing the approach of the research methodology in order to document the energy profile of the above needs and set the desired installed capacity limits for the PV systems.

- Second Phase. With the assistance from Municipality's Technical Service, the contractor will collect and process all recorded data of energy requirements as well as data concerning the possibility of PV location in buildings, land plots owned by the Municipality. The solar potential of each area will be studied and the proposed PV parks will be measured and proposed.

- Third Phase. A comprehensive presentation of the conclusions with a detailed technical description of the projects will be delivered by the contractor, showing the location, size and indices of each proposed energy system. The technical description will be accompanied by the economic and technical analysis of each energy project. Finally, the contractor's project team will assist with all the necessary advisory and technical actions, the Municipalities' Technical Services for the preparation of the tender documents of those projects that will be decided to be constructed with a public

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<sup>3</sup> [www.wwf.gr/forests/pdfs/atlas/ATLAS\\_WWF\\_BOOK\\_12.2\\_012\\_WEB%20%5BMAPs\\_09\\_KRITI%5D.pdf](http://www.wwf.gr/forests/pdfs/atlas/ATLAS_WWF_BOOK_12.2_012_WEB%20%5BMAPs_09_KRITI%5D.pdf) (in language).

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<sup>4</sup> Research-Feasibility Study for the Implementation of Net-Metering and Virtual Net-Metering Measures in the Region of Crete and the Municipalities of Crete, 2018 (in language).

procurement competition by Municipalities.

All of the above deliverables will be submitted to Region of Crete and then to the participating Municipalities to integrate into their projects the construction of photovoltaic parks, thus contributing to the reduction of their operating costs and to the improvement of their environmental footprint.

### *2.3 REBUS Program*

Renovation for Energy efficient BUildingS program (REBUS) was funded on the first call of the INTERREG EUROPE program and has five years duration from 2016 to 2021<sup>5</sup>. INTERREG EUROPE, financed by the European Regional Development Fund (ERDF), was designed to support policy learning among relevant policy organizations with a view to improving the performance of regional development policies and programs. It allows regional and local public authorities and other players of regional relevance across Europe to exchange practices and ideas on the way public policies work, and thereby find solutions to improve their strategies for their own citizens. REBUS was funded under priority 3: Low carbon economies. This priority deals with the transition to a low-carbon economy. REBUS addresses the Regional Operational Program for the Region of Crete 2014-2020, Priority 2 Sustainable Development through upgrading of the environment and facing the climate change impacts in Crete, Axis 2.4c—Energy efficiency, smart management and use of renewable energy sources in the building sector.

The energy savings and the relevant energy costs to be tackled and reduced are a very important issue, which has multiple impacts (governance, environment, climate change, low carbon economy, energy efficiency and security of supply, innovation and regional smart specialization etc.). Hence a Local Stakeholders Group was created by each of the eight partners (Greece, Italy, Poland, Romania, Sweden, Hungary, Germany and UK), including local

representatives from public authorities, civil servants, energy experts and consultants, business associations in the building sector, energy service companies and financiers, etc. Municipality of Hersonisos is one of the main stakeholders and is aiming to implement the Energy Renovation Path (ERP) derived from this program for planning, implementing and monitoring renovation works in its buildings. Also its overall objective is to:

- raise awareness internally and externally on potential savings/efficient use of resources;
- collect feedback and stream line data on energy efficiency needs in the its buildings;
- use this feedback to select buildings for renovation;
- draft tenders for renovation works that include energy efficiency baselines, targets and monitoring measures;
- manage its buildings in a more efficient way after renovation;
- improve skills on the selected topics at individual (staff, policy makers etc.), organizational (local authorities) and regional (stakeholders e.g. energy agencies, construction sector) level.

As REBUS is in line with Municipality's priority target for energy renovation and promotion of sustainable energy its participation in the program will also assist avoiding mistakes presented by most advanced countries as lessons learned.

### *2.4 SHERPA Program*

SHared knowledge for Energy Renovation in buildings by Public Administrations program (SHERPA) is an EU project financed by the Interreg Med Program<sup>6</sup>. The Interreg MED Program, which is part of the European Territorial Cooperation (ETC) objective of the EU Regional Policy, was initiated with the ambition of contributing to the long-term development of the Mediterranean area and of strengthening transnational cooperation among 57 regions in 10 different EU member states and 3 candidate countries [19].

<sup>5</sup> [www.interregeurope.eu/rebus/](http://www.interregeurope.eu/rebus/).

<sup>6</sup> [sherpa.interreg-med.eu/](http://sherpa.interreg-med.eu/).

The main territorial challenge of the SHERPA project is to accelerate the implementation of the Energy Performance of Buildings Directive 2010/31/EU and the Energy Efficiency Directive 2012/27/EU with respect to the existing stock of Mediterranean public buildings. Several past EU projects, in particular strategic MED projects such as MARIE, ELIH-Med and PROFORBIOMED, among others, have highlighted the specific conditions and difficulties related to projects in Energy Efficiency in Buildings (EEB) within the MED area. Concretely, the Policy Paper “Responding to Challenges Regarding Energy Efficiency and Renewable Energy in Mediterranean Buildings” (2014), developed by AviTeM-France and SHERPA’s lead partner within the context of the three abovementioned MED projects, detects, as a consequence of geographical, climatic, social and economic specificities, a huge potential of energy saving. The main problems nonetheless identified in the MED area with regards to the project implementation are: financing, internal structure of the public Administrations, training of the public workers and data collection systems. To give response to these issues, four Working Groups have been created: governance, information, awareness and training, and financing. Each Group will develop a series of pilot activities, to be later capitalized at a larger scale.

Aligned with the conclusions of these past projects, SHERPA promotes energy efficiency of public buildings in the MED area. It is therefore consistent with Priority Axis 2 of the INTERREG MED program, which contributes to supporting growth-enhancing and job-creating investments, with a focus on energy efficiency and the low-carbon economy. Moreover, the Project directly aims to foster activities defined within Specific Objective 2.1, “Raise capacity for better management of energy in public buildings at transnational level”, concretely for owners, managers, planners and designers of public buildings in Mediterranean territories.

SHERPA gathers 12 partners, including nine (9)

regional authorities, as well as 12 associated partners, including eight (8) local and regional authorities, one of which is Hersonisos Municipality. By its participation in this program the Municipality aims to:

- improve the energy performance and efficiency of its buildings;
- increase awareness on possible funding schemes;
- avoid mistakes in decision making due to its internal structure;
- support growth-enhancing and job-creating investments;
- improve staff training;
- create a data collection system that will keep a record of its buildings current situation and in the same time assist decision making for future interventions.

Also one of Municipality’s key objectives is to set up 10 projects [3] of energy renovation in its buildings, in order for them to be implemented according to the specific conditions that characterize every one of them. The implementation will incorporate public-private investment schemes as well as other innovative funding schemes, creating growth and thousands of jobs. Closing this section, Municipality’s participation in these two similar yet distinct programs (REBUS and SHERPA) besides from gaining knowledge and becoming part of a European network, aims towards establishing its own distinct strategy on renovating public buildings as well as designing implementing and monitoring such projects. At the moment these two programs are on the level of exchanging knowledge.

### *2.5 SYNERGEIN Program*

As part of INTERREG Co-operation E.E. program between Greece and Cyprus, Synergein<sup>7</sup> is a program for the reduction of energy consumption in public buildings with the materialization of two energy saving pilot projects. The Municipality with the technical assistance of the Centre for Renewable Energy Sources & Saving (CRES) is participating with two energy

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<sup>7</sup> SYNERGEIN–Cooperation Program INTERREG V-A Greece–Cyprus 2014-2020, November 2017 (in language).

renovation projects in two different school units: the Elementary and the Primary School of the village of Episkopi; The improvement on the building shell and the upgrading of the lighting systems within Malia's high school.

#### 2.5.1 Elementary and Primary School of Episkopi

The school is comprised by two separate main buildings and three secondary buildings, on two levels, most of them constructed in different time periods with different methods and materials varying from 500 mm thick masonry walls, to reinforced concrete frame with 250 mm thick cavity walls. At present, the heating system is based on radiators with a diesel heated boiler while the cooling system relies on independent electrical air-conditioning units. The windows are of single glazing. After a thorough inspection of the building and after taking into account the area's microclimate, different suggestions were made. In close collaboration with the Municipality's Technical Service the Geothermal Energy solution was selected, placing the school among the first in the country and the first on Crete to incorporate this method. As a result the school's heating and cooling system will be entirely replaced with a new one that will take full advantage of the soil's constant temperature. More specific the new system will be comprised of pipes containing water and small percentage of Ethylene Glycol placed in a vertical "U" shaped array, benefiting from the ground's virtually constant temperature supplying the new heating and cooling equipment, (heat pump) with warmer and cooler respectively liquid, requiring up to 70% less energy for heating and cooling. The system will be placed centrally and the two buildings will be supplied through underground insulated pipelines. According to the CRES study it is estimated that an average of 50%<sup>8</sup> cost reduction will be made. It has to be mentioned at this point that during the project's construction, the Municipality will be also replacing the existing windows with new double glazed with a

thermal blockage in order to reduce energy losses and also due to the fact that the energy study required such a glazing system. This action will be funded solely by the Municipality.

#### 2.5.2 Senior and Junior High School of Malia

Malia's High School unit is comprised by two main buildings and a secondary smaller one, designed in the late 80's. All buildings are made of reinforced concrete structure with 250 mm thick cavity walls. The windows and doors are of single glazing, while the roof is not thermally insulated. The lighting system is comprised by fluorescence lamps in the classroom and office space while the corridors areas are lighted by incandescent lamps. The heating system includes a diesel heated boiler with a timer. Hence a set of actions were suggested aiming to thermally reinforce the building shell, reduce the energy consumption for lighting and improve the radiators' performance. More specific after the energy study it was proposed:

- The building's roof to be covered with rigid insulation, followed by a damp proof course;
- The existing windows and external doors to be replaced with new double ones with double glazing and thermal blockage;
- The existing lighting fluorescence lighting schemes to be replaced by new ones with LED bulbs;
- The existing incandescent bulbs to be replaced by LED ones;
- The radiators to be fitted with thermostatic valves that will help regulate independently every room's temperature and thus improve energy consumption;
- Three new smart meters to be fitted on the main power panel and on the boilers so that an accurate electrical energy consumption measurement can be made for monitoring.

It is also important to mention that the Synergiein project is budget controlled and thus those two actions were deemed to be the best-suited solutions. At the current status, the program is at tender stage waiting for regional approval before proceeding to the procurement public competition.

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<sup>8</sup> [www.cres.gr](http://www.cres.gr).

### *2.6 European Energy Days and European Mobility Week Actions*

European Energy Days and European Mobility Week<sup>9</sup> are two independent actions aiming at raising awareness and make the public participate in sustainable ways of saving energy. European Energy Days organized by local public and private organizations are activities and events that promote clean energy transition. Any activity can be an Energy Day—from a workshop, to a competition, to a tour of a power station—provided it engages citizens and energy stakeholders in building the Energy Union ([eusew.eu/about-energy-days](http://eusew.eu/about-energy-days)).

In the case of Hersonisos Municipality, Energy Days aim in educating children at schools along with adults. For that purpose, based on the proposed by the EU framework, the Municipality has been organizing visits at schools by teams of specialist, aiming at making aware and educating children through various interactive actions, educational lecturing and exhibitions. In the same time events have been organized in public spaces including exhibitions, lectures and award-giving ceremonies. Further value is added to these actions as they were disseminated beyond the borders of the Municipality and thus lecturers and schools from different areas have also participated.

Since 2002, European Mobility Week has sought to improve public health and quality of life through promoting clean mobility and sustainable urban transport. This campaign gives people the chance to explore the role of city streets and to experiment with practical solutions to tackle urban challenges, such as air pollution. It also provides local authorities the perfect opportunity to explain the challenges that cities and towns are facing to their citizens ([mobilityweek.eu](http://mobilityweek.eu)).

In the case of Hersonisos Municipality, European Mobility Week aims at promoting sustainable mobility both for children and adults, citizens and personnel. The events included educational talks, technological

display through events and bicycle rides in picturesque parts of the Municipality. The events have also included a presentation of an experimental solar vehicle (Sunnyclist) created entirely in Crete and an 850 km tour of Crete with it<sup>10</sup>. By its annually participation to this action, the Municipality attempts to present the benefits of cleaner transport choices not only to its habitants or to its personnel but also to the visitors.

These two actions have been annually implemented for several years aiming to integrate into the consciousness of the public. It is of great value that these actions, which are mostly funded by the Municipality, have the support of the local society and companies and in some cases also the visitors' participation.

### **3. Results**

The European Union has established world's most ambitious and comprehensive set of policies and strategies by setting high aims for its 2030 targets for renewable energy and energy efficiency and its long-term commitment to the decarbonization of its energy system. This has given public authorities the opportunity to participate in funded European programs and projects aiming to improve local competitiveness, energy efficiency and environmental sustainability. The effect on multilevel governance and networking at European level is thus essential for strengthening the effectiveness of the battle against climate change. As the energy challenge is multitasked, international cooperation and networking with strategic partner countries will support local and regional authorities in achieving their objectives and contribute to the global efforts to mitigate climate change [14]. Hence local authorities must take the lead in action and set a good example, not only because they are closer to citizens, but also because they can become the mean for transforming the cities and making them

<sup>9</sup> [ec.europa.eu/energy/en/eu-energy-day](http://ec.europa.eu/energy/en/eu-energy-day).

<sup>10</sup> [www.hersonissos.gr/press-release/press/energydaysunnyclist.html](http://www.hersonissos.gr/press-release/press/energydaysunnyclist.html) (in language).

more attractive and sustainable for both citizens and visitors [14].

Hersonisos municipality embraced the idea that, for the local economy to be competitive in such a demanding environment actions should be taken in order:

- to add value to local businesses: by creating an environment that creates incentives for local firms to innovate and learn from each other, and to upgrade the level of competitiveness of the overall local economy,
- to provide environmental sustainability: by reducing its energy footprint and in the same time reducing its energy consuming building stock,
- to activate and empower citizens: through experiential education to grow awareness on energy related issues.

Thus Hersonisos municipality adapted both horizontal collaboration with other regional national and foreign authorities, and vertical collaboration and

coalition with the private sector and its citizens. With this in mind and before presenting the results of the previous mentioned actions in Table 2, a simple definition of experiential education should be given. Thereupon experiential education is learning by doing and has value far beyond building the kind of social skills, work ethic, and practical expertise that are important in professional life.

It is obvious from Table 2 that even though these programs, projects or actions have different outcomes their overall results can be homogenized under the same three pillars; competitiveness, sustainability and experiential education. As local authorities are being equipped to address the long term issues and to have a strategic vision for a sustainable future [20] Table 2 highlights that a confident and committed local authority is crucial to the development of citizens' capacity and learning.

**Table 2 Bilateral additional results from Hersonisos Municipality participation in various actions (source: authors).**

Project/Program/Action	Competitiveness	Environmental sustainability	Experiential education
Euronet 50-50 program	<ul style="list-style-type: none"> <li>• Creation of new jobs</li> <li>• Creation of opportunities for implementation of innovative products</li> <li>• Attraction of new companies</li> <li>• Creation of a local case study easily adopted by both public and private sector</li> </ul>	<ul style="list-style-type: none"> <li>• Increase of environmentally friendly building stock</li> <li>• Energy team's action plan assists the implementation of small innovative steps</li> <li>• Periodical building inspection and surveying</li> <li>• Long term temperature measurements and energy consumption estimation</li> <li>• Reuse of the money saved</li> </ul>	<ul style="list-style-type: none"> <li>• Interaction with the energy team raises awareness to both the users and to their families</li> <li>• Diffusion of results to the visitors</li> <li>• Solution proposals by both the users and the energy team</li> <li>• Information Campaigns</li> <li>• Creation of a good practice open to the public</li> </ul>
Virtual Net-Metering project	<ul style="list-style-type: none"> <li>• Creation of the right conditions for new ventures public and private</li> <li>• Adoption of the latest renewable systems</li> <li>• Creation of new jobs</li> <li>• Increase of the region prestige both national and international due to eco-friendly projects</li> <li>• Opportunity for the creation of an Energy Community</li> </ul>	<ul style="list-style-type: none"> <li>• Eco-friendly long lasting projects</li> <li>• Energy saving for both the municipality and its citizens</li> <li>• Possible creation of an Energy Community organization that will benefit socially vulnerable groups first and then all citizens</li> </ul>	<ul style="list-style-type: none"> <li>• Information campaigns</li> <li>• Educational visits to the construction site</li> <li>• Interaction between the municipality, stakeholders, citizens, local companies and hotels</li> </ul>
REBUS program	<ul style="list-style-type: none"> <li>• Creation of a local stakeholder team with same or interconnected interests</li> <li>• Network creation between local and foreign firms</li> <li>• Increase of the region prestige both national and abroad</li> <li>• Dissemination locally of good practices could create new jobs</li> </ul>	<ul style="list-style-type: none"> <li>• Collect feedback and stream line data on energy efficiency needs in the its buildings</li> <li>• Use this feedback to select buildings for renovation</li> <li>• Draft tenders for renovation works that include energy efficiency baselines, targets and monitoring measures</li> <li>• Manage its buildings in a more efficient way after renovation</li> </ul>	<ul style="list-style-type: none"> <li>• Raise awareness internally and externally on potential savings/ efficient use of resources</li> <li>• Improve skills on the selected topics at individual (staff, policy makers etc.), organizational (local authorities) and regional (stakeholders e.g. energy agencies, construction sector) level</li> <li>• Dissemination actions and events</li> </ul>

Table 2 to be continued

SHERPA program	<ul style="list-style-type: none"> <li>• Support growth-enhancing and job-creating investments</li> <li>• Application of new products and skills</li> <li>• Interaction with companies from more developed countries</li> </ul>	<ul style="list-style-type: none"> <li>• Improve the energy performance and efficiency of its buildings</li> <li>• Increase awareness on possible funding schemes</li> <li>• Create a data collection system that will keep a record of its buildings current situation and in the same time assist decision making for future interventions.</li> </ul>	<ul style="list-style-type: none"> <li>• Improve staff training</li> <li>• Avoid mistakes in decision making due to its internal structure</li> <li>• Dissemination actions and events</li> </ul>
SYNERGEIN program	<ul style="list-style-type: none"> <li>• Job creation</li> <li>• Creation of a unique good practice</li> <li>• Adoption of new innovative renewable technologies</li> <li>• Increase of the region prestige both national and international due to eco-friendly projects</li> </ul>	<ul style="list-style-type: none"> <li>• Increase of environmentally friendly building stock</li> <li>• Reuse of saved money from the required energy consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Raise awareness for energy saving issues and new technologies between the pupils and hence their families</li> <li>• Educational visits by other regional schools</li> <li>• Information campaigns</li> </ul>
European Energy Days action & European Mobility Week action	<ul style="list-style-type: none"> <li>• Creation of networks</li> <li>• Creative workshops</li> <li>• Competitions</li> <li>• Presentation of new/innovative products</li> </ul>	<ul style="list-style-type: none"> <li>• Interactive actions</li> <li>• Alternative transportation</li> <li>• Bicycle rides</li> </ul>	<ul style="list-style-type: none"> <li>• Educational lecturing</li> <li>• Exhibitions</li> <li>• School competitions, interactive actions</li> </ul>

Peoples involvement and every day cooperation along with the encouragement of peer to peer learning between the regional-local authority and the actors presented in Fig. 1, provides important tools for regional competitiveness improvement and environmental sustainability. Social interaction can make the difference for both the private and the public sector as experiential education [16] especially when addressed to residents living in urban areas, who often have limited opportunities to experience informal science environments. As a result, some do not have a deep understanding of the environment, natural resources, ecosystems, and the ways human activities affect nature.

#### 4. Conclusion

In accordance with the new design of the European Cohesion Policy 2014-2020 and the targets set out in Europe 2020, and acknowledging that energy saving is a key issue for sustainable development and competitiveness improvement, Hersonisos Municipality has been applying a holistic approach towards energy saving, through participation, collaboration, exchange of knowledge, and making all the necessary innovative steps to fulfill its aims and scopes.

Environmental sustainability, local competitiveness and citizens' capacity on energy related issues are essential for a regions development and its people's prosperity as the energy sector is closely connected with climate change and environmental problems. As discussions about sustainability in local authorities evolve public authorities seem to lack clear framework that might contribute to policy achievement [20, 21]. Even so and even in an area that economic crisis has been harsh this empirical study shows that a local authority, a municipality, can combine every available resource, project or program and with determination, consistency and continuity to enhance its competitiveness and in the same time to succeed environmental sustainability and energy awareness throughout its boundaries.

Apart from the executives and Municipality's personnel, it is equally important that the people, the citizens, and the firms operating within its jurisdiction area will accept and embrace this way of thinking. Collaboration and coalition between the authority and diverse external stakeholders in planning and implementing interventions fostered improvements on local competitiveness and on decreasing natural resources, and as such improving environmental

sustainability. Through the actions presented in Table 2 public private dialogue was strengthened and Hersonisos Municipality demonstrated its willingness to implement a sustainable strategy not only through its participation in the Covenant of Mayors but also through the participation in every available collaboration network. Still, in a municipality which is comprised by small towns and villages, often distant from each other it is crucial that not only a collective awareness is raised but also that both citizens and Municipality's visitors will participate in this effort. So apart from all projects and all actions that will help ensure the reduction of energy consumption, inclusivity is perhaps among the key elements for continuity, intensiveness and local success.

Concluding, in the case of Greece very few published data can be retrieved as most of the successful stories come from abroad regarding a local authority's role in environmental sustainability, regional competitiveness and energy savings. Nonetheless this empirical study pointed out that by making the best of every resource, network or collaboration a public local authority can become both a beacon of sustainability and a regional development pillar. Furthermore as this study was focused on a specific national setting, Greece, and region Crete, it would be interesting to investigate other local authorities both within Greece and abroad. Further empirical studies could provide the basis for perceptive cross country comparisons with the purpose to identify potential similarities or differences, and to illustrate the role of different cultural environments in more diverse geographical settings.

### Acknowledgements

This study is supported by the Municipality of Hersonissos.

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