Strategic Project

alterenergy
Energy Sustainability
for Adriatic Small Communities

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Adriatic IPA
Cross Border Cooperation 2007-2013

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Technical Support
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Guidelines for Sustainable Energy Management in the Adriatic Area

The Project is co-funded by the European Union, Instrument for Pre-Accession Assistance

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D6.5 – GUIDELINES FOR SUSTAINABLE ENERGY MANAGEMENT IN THE ADRIATIC AREA

Main authors

Giuseppe Creanza – ARTI Puglia Regional Agency for Technology and Innovation
Carlo Gadaleta Caldarola – ARTI Puglia Regional Agency for Technology and Innovation
Caterina Liddi – ARTI Puglia Regional Agency for Technology and Innovation
With the contribution and revision of the LB- Puglia Region and the ALTERENERGY Partnership

Credits

Important technical contribution on various aspects of renewable energy and Energy Efficiency has been provided by Ambiente Italia srl.
Graphs and charts, if not specified, were processed by ARTI Puglia Regional Agency for Technology and Innovation.

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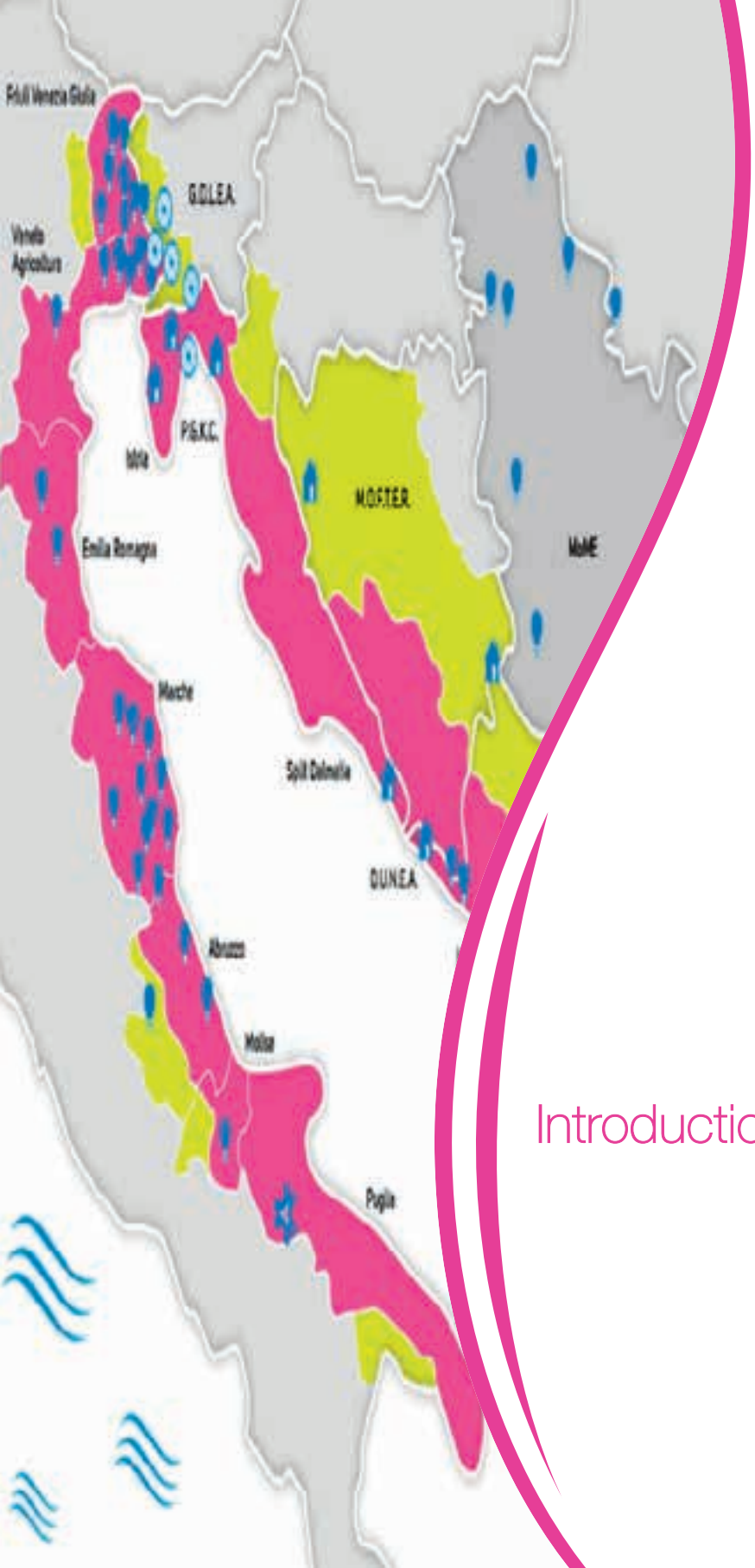


Introduction

The Report D6.5 – Guidelines for Sustainable Energy Management in Adriatic area – summarizes the results of the assessment process of the infrastructural investments realized by the IPA – Adriatic Project Alterenergy.

The analysis considers aspects such as the level of acceptance by citizens and economic stakeholders, the impact on the energy balance and local landscape, the potential for replication in different urban contexts in the Adriatic area, amongst other things. The Report explains also the integrated model followed and the chosen solutions, highlighting both good practices to follow and errors to avoid.

The Alternergy model

The Strategic Project Alterenergy (Energy Sustainability for Adriatic Small Communities) aims to contribute to the European Union's objectives on climate and energy "20-20-20" through the promotion of sustainable energy in small Adriatic municipalities, improving their capacity to plan and manage integrated actions of energy saving and the production of energy from renewable sources.

Alterenergy is focused on municipalities with less than 10.000 inhabitants, in which 8 pilot projects/ demonstrative actions in the energy field have been implemented.

- "Pilot Projects" are larger scale interventions that aim to concretely demonstrate the integration of different solutions regarding energy efficiency and renewable energy production.
- "Demonstrative Actions" are small scale RES/ RUE applications that will demonstrate specific solutions of high exemplary value

Puglia Region and Albania where the partners responsible for the realization of the two Pilot Projects, while Epirus Region, Bosnia Herzegovina, Istria County, Primorsko Goranska County, Dubrovnik Neretva County – DUNEA and Split Dalmatia County were the partners responsible for the realization of the seven Demonstrative Actions.

Consultation and participated approach are the methodologies used in Alterenergy to involve public administrations responsible for the local energy policies, citizens and economic operators. Indeed, the project activities of Alterenegy included studies, assessment on the local energy balances, action plans, feasibility studies and capacity building and awareness raising activities as summarized in the following figure and explained in detail in the project website. The infrastructural investment of pilot project and demonstrative actions are only the final part of this project and aims to demonstrate and promote replicable solution in all the Adriatic Area.

The Alterenergy model

The selection of pilot projects and demonstrative actions

Concerning the infrastructural investments, it is important to underline the project focus on integrated measures. Alterenergy does not promoted a single type of intervention or a single technology in the energy efficiency or renewable energy field; instead it financed an integrated system of "low-cost" measures that, altogether, are able to achieve significant and tangible results.

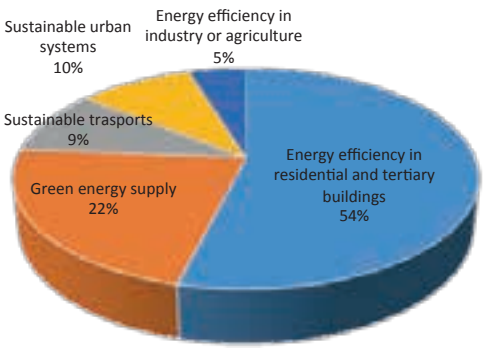
This is functional to the characteristics of small municipalities that discourage the adoption of expensive and complex solutions. Moreover, the pursued model is characterized by the effort to integrate the potentials and resources available at local level in the different sectors of economic and social life, like agriculture, industry, tourism, public administration, etc.

During 2015 and 2016 two larger pilot projects have been implemented in Puglia and Albania, while the demonstrative actions (6 in total) have been realized in the four Croatian partner counties (Istria, Primorsko Goranska, Dubrovnik/Neretva, Split And Dalmatia), in Epirus (Greece) and in Bosnia-Herzegovina.

Both the pilot projects and the demonstrative actions have been identified starting from the solutions indicated as more appropriate by the feasibility studies produced in another Alterenergy work package (WP4). Among the others, the selection took into consideration the following general criteria: short implementation time, low implementation risks, high visibility and impact, high potential for replication (the implemented action should contribute to solve problems that are common in the Adriatic small communities).

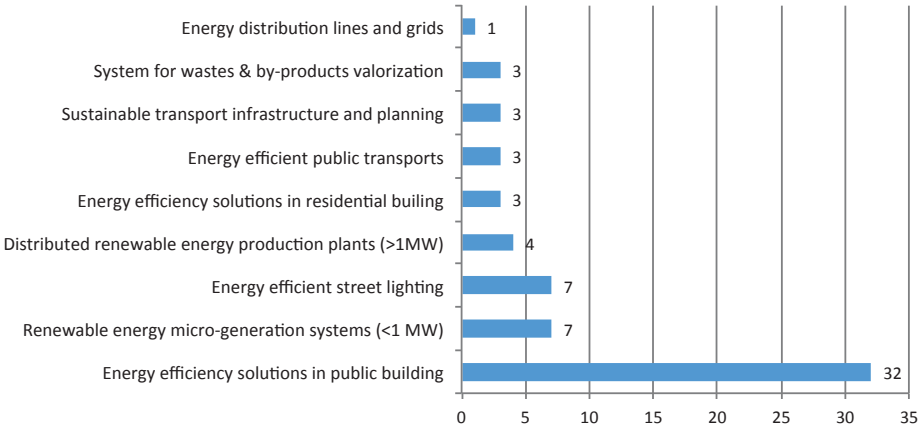
In the Alterenergy WP4, 63 feasibility studies were realized: 34 feasibility studies regarded energy efficiency in residential and tertiary buildings, 14 green energy supply, 6 sustainable transport and 6 sustainable urban systems, 3 energy efficiency in industry or agriculture.

Area of intervention of the feasibility studies



In the following figure, the sub-areas of intervention choosen by the feasibility studies is specified; more in

Sub-area of intervention of the feasibility studies

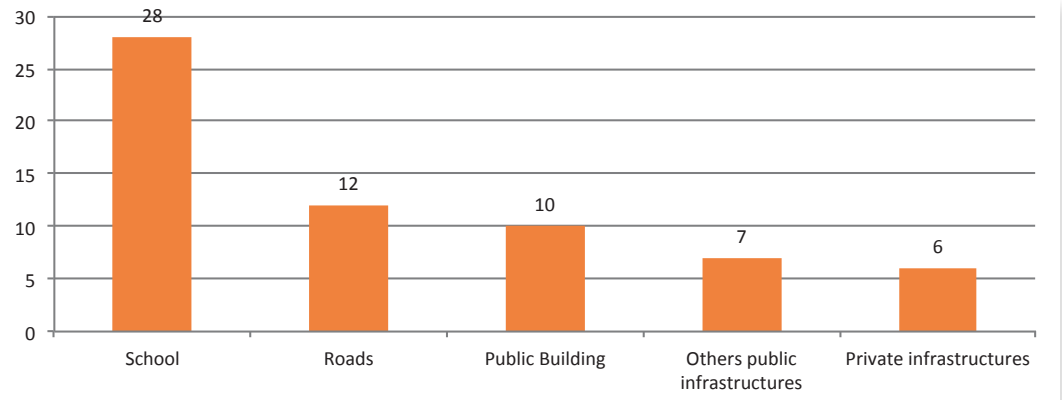


detail, it emerges that the energy efficiency solutions in public building was the more successful solution.

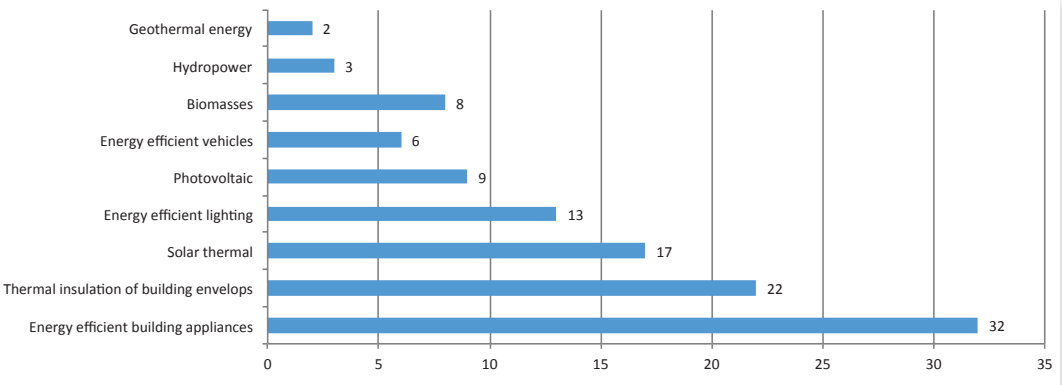
The next figure shows the target of the interventions foreseen in the feasibility studies: the main target were the municipal schools, followed by public roads (interventions on mobility or public lightining), others public buildings and private infrastructures.

Energy efficient building appliances and thermal insulations solutions were, conseguently, the main tecnologies analized in the feasibility studies. Among the Renewable Energy Sources (RES), the solar source (both thermal and photovoltaic) was the preferred solution. Almost all the main energy related technologies were considered by the Alterenergy feasibility studies. Energy efficency interventions and the adoption of RES in public building were considered the most profitable solutions by the maiority of target communities.

Targets of the interventions foreseen in the feasibility studies



Technologies considered in the feasibility studies








The pilot projects and demonstrative actions realized

“Pilot Projects” are larger scale interventions that aim to concretely demonstrate the integration of different solutions regarding energy efficiency and renewable energy production.

“Demonstrative Actions” are small scale RES/RUE applications that will demonstrate specific solutions of high exemplary value.

Thanks to the Alterenergy project, two large pilot interventions have been realized in Albania and Puglia and seven demonstrative actions have been realized in Bosnia Herzegovina, Croatia, Greece and Slovenia.

Thanks to the Alterenergy project, two large pilot interventions have been realized in Albania and Puglia and seven demonstrative actions have been realized in Croatia, Slovenia, Greece, and Bosnia Herzegovina.

Ten interventions were finalized in public schools in Albania, including energy efficiency measures at the building envelope, along with interventions on heating, solar, and lighting systems. In the following picture it is possible to see the overall improvement of the quality of the infrastructures after the project interventions.

An integrated intervention focused on energy efficiency of 2 public schools and of a municipal historic building to be used for social tourist purposes, together with sustainable mobility interventions, was realized in Sant'Agata di Puglia in Italy, by the project partner Puglia Region.

In Bosnia Herzegovina the intervention concerned public lighting and efficient heating in schools of Cajnice and Bosanski Petrovac municipalities.

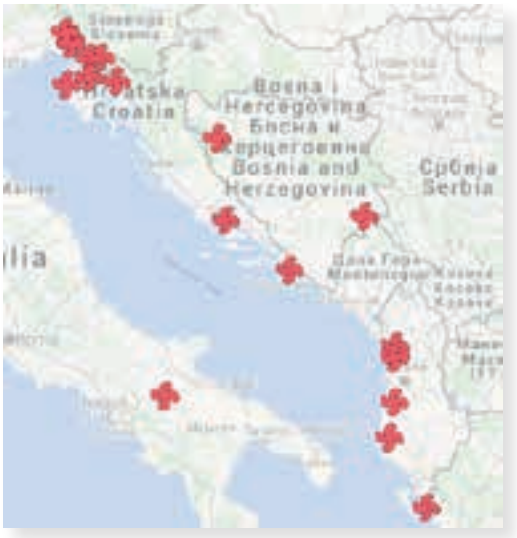
Four interventions were carried out in Croatia: the first one in Ston Municipality, related to photovoltaic collectors, solar thermal collectors for hot water and led lighting in the elementary school buildings (by Dunea project partner). Integrated measures with the accent on energy efficiency and renewable energy sources were implemented in the kinder gardens of Novigrad and Buzet municipalities (by Istria Region project partner). A 19,9 kW photovoltaic system, solar thermal system for water heating and 90kW heat pump were installed on the public building of the Kindergarten Cavle (by Primorje-Gorski Kotar *County*), while the installation of photovoltaic power plant (PVPP) on the roofs of the Vrgorac elementary and secondary school wwre implemented by Split Dalmatia County.

One intervention was realized in Greece, in the Epirus Region, concerning the upgrade of the heating system of the building that houses the Regional Unit of Thesprotia offices. A geothermal heat pump has been installed, along with the needed infrastructure inside the building for space heating and cooling purposes.

Finally, an investment has been carried out by Golea, concerning sustainable transport in 4 pilot municipalities (Šempeter-Vrtojba, Miren-Kostanjevica, Divača) and in Nova Gorica, where 14 electric bicycles, and 4 electric vehicle charging stations are now available.

From a geographical perspective, as shown in the next figure, the infrastructural investments were distributed in all the Adriatic area.

The pilot projects and demonstrative actions localization



The following table gives an overall picture of the 30 interventions realized in the demonstrative actions and pilot projects.

Pilot Projects and demonstrative actions overview

Pilot Project and demonstrative actions	Total
on schools	18
on municipality buildings	4
on public transport	6
on public lighting	2

PILOT PROJECT

The Alterenergy project in Albania

Lushnje Region (Terbuf, Grabian) and Lezha Region (Shenkoll, Fushe Kuqe, Balldre)

9 School buildings and and 1 Municipality building

Interventions related to Energy Efficiency Measures at the building envelope, along with interventions on heating, solar, and lighting systems: rehabilitation of the floors; rehabilitation of the chimney; rehabilitation of the roofs of the buildings and the terraces; replacement of the thermo-insulating layer in the outside walls, roof and floor; supply and placement of new, double-glazed windows and doors with PVC structure; reparation of the interior walls and toilets; rehabilitation and construction of drainages; installation of a new complete heating system; installation of a new solar collector system in the roof of the building; installation of a new efficient lighting system

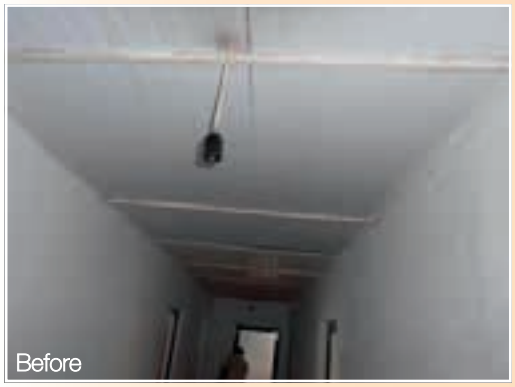
Elementary School Cerme e Siperme

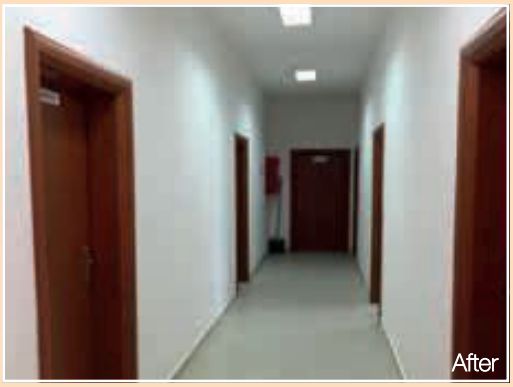
Elementary School Sulzotaj

Elementary School Cerme Proshke

Elementary School Grabian

Grabian Commune





Elementary School Urra e Muratit

Elementary School Marlecaj

Elementary School Kakariq

Elementary School Fushe Kuqe

Elementary School Shenkoll

The Alterenergy project in Italy – Puglia Region

PILOT PROJECT

Sant'Agata di Puglia

Sustainable transport, Primary and Secondary School buildings and an historical building

Renovation of the urban sustainable transport by replacing the previous diesel bus with the delivering an electric urban bus.

Refurbishment of the historical building Hotel "La Cisterna": renovation of the building energy efficiency solutions, including thermal and electric retrofit, insulation of vertical walls, insulation of roof, replacement of windows, replacement of skylight, replacement of heat plant, installation of solar thermal system.

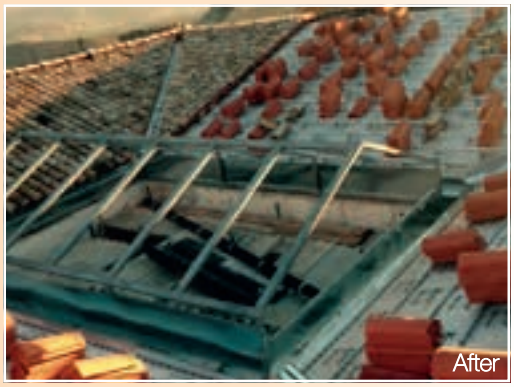
Interventions regarding the retrofit of the building envelope and of the heating plant (Primary School) and the retrofit of the building and of the heating plant (Secondary School): insulation of vertical walls, insulation of roof, replacement of windows, replacement of skylight, replacement of heat plant, installation of solar thermal system.

Electric Bus


Before


After

Hotel la Cisterna



Elementary School

Seconday School

The Alterenergy project in Bosnia and Herzegovina

DEMONSTRATIVE ACTION

Municipality of Cajnice and Municipality of Bosanski Petrovac

School building, Public building, Public lighting

Bosanski Petrovac: Revitalization of the Municipality administrative building (thermal insulation and facade windows replacement) and heating system regulation; Revitalization of the Streets' Public Lighting Net (replacement of existed Mercury lamps with LED lights)

Čajniče: Revitalization and insulation works replacement of coal fuel heating boiler plant with in the biomass heating boiler plant in the Primary School "Jovan Dučić"; Replacement of existed classic lamps with fluorescent sporting lamps in the Primary School "Jovan Dučić" – sport hall; Revitalization of the Streets' Public Lighting Net (replacement of existed Mercury lamps with Sodium high-pressure lamps)

The Alterenergy project in Bosnia Herzegovina


Bosanski Petrovac


Cajnice

DEMONSTRATIVE ACTION

The Alterenergy project in Croatia – Dubrovnik and Neretva County

Municipality of Ston

Elementary School building

Implemented 3 RES/RUE solutions: photovoltaic tracker system, thermal solar system and LED lightning in school building:

- Replacement of all indoor and outdoor lighting systems (48x75W incandescent, 38x60W incandescent, 30x18W fluorescent tubes) in the school with LED.
- Solar thermal system installation: 2x2m² solar vacuum tubes collector, 2x2m² solar flat plate collectors, 500 litters (0.5m³) hot water tank, piping system, circulation pump, working fluid, temperature sensors and regulation system.
- Solar PV system with two axis tracker: the system consists of solar tracker (concrete foundations, main beam, PV panel carrier construction, PV modules up to 10kW, inverter up to 10kW, tracking device and automation, auxiliary equipment, wiring, antrdiligtening installation, fence, and small meteorological station).
- Installation of a monitoring and evaluation system for educational and dissemination purposes in order to show RES production from PV installation.

Elementary School in Ston Municipality (Dubrovnik and Neretva County)

The Alterenergy project in Croatia – Istria County

DEMONSTRATIVE ACTION

Municipality of Buzet

School building

Integrated measures with the accent on energy efficiency and renewable energy sources in the kinder gardens: modular hybrid heat pump using geothermal and solar energy, new engine room for the geothermal heat pump, new heat pipe system and automatic management of the heating system.

Kindergarten in Buzet Municipality (Istria County)

DEMONSTRATIVE ACTION

The Alterenergy project in Croatia – Istria County

Municipality of Novigrad

School building

Integrated measures with the accent on energy efficiency and renewable energy sources in the kinder gardens: building energy refurbishment, including floor insulation, windows and doors replacement; ceiling lowering, new energy efficient LED lights.

Kindergarten in Novigrad Municipality (Istria County)

The Alterenergy project in Croatia – Primorje-Gorski Kotar County

DEMONSTRATIVE ACTION

Municipality of Čavle

Kindergarten building

Installation of a 29,9 kW photovoltaic system, solar thermal system for water heating and 90kW heat pump.

Photovoltaic panels were installed on the roof of the kindergarten building. The system has a capacity of 30 kW. A heat pump air-water, of 90 kW power, has been installed. The third system of renewable energy that is built on a kindergarten in accordance with the plan is the solar thermal system for hot water preparation. The system consists of plate solar collectors that are mounted on the roof of the kindergarten. Solar collectors convert solar thermal energy into usable heat for hot water preparation.

Kindergarten in Cavle Municipality (Primorje-Gorski Kotar County)

The Alterenergy project in Croatia – Split and Dalmatia County

DEMONSTRATIVE ACTION

Municipality of Vrgorac

Primary and Secondary School buildings

Installation of photovoltaic power plant (PVPP) on the roofs of the Vrgorac elementary and secondary school.

The realization of the solar photovoltaic power plant (PVPP) will primarily make an impact on reducing the school's electricity consumption from the grid and delivering the surplus electricity production into the grid, with increasing electricity generation from renewable energy sources.

Namely, school's average annual electricity consumption turns out to be 38.850 kWh (primary school) and 44.996 kWh (secondary school).

Total installed capacity is of 30 kW on grid connection point.

Primary and Secondary School in Vgrorac Municipality (Split and Dalmatia County)

The Alterenergy project in Greece

DEMONSTRATIVE ACTION

Municipality of Igoumenitsa

Building of the Municipality of Igoumenitsa

Installation of a geothermal heat pump using underground brackish waters so as to cover the heating-cooling needs of the public building that houses the offices of the Regional Unit of Thesprotia in Igoumenitsa, Epirus. The intervention and the new technologies has been implemented to the ground floor of the building because the budget was limited and it could not cover the whole building. However, the local authorities are very willing to expand the installation to the rest of the building (1rst and 2nd floor (as well as to other public buildings aiming at saving financial and environmental resources).

Municipality Building in Igoumenitsa

DEMONSTRATIVE ACTION

The Alterenergy project in Slovenia

Šempeter-Vrtojba, Miren-Kostanjevica, Divača and in Nova Gorica

Sustainable transport

Purchasing of 14 electric bicycles and 4 electric vehicle charging stations

Sustainable transport in Šempeter-Vrtojba, Miren-Kostanjevica, Divača and in Nova Gorica

The impact of pilot projects and demonstrative actions

The realization of the pilot projects and demonstrative actions produced important benefits for the territories hosting them. The main goal of the Alterenergy project is, however, the promotion of energy sustainability on a much wider scale in the Adriatic area, capitalizing from these pilot initiatives.

In this paragraph, the main impacts of the infrastructural interventions of Alternergy are summarized, gathering the information of the project D6.4 reports. These reports analysed, for each intervention, its impact on the energy balance and CO2 emissions, its impact on the local economy and quality of life and its level of acceptance by social and economic actors (social impacts).

Technical and economic impact

Regarding Sant'Agata municipality (Puglia Region, Italy), the new electric bus for public transport would guarantee a yearly economic saving of 5.400 euro, mainly due to a diesel saving of about 3 t. The interventions on the hotel La Cisterna (compared with alternative scenarios) are able to guarantee an estimated savings of 20% of the heat consumption, equivalent to about 5,192 kg of diesel fuel per year, and about 40% of electrical consumptions (1,128 kWh). For the retrofitting of the local primary school it is estimated a reduction of the Sant'Agata municipality energy expenses of about 20.000 euro, determined by a reduction of approximately 6,400 kWh per year of electrical consumptions and 19,000 m3 of gas per year. Finally, for the retrofitting of the secondary school it is estimated a reduction of the energy expenses of about 16.500 euro per year, determined by a reduction of approximately 5,600 kWh per year of electrical consumptions and 15,000 m3 of gas per year.

Concerning the Croatian city of Ston, the LED lights installed in the school will produce yearly electricity savings of 3 MWh. Solar thermal systems should produce electricity savings of 2.43 MWh for hot water consumption and additionally contribute to savings of 1.25 MWh of light fuel oil. Estimated yearly production of electricity by solar PV installation with tracker is 18 MWh. Final energy balance after interventions should be 56% less than before (6.68 MWh savings and 18 MWh of local PV production).

In the Slovenian Municipalities of Šempeter-Vrtojba, Miren-Kostanjevica, Pivka and Divača, it is estimated a 133 MWh reduction of energy consumption and a reduction of energy expenses of 14,652 euro.

Concerning the Croatian City of Buzet, energy consumption have been reduced by 10-20% due to the automatic heating system management. It is also expected a 50% saving on energy costs for the kindergarten due to the hybrid system in place.

In the City of Novigrad (Istria) energy consumption will be reduced by 65% of the current kindergarten needs. Energy savings will cut the bills in half right away and with the planned intervention of replacing the old oil boilers with a heat pump will result in even bigger savings.

Regarding the implementation of energy efficiency measures and renewable energy in public buildings in Lezha Region (Albania), it is calculated that the overall consumptions in terms of energy (thermal and electrical) will decrease of about 50%

In Cerme e Siperme, Cerme Proshke, Sulzotaj and Grabian in Lushnje Region (Albania) the overall reduction of energy consumption was comprised from 46% in Grabian Elementary School and 50% in Cerme Elementary School.

In the Municipality of Cavle (Primorje-Gorski Kotar County of Croatia), savings in electricity consumption due to the production of a photovoltaic system are 34,100 kWh/y. Savings in electricity consumption due to hot water from solar collectors 5,542 kWh per year. Annual savings of gas are about 586 m3. From the economic perspective, the total annual savings in Cavle are about 5,530 euro.

Photovoltaic power plants in the primary school and secondary school in Vrgorac (Split and Dalmatia County, Croatia) will ensure 48% of the objects power demand, which makes 44% of the total plant production. The other 51% of the consumption will be bought from the grid while the surplus of generated electricity will be sold into grid at an electricity market price.

The pilot projects and demonstrative actions have effects on the reduction of greenhouse gases and the reduction of local atmospheric pollution (acid rains, smog, etc.).

Regarding Sant'Agata (Puglia Region), the electric bus for public transport would guarantee a reduction of about 3 tons per year compared to the old diesel bus; the retrofitting of "La Cisterna" hotel, about 58 t of CO2; the intervention on primary school 38 t and the retrofitting of secondary school 31 t of Co2.

Concerning Ston, the environmental sustainability analysis shows that applied measures can save up to 7 tons CO2 equivalent emissions per year.

Concerning the Slovenian Municipalities of Šempeter-Vrtojba, Miren-Kostanjevica, Pivka and Divača, the reduction of CO2 emission after 1 year from the purchase of equipment is evaluated on 27 t CO2.

Concerning the Croatian City of Buzet, the CO2 emission for the kindergarten will be reduced almost 100%.

Regarding the implementation of energy efficiency measures and renewable energy in public buildings in Lezha Region (Albania), the CO2 emissions of the five schools will be reduced by about 60%.

In the municipality of Cavle (Primorje-Gorski Kotar County of Croatia) CO2 savings per year are: 11.987 t thanks the photovoltaic system; 1,4 t due to the solar thermal collectors; 13.413 thanks to the heat pumps.

Photovoltaic power plants in Split and Dalmatia County will results in lowering the CO2 emission of about 35 t/year.

Replaced lighting guarantees better illumination. The improvement in hot water systems has a direct impact on comfort of building users. For example, the quality of life for the children staying in the kindergarten of Buzet will be drastically changed. The kindergarten will be properly heated, the automatic management system will allow rooms to be heated differently and there will be no problems during Mondays because the heating system in the police station was offline during the weekend.

PV tracker system can be additionally used as part of open space classroom for renewable energy sources and rise awareness on renewables.

The users of the electric bicycles enabled some public administrators and other users to travel with bicycle instead with the car, with all the connected benefits: fun exercise, free parking, zero emissions. In most situations in the city, riding an electric bike will be faster and cheaper than either car or public transit.

The new sustainable public transport means will increase tangible comfort for users, endowed of the newest safety and technological systems.

Social impact

Despite the general positive social acceptance of the Alterenergy intervention, in specific cases citizens found dificculty in understand how the investment was working. To avoid this problem, for example, in Buzet kindergarten it is planned to install a system monitoring the savings achieved and give information about the system.

The impact of the investments of the citizens regards also:

- Raising the awareness for renewable energy sources and additional investments in renewable energy (i.e. replacement of the current fossil fuel based heat energy sources).
- Education of younger and older generations regarding the renewable energy exploitation and encouraging them to install PV systems in their homes.
- Potential participation of local or county companies in the processes of developing and constructing power plants which lead to job creation and improvement of the local economic activity.

Local stakeholders and interest groups have been informed on planned and realized activity through press releases, dedicated web pages, local workshops, forums. In some target communities, local public administrations organized some public meetings with project partners, trying to involve citizens in the project from the beginning.

In all target communities, there was a positive feedback from all stakeholders, from school directors to mayors and administrations, to the regional and national administration and leadership.

The interventions in the schools have an important social and educational effect in terms of awareness rising on sustainability. Schools, indeed, represents unique places in the municipalities as they are visited by most population with children, but also they represent spaces for other local activities. Different exhibitions and shows were also organised there by Alterenergy Project. In this context, school represents ideal places for pilot projects or intervention in energy savings and environmental protection.

Some measures (electric bicycle in Slovenia and public hotel la Cisterna in Italy) have a promotional and a touristic purpose.

In case of Buzet, the geothermal energy is still unknown in Istria. For this reason, information about that investment aim to create interest in stakeholders making them open new production lines or services.

The reduced energy bills following the interventions will affect the target communities' budget. The money saved in this way can be reinvested for future energy needs or other priorities.

Equipment suppliers and contractors will also improve their skills. All this will consequently result in greater employment and development of renewable energy sector in the region and the wider community. In terms of job creation, the benefits of Alterenergy investments can be divided into three categories:

1) Direct jobs in firms that carried out the energy efficiency works (e.g., construction, engineering, architecture).
2) Indirect jobs in firms supplying goods and services to company directly involved in the works (e.g., manufacturing, accounting).
3) Induced jobs created by the demand generated by wage and business income from energy efficiency investments and by energy bill savings.

It is expected that while using renewable energy technologies in the pilot actions, but also through the implementation of the Action Plan-SEAP, a large number of stakeholders will be more familiar with renewable energy sources.

Impact on the local administration

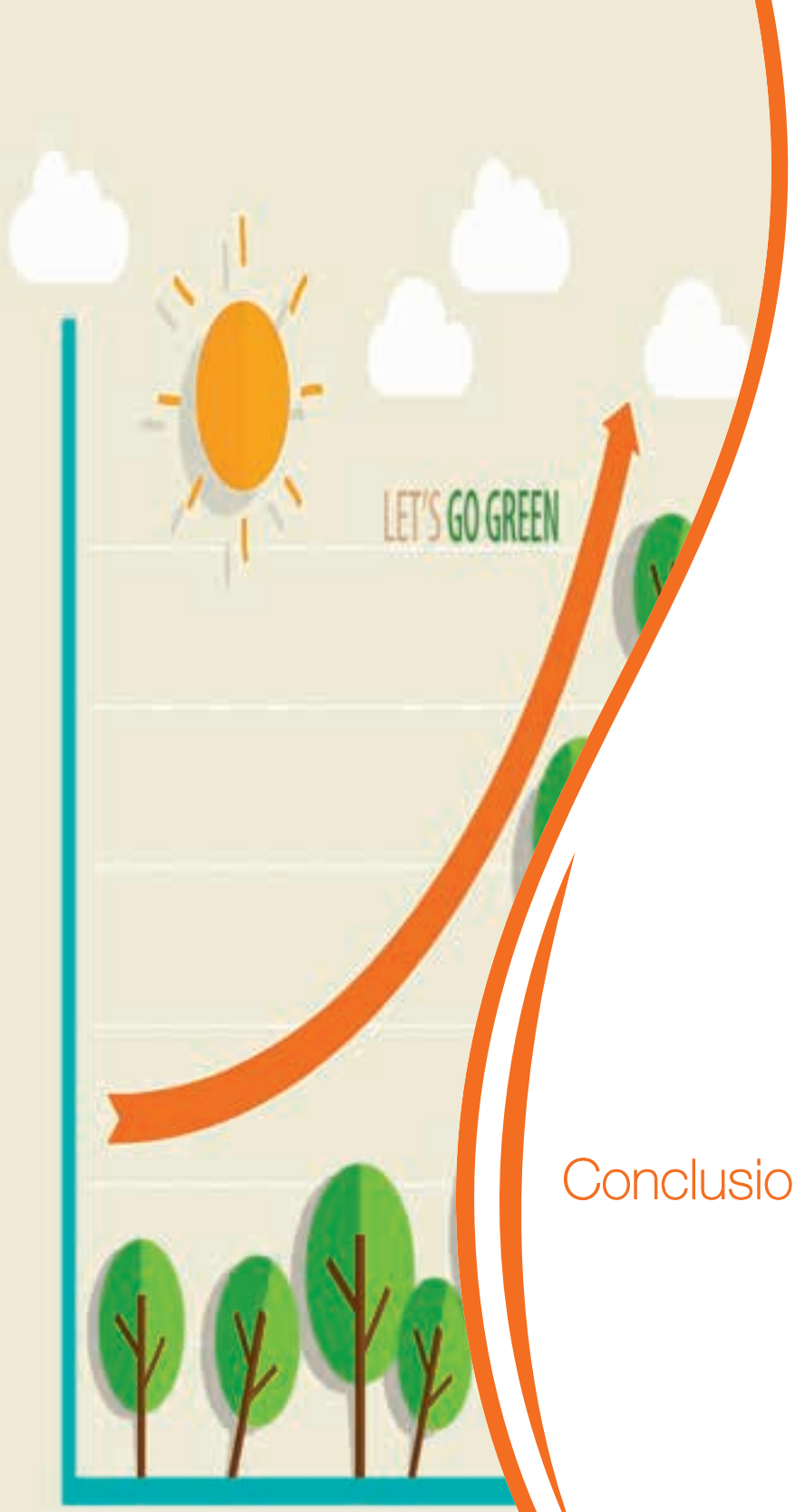
Municipality mayors and administrative staff of target municipalities have been fully involved in preparation of projects, helped issuing all required permits and provided support to local contractors during the development of the project.

The target communities' functionaries assisting the interventions realization improved their knowledge about European projects, on-site problem management, decision-making and communication concerning energy. The local energy managers have been directly involved, from the beginning, in all the project phases (the feasibility study, the final planning, the call for tender procedure, etc.) and could so greatly increase their technical expertise concerning public transports management and sustainable mobility technologies.

Energy efficiency is not just about new technologies; it also concerns new behaviours and better decisions. Local authorities, through the experience of Alterenergy project, have established new energy efficiency and environmental programs (SEAPs). With the drafting of their new SEAP and energy balance documents, target communities have a good base for future planning.

The interventions themselves were included in the new local Sustainable Action Plans and were considered strategic actions of the local energy strategy the municipal administration is implementing toward CoM 2020 targets.

Finally, it is important to underline that the municipalities involved can use the achieved cost savings from the intervention to further work with environmental and social issues.



Conclusions

Interventions that were implemented in Alterenergy spanned across many technical fields, from building refurbishment to efficient lighting, from renewable energies to electric mobility.

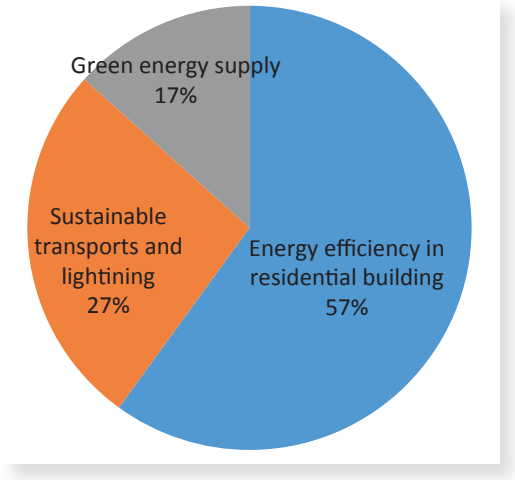
All such interventions can be considered consolidated, that is they are using commercial technologies and require a quite standard management. This represents a basic prerequisite for replicability.

The general purpose of the demonstration actions and pilot projects was to show the novel concept of efficient energy utilization and local renewable energy production that can be widely used and integrated in the small communities of the Adriatic Area.

Interventions that were implemented in Alterenergy spanned across many technical fields, from building refurbishment to efficient lighting, from renewable energies to electric mobility.

In the next figure, the main areas of interventions of the investments have been analyzed. Likewise the feasibility studies, the main focus of the infrastructural interventions was "energy efficiency in residential and tertiary buildings", with more than one half of all the investment realized. Other important areas were "sustainable transports and lightning", with the 27% of the infrastructural investments, and green energy supply, with 17%.

The main area of intervention of the pilot projects and demonstrative actions



Generally, one of the most experimented obstacles met during the implementation was the long administrative path necessary to realize the interventions: the investments, indeed, had to be compliant with public procurement rules, publicity and information rules, national legislation related to the environmental policies, all compulsory requirements set by the local laws and, additionally, with all the requirements of the IPA Adriatic Programme. This determined a long list of drawn documents and obtained permits and validations (i.e. each Alterenergy project partner had to obtain the required property rights from the concerned local public authority for the realization of the investments).

Another obstacle was missing data registered from some local administrations; this made difficult to plan properly the related interventions.

Finally, the limited economic resources of Alterenergy project restricted the impacts of the investments carried out.

When speaking about energy improvement, an interesting concept regards the comprehensive approach that is conceiving a proper mix of actions regarding both demand side refurbishment and supply side actions. Of course, demand side actions need to be considered of main importance since they allow, after being implemented, to better size the supply needs. Some of the Alterenergy implemented projects well represent such comprehensive approach.

Some interventions demonstrated that not only energy saving, but also increased comfort is a direct result of the project. New and more efficient lighting guarantees better illumination. The improvement in hot water systems has a direct positive impact on comfort for the users. A proper heating guarantees better living conditions.

Concerning a broader acceptability from politicians, stakeholders and people, it is important to underline that interventions proposers should stress the multipurpose character of energy sustainability projects. Vice versa, a project planned with the aim to implement new services, better comfort or standards should include energy efficiency and renewable energy exploitation in their value chain. Many norms are already pushing in such direction, but more can be done.

The above considerations suggest different approaches from the financing point of view. It is known that the financing of an energy sustainability intervention can be based on project finance principles as the investment costs could be re-

imbursed by cash flow savings generated by the intervention itself. As underlined in the Alterenergy Guidelines for "Financial Plans definition" (Task 6.2), the economic opportunity to make an investment derives from a comparison of the wealth generated by the project and the costs incurred for its construction. To assess whether and to what extent a project is profitable it is necessary to verify its net cash flow, derived from the difference between the revenues and expenditures related to the project, calculated for each year. Of course, it is often unlikely that revenues can cover also costs incurred to put plants and facilities up to standard or to implement a general refurbishment of a building. In these cases, grants could be used as an additional fund to support renovations that go beyond energy performance requirements or even to help the development of innovative technologies. On the contrary, grant funding should generally not be used to finance investments that provide sufficient returns by themselves.

The potential for replication of the Alterenergy interventions in the wider Adriatic area is huge because they were small and standard. Indeed, the project did not privilege big, expensive or high innovative solutions but integrated and simple measures with a high social acceptance. Therefore, most of the presented interventions could, with very small adjustments, be replicated to similar municipalities and similar buildings and technologies: all schools and other public buildings in the county registered similar consumption patterns and final energy use per unit of surface.

The smaller communities, which are much diffused in the Adriatic area, represent an interesting potential for energy sustainability improvement. Thanks to the Alterenergy project, 63 small municipalities tested sustainable models for the management of the local energy resources, providing a interesting example for the whole area.

The multi-level governance model built within Alterenergy was born by a complex and gradual process, which today allows us to provide concrete examples for the experiment replicability in other similar contexts but also gives us an idea of forward-looking capitalization of shares put in place to support the energy sustainability in the territory that takes on the challenges of the IPA Adriatic Cross-border Programme 2007-2013.

The network of ALTERENERGY communities, through an innovative approach, has opened a new networking path and encouraged and supported the participation of public administrations responsible for local energy policies, citizens and economic operators, together with universities, research institutes, the energy agencies and the media: they are all final beneficiaries of an active involvement process that looks away, an experimental test bed but in the perspective of the 2014-2020 European programming opportunities and new vision for the Adriatic-Ionian macro-region.

Ragusa Grafica Moderna Srl – Bari
tel. 080 5315780 – info@ragusagrafica.it

CONTACTS

Puglia Region – Via P. Gobetti, 26 - 70125 Bari - ITALY
Tel. +39.080.540.6545 - Fax. +39.080.540.6554 - E-mail: info@alter-energy.eu

Web Site: **www.alter-energy.eu**
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