LC Districts

Interreg Europe

European Union
European Regional
Development Fund

[LC DISTRICTS GOOD PRACTICE GUIDE]

Index

1 INTRODUCTION

The building sector is the largest energy-consuming, accounting for over one-third of final energy consumption globally, being also an important source of CO_2 emissions. Energy performance in this sector can be drastically improved through different measures, however measures should be implemented in a coordinated and holistic way, taking into account all aspects involved in the achievement of the low-carbon economy in order for them to go hand in hand with sustainable development strategies at the overall municipality/district.

LC Districts in a nutshell

LC Districts is a European project, funded under the Interreg Europe programme, whose overall objective is to improve regional development policies and programmes in the areas of building renovation and construction of energy efficient buildings, creation and renovation of district heating and other urban renovation actions, in order to facilitate the transition to low-carbon districts and municipalities.

The interregional learning process has taken place around three thematic areas:

i) information and assessment methodologies and services for the design and implementation of low-carbon districts and municipalities;

ii) information and assessment structures at the municipality and district level;

iii) policies and programmes governance and management.

Since August 2019, seven partners across Europe (Spain, Italy, Sweden, Czech Republic and Croatia) are cooperating in this three-years-and-a-half project.
It is organised in two phases:

1. Interregional learning (2019-2022): partners identify and exchange good practices, conduct study visits and incorporate the knowledge into concrete action plans;

2. Implementation (2022-2023): partners put into action the knowledge acquired, monitor their results, and share solutions with other European cities and regions.

The Good Practices

The interregional learning process has taken place through the exchange of GPs. Partners have contributed to it together with their local stakeholders by identifying and explaining their experiences and initiatives related to the pursuit of the decarbonisation of their cities, to inspire the other partners.

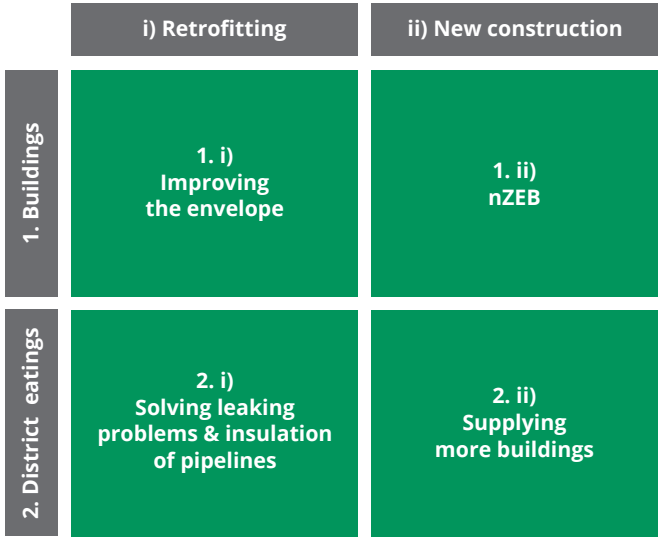
The good practices presented can be divided mainly into 2 groups:

A) Concrete projects in which energy efficiency measures have been implemented in the building sector. These projects have resulted in a decrease of energy demand in the building sector and therefore reduction of CO_2 emissions. Either by rehabilitating existing buildings and infrastructures or by building new ones, they show how this sector can become neutral to climate change.

B) "Facilitators" or "enabling structures" for the implementation of projects such as those described in the previous section and that contribute to the spread of them.

Implementation

The first group includes the following projects:



1. i) renovations in the envelopes of buildings provide good insulation from both heat and cold and improve the comfort of its inhabitants/users.

1. ii) buildings that are designed to require almost zero energy demand and that intend to be references for future constructions.

Another way to improve energy efficiency is by using district heating, as centralizing the heat source achieves greater efficiency because it allows a continuous flow. Therefore, the same amount of energy is satisfied but with a better use of heat production.

2. i) In this line we have examples of renewal of existing heat networks to amend deficiencies in the pipeline network due to deterioration and leakages, replacing the systems by newer and more efficient ones

2. ii) Likewise, cities have opted to expand and create new DH networks with leading-edge technology.

The incorporation of renewable energy sources to replace fossil energy sources plays a key role together with the improvement of buildings performance and heating networks. All regions have opted for the use of renewable energies together with actions in improving efficiency, contributing to the decarbonization of their cities.

Facilitators or enabling structures

The good practices exchanged under the second type are very varied, but we could group them into ***strategies*** and ***tools*** whose objective is boosting of initiatives aimed at improving energy efficiency and incorporating renewables, mainly:

Strategies:

The regions have presented a number of strategies that contribute to the decarbonization of their cities:

- Inclusion of the measures contained in the energy plan in the urban plan
- Joint action plans that promote the initiative of local entities
- The design of a comprehensive energy plan including the energy efficiency financing plan from an agency such as the energy agency,
- The commitment to local materials
- The commitment to provide officially protected homes with the highest standards of energy efficiency
- The bet on the DH systems

Tools:

- In order to facilitate and guide the administrations in their path for the energy transition, some tools allow a better understanding of the starting point situation and help identifying the needs for improvement, and enable them for a more efficient planning: SIE, GIS Navarra (vulnerability map), ITACA. The latter example also contributes to the evaluation of the sustainability of buildings and can be used for tax or regulatory purposes, if determined by the administrations.
- Oriented to the builder team: decision-making tool in which a large number of variables are incorporated and a balance is severed when there are conflicting interests of the stakeholders.

This guide gathers all the good practices selected by the LC Districts partners, separated into two categories:

implementation oriented projects;

facilitators: strategies and tools;

We invite you to explore these good practices either by geographical location or by the theme(s) associated to it. They are also available online on the LC Districts website.

2 SELECTION CRITERIA AND AREAS OF INFLUENCE

A good practice is a method, program, project or technique that has been generally accepted because it produces good results. In this guide we provide a selection of the ***programs and initiatives supporting low carbon transition in the regional*** renovation and construction areas that have been studied and analysed in the project, among the consortium.

Stakeholders' workshops provide an excellent opportunity to screen all Good Practices known or performed by local actors at the regional level. The resulting identified Good Practices during the LC Districts learning process were shortlisted conducting a critical analysis by the project team (or stakeholders' local groups) in order to assess them upon background, objective and alignment criteria:

Background: The good practices address the decarbonisation of the built park of the cities, which represent a high energy consumer sector, and there is room and techniques available to improve its performance.

Objective: Private dwellings, public buildings, DH and urban infrastructures.

Alignment: The alignment of the GP with the overall LC Districts project (objective, actions, partners, etc.).

The selected GPs were subject to a deeper analysis by a peer review aiming at highlighting the benefits and interest of the good practice, its potential for improvement and replicability or transferability of it to the rest of the partners' regions. Financing aspects were also an important issue for all the partners.

The transition to low-carbon cities must be carried out in a holistic way and different actions must come together to mobilize and boost the transformation of our built stock and the heating and cooling systems for buildings. This conversion is creating a new market in which it is necessary to act on demand, supply and also on institutions policies, promoting public-private collaboration and showing the benefits that this transition entails, not only in environmental terms, but also in economical and social aspects.

The ***Demand*** in this case is made up of the promoters of the implementation of measures that improve the efficiency of the energy used in buildings. The ***Supply*** is comprised by the professionals that implement the measures, while the ***Administrations*** have the function of favouring conditions so that the supply and demand develop increasing this market and obtain the expected results, and will also take a promoting role.

The good practices that we present in this guide try to improve some of the aspects or factors that we consider to be key in this transformation, influencing the three mentioned vertices:

→ From the point of view of the Demand:

- *Demand incentive through awareness of the benefits* of energy efficiency measures and through close advice that provides reliance to the promoter.
- *Efficiency gains from the demand:* a change in energy use can lead to improvements in efficiency without the need for material implementations: Homes or buildings that are hooked up to a DH dilute their specific demand in the whole, making a more efficient use. Consumption monitoring also provides the information necessary to assess possible improvements in the habits of the building's inhabitant / user.
- *Boosting demand from the public sphere:* use of public buildings to implement improvements in their energy performance or the construction of emblematic buildings that serve as a reference and exemplary way.
- *Demand more ambitious goals with a longer-term vision:* sustainability and energy self-sufficiency

→ From the point of view of the Supply:

- *Technical training:* capacitation as a means to consolidate a pushing up market.
- Incorporation of renewables: the combination of energy efficiency measures with the production of clean and on-site energy multiplies the results sought.
- *Built-up park:* implementation of technical solutions in an existing building or heat network to improve its energy efficiency and meet the objectives set by Europe.
- New construction with nZEB standards: the way to do it from now on, placing the built sector as neutral for climate change.
- *Evaluation and monitoring of improvement actions:* measurement of environmental impacts, assessment of the energy and economic efficiency obtained with the implementations carried out, is essential to know the actions benefit and the way forward.
- *Multidisciplinary teams and learning acquired based on experiences:* carrying out projects that involve actions to improve energy efficiency requires the creation of technical teams made up of architects, engineers and construction companies. But they may also require technicians from the legal, financial and psycho-social fields, mainly in those projects in which the promoter is a group of people. This team requires good coordination and the projects provide them with experience that serves to create a valid work methodology for other projects.

→ From the point of view of the Administrations:

- *Coordination between institutions* enables better channelling of efforts and obtaining a greater impact: agencies, tools or plans that include centralized information favour this coordination.
- *Use of European funds:* financing is a condition that can limit actions, and it is important that the administration channels and takes advantage of the available resources to promote the transition.
- *Urban planning:* actions for decarbonisation can be limited to a building or cover an urban area. Several of the good practices presented have an impact on urban regeneration
- *Local employment:* we must not lose sight of the fact that the transformation towards a low-carbon economy is also an opportunity to improve other aspects of our society. To carry out the change many resources are needed that result in job creation, an aspect that is very relevant for the administration.
- *Categorization:* decisions on where to act require action criteria and their identification and assessment. The administration can make use of useful tools that make it possible to identify priority projects.

3 GOOD PRACTICES LIST

Projects

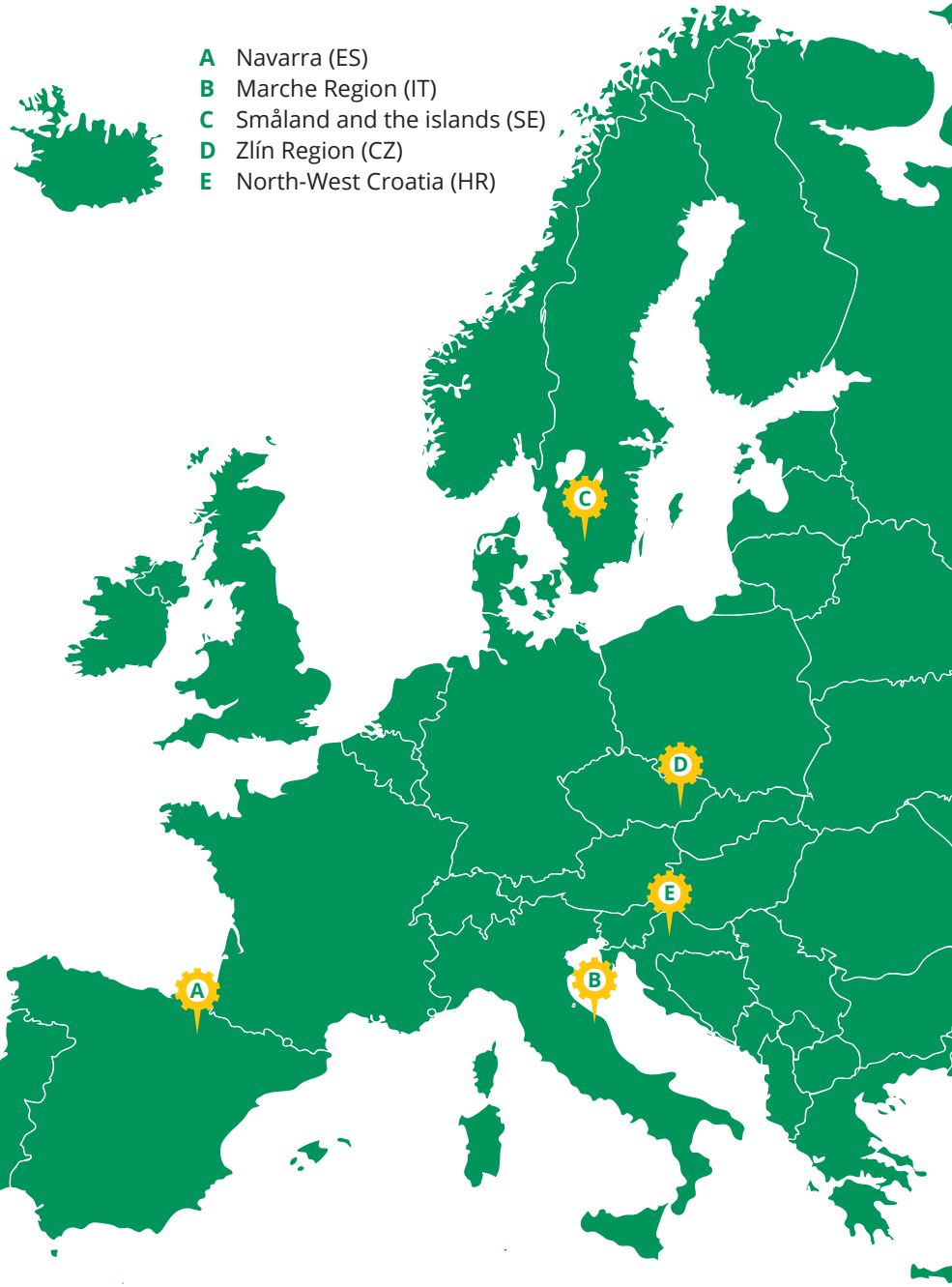
1 (A) Lourdes Renove
2 (A) Efidistrict
3 (B) Urban recovery with ecological value of the neighborhood ex I.C.P. "Villa Aosta"
4 (B) Villa Fastiggi, Eco-sustainable district
5 (C) Resource Efficient cities implementing ADvanced smart citY solutions
6 (C) Växjo City Hall and central station
7 (D) Reconstruction of the Zubří sports hall in the Zlín Region
8 (D) New construction of a fire station in a passive standard in the Zlín Region
9 (D) Reconstruction of the central heating system in Slavičín town
10 (D) District Heating system reconstruction in Brumov-Bylnice
11 (D) Decreasing the energy demand in Uherské Hradiště hospital
12 (E) Improving the performance of district heating system in the city of Zaprešić
13 (E) NEWLIGHT - refurbishment of public lightning

Tools

14 (A) Navarra Government energy information system
15 (A) Economic and social vulnerability map (GIS viewer)
16 (B) Protocollo ITACA, building a culture of change towards environmental sustainability in constructions
17 (B) ITACA protocol urban scale
18 (C)Decision-making method

Strategies

19 (A) Navarra Social Housing: nZEB housing
20 (B) Joint SECAP Vallesina
21 (C) Project Vikleby: local materials
22 (C) Rental housing by ETC Bygg
23 (E) Zagreb district heating system renewal – policy and financing perspective
24 (E) Green spatial plan of the city of Karlovac
25 (E) Green Mobility Brdovec - study of new mobility concepts in the Brdovec Municipality



4 LEGEND

Demand

- Awareness & follow-up steps
- Better use of energy demand
- Public buildings/infrastructures
- Sustainability (beyond energy)
- Autosufficiency

Supply

- Skill upgrading / Trainning and capacity
- RES
- Energy efficiency (implementation)
- nZEB
- Assessment, monitoring
- Management teams
- Technical experience (Flagship to follow)

Administration

- Helps coordination
- Capitalise EU funds
- Urban planning (new and existent)
- Local employment
- Spearhead
- Labelling

PROJECTS

Number	Description	DEMAND					SUPPLY/PROVIDERS							ADMINISTRATION				
	Influence to improve.../tackles with...	Awareness & follow-up steps	Better use of energy demand	Public buildings/infrastructures	Sustainability (beyond energy)	Autosufficiency	Skill upgrading / Trainning and capacity	RES	Energy efficiency (implementation)	nZEB	Assessment, monitoring	Management teams	Technical experience (Flagship to follow)	Helps coordination	Capitalise EU funds	Urban planning (new and existent)	Local employment	Spearhead
1	Lourdes Renove	●						●	●			●	●			●	●	
2	Efidistrict	●						●	●			●	●				●	●
3	Urban recovery with ecological value of the neighborhood ex I.C.P. "Villa Aosta"	●	●		●		●								●	●		
4	Villa Fastiggi, Eco-sustainable district	●	●				●		●			●	●			●	●	
5	Resource Efficient cities implementing ADvanced smart citY solutions	●	●				●		●			●	●				●	●
6	Växjo City Hall and central station			●		●		●		●							●	●
7	Reconstruction of the Zubří sports hall in the Zlín Region		●	●		●		●	●						●			●
8	New construction of a fire station in a passive standard in the Zlín Region			●		●		●	●	●	●				●			●
9	Reconstruction of the central heating system in Slavičín town		●	●	●	●		●	●						●		●	
10	District Heating system reconstruction in Brumov-Bylnice		●	●	●	●		●	●						●		●	
11	Decreasing the energy demand in Uherské Hradiště hospital			●	●	●		●	●		●				●			●
12	Improving the performance of district heating system in the city of Zaprešić		●				●	●	●		●		●				●	
13	NEWLIGHT - refurbishment of public lightning	●		●	●				●		●		●	●	●			

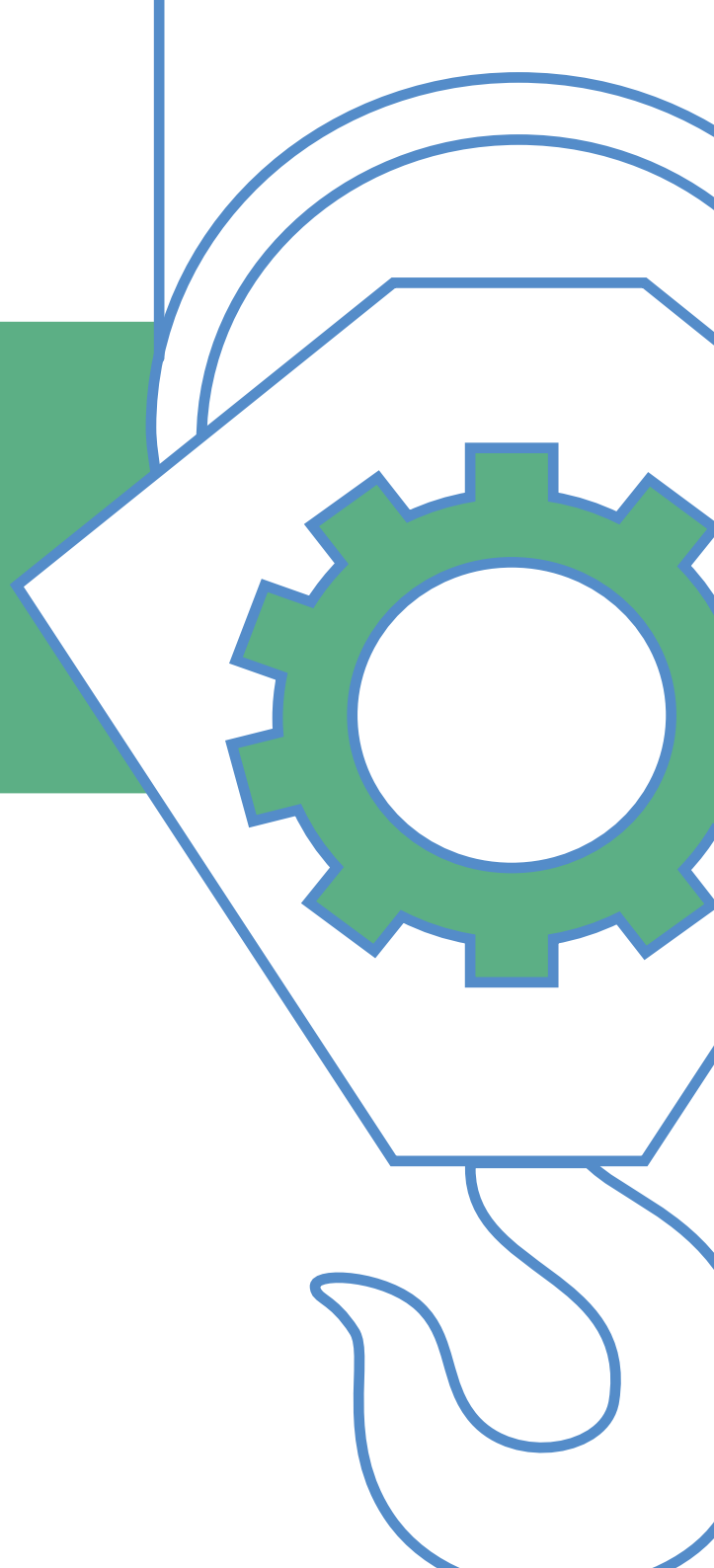
TOOLS

Number	Description	DEMAND			SUPPLY/PROVIDERS	ADMINISTRATION			
	Influence to improve.../tackles with...	Awareness & follow-up steps	Public buildings/infrastructures	Sustainability (beyond energy)	Assessment, monitoring	Helps coordination	Urban planning (new and existent)	Local employment	Labelling
14	Navarra Government energy information system	◎	◎		◎	◎			
15	Economic and social vulnerability map (GIS viewer)	◎			◎		◎		◎
16	Protocollo ITACA, building a culture of change towards environmental sustainability in constructions		◎	◎	◎			◎	◎
17	ITACA protocol urban scale		◎	◎	◎		◎	◎	◎
18	Decision-making method	◎		◎	◎	◎			

STRATEGIES

Number	Description	DEMAND					SUPPLY/PROVIDERS							ADMINISTRATION				
	Influence to improve.../tackles with...	Awareness & follow-up steps	Better use of energy demand	Public buildings/infrastructures	Sustainability (beyond energy)	Autosufficiency	Skill upgrading / Trainning and capacity	RES	Energy efficiency (implementation)	nZEB	Assessment, monitoring	Management teams	Technical experience (Flagship to follow)	Helps coordination	Capitalise EU funds	Urban planning (new and existent)	Local employment	Spearhead
19	Navarra Social Housing: nZEB housing			●		●		●		●								●
20	Joint SECAP Vallesina	●		●							●	●			●	●		
21	Project Vikleby: local materials				●				●								●	
22	Rental housing by ETC Bygg				●					●			●					
23	Zagreb district heating system renewal – policy and financing perspective	●	●	●					●			●			●	●	●	
24	Green spatial plan of the city of Karlovac	●		●	●				●		●			●	●	●		
25	Green Mobility Brdovec - study of new mobility concepts in the Brdovec Municipality	●	●		●		●	●	●					●		●		

6 PROJECTS



1 Lourdes Renove-Tudela

Regeneration of a deprived neighbourhood through energy saving renovation, introducing renewable energy sources and urban regeneration.

The Lourdes district is a social housing district built between 1954 and 1972 using very basic construction systems: lacking any type of thermal insulation and with no accessibility solutions. The neighbourhood is experiencing continuous deterioration and its population is aging.

The Lourdes Renove project is conceived as the first phase of the Integral Energy Rehabilitation of the Lourdes Neighbourhood. Under the energy saving criteria that lead the project, the actions were taken on both in the public and the private space:

- 4 type pilot projects for a complex building refurbishment
- Renovation of heating networks and replacement of district heating boilers
- Partial redevelopment of the urban area

In order to reach maximum involvement of its inhabitants, an office was opened in the neighbourhood as a meeting point for technicians and neighbours, with an informative and awareness-raising mission, as well as a dynamic function. A social company was also contracted for the participation and social invigoration plan drafting and implementation.

The involvement of the municipality was essential making possible the coordination between public and private actions.

Resources needed

- European funding: CONCERTO programme
- Government of Navarra – regional grants
- Municipality of Tudela – specific grants to low income people
- Citizens own funds, general investment, around 18,000€/dwelling

Main stakeholders and beneficiaries

- Public entities: Government of Navarra, Municipality of Tudela and NASUVINSA
- Private entities: CENIFER, CENER, Zabala Innovation consulting, financial institutions, Kamira - social initiative cooperative, architects and building companies and neighbours

Evidence of success

Dwellings affected: more than 600

Total investment: more than 5,5 M€ (1M€ by the city council)

Employment: 147 jobs

Difficulties encountered

An exhaustive work at technical level, but still tougher at social level was needed, as the population had to understand the benefits of rehabilitation to become the driving force behind the project. Thus, the proximity office, where doubts were resolved in the spot, was fundamental.

Potential for learning or transfer

The replicability potential has been very high, such as IEE project Efidistrict FWD (AGREEMENT NUMBER IEE/13/936/SI2.675074), and LIFE NAdapta with the reopen of the office in Tudela. This project has served as a basis for forming a methodology for awareness citizens how to implement renovation projects in other parts of the region. The main lesson learned is that it is important to involved citizens.

2 Efidistrict

Regeneration of a deprived neighbourhood through energy saving renovation, introducing renewable energy sources and urban regeneration.

During the 1950s, 60s and 70s a large number of social housing neighbourhoods were built in Pamplona to meet the strong demand caused by the exodus of the rural population to the big cities, with very basic building systems. The buildings were not insulated as they were built before the basic building regulations NBE-CT79 entered into force, which for the very first time required the insulation of buildings. Therefore these buildings have had high energy losses by their facades and roofs.
In addition, the existent urban heat networks are witnessing decentralisation processes in the neighbourhoods.

The aim was to revitalize an ageing district to improve the quality of life of its residents by three actions:

1/ The complex energy renovation of the buildings in the district including their thermal envelopes
2/ The renovation of the old district heating systems existing in the neighbourhood to improve their performance: renewal and improvement of the distribution networks through the inclusion of energy saving measures, supported by the inclusion of systems and control
3/ The creation of a new district heating network, where heat is generated from biomass to supply the whole neighbourhood (public and private buildings).

To implement these actions maximizing citizen involvement is essential.

Main stakeholders

- Public entities: Government of Navarra, Municipality of Pamplona, Municipality of Burlada and NASUVINSA
- Private entities: financial institutions, architects and building companies and neighbours

Resources needed

- European funding – Intelligent energy Europe (IEE) - H2020 funding program – Acronym Efidistrict (Nasuvinsa Staff)
- Navarra Government grants for the citizens
- Own funds (Citizens)

Evidence of success

Dwellings affected by the project: more than 3,000

The private investment made during 2013-2017 adds up to 13,500,000 €.

Employment:184 jobs.

Difficulties encountered

Efidistrict was an important milestone of collaboration with the communities of neighbours. It was a neighbourhood scale project, defined by the neighbourhood itself that responded to their real needs in the energy rehabilitation process, where the consensus is a veritable challenge.

Generally, renovation process in residential stock is quite complex. The term of one-stop-shop is an office where multiple services are provided so as to offer customers all they need in just “one stop”. In that sense, regarding energy efficiency and renovation process, this concept is a way to bridge the complexities of renovation projects for all the actors involved, especially, for householders.

Potential for learning or transfer

What makes Efidistrict an appropriate study case is its holistic approach.

The neighbourhood office (one-stop shop) created to advise residents and promote consensus through explanatory and working meetings and to facilitate the search for financing and application for national and regional subsidies is perfectly replicable in other projects.

3 Urban recovery with ecological value of the neighborhood ex I.C.P. "Villa Aosta"

Urban redevelopment with environmental value of a ex I.C.P. district of aseismic 1930's houses through architectural renovation and building energy improvement.

The neighborhood covers an area of 9000 sqm, consists of 7 building, 83 dwellings, now publicly and privately owned).

Located in a context of high environmental criticity (between the Bologna-Lecce railway and the State road ss 16 Adriatica), it was in a generalized state of material-architectural degradation (aging of materials, neglect, replacements, energy inefficiency) and social, accentuated by the lack of space for socialization, inadequacy and energy inefficiency of residential units. Through interventions such as:

A_recovery of buildings outer shell;
B_ recovery of external appliances;
C_ renovation of thermal plant.

The environmental and social requalification has occurred through the architectural and technical renovation of buildings and plants. The outer shell of the buildings has been the main device to apply minimal and low cost works, such as insulation of external walls and roofs, in addiction to replacement of windows, to make the buildings more passive and recover at the same time the original architectural features. For the thermal equipment, a power plant was created with district heating and use of renewable energy sources. The outdoor areas have been pedestrianized and designed in spaces for socialization. The main stakeholders and beneficiaries are the population residing, private owners of the dwellings citizens living in the neighbourhood.

Resources needed:
E.R.A.P., Province of Ancona and privates contributed with own resources respectively: € 1.630.030,09; € 1.615.000,00 e € 746.677,15. The provincial funding included in favour of private individuals only € 525.000,00.

Institutions involved:
- E.R.A.P. (Regional Public Housing Authority),
- Province of Ancona, Municipality.

Evidence of success

The participation of several public administrations with their own financial resources, together with private resources from the owners of the accommodation;

The redevelopment of a degraded building complex from both an architectural and social point of view;

Use of technologies based on a strong sense of environmental sustainability and energy saving: low consumption and emission heating sources, passive insulation systems of the building envelope, renewable energy from solar panels.

Difficulties encountered

Before, the deterioration and lack of drawings an diversification had generated arbitrary use of these areas, with transit of cars. Original architectural features preserved. The drawing of outdoor areas in gardens and pedestrian paths led people to respect rules of playing and socializing.

Potential for learning or transfer

It was an opportunity to test a "sustainable corpus type of interventions" which can be exported as a methodology to be reused in residential districts of considerable size and mixed ownership (public and private).
This methodology can be applied by all ERP property owners and/or managers, which in Italy can be Municipalities or Regional or Provincial Companies ex IACP (Instituto Autonomo Case Popolari), such as ERAP Marche ATER Milano itself etc;.
These "sustainable interventions" have allowed to redevelop a degraded and socially alienated historic neighborhood, having greatly improved environmental and social conditions.
The original architectural features (colored plasters and molded cornices massing), have been preserved using minimally invasive technologies to improvement of energy efficiency, such as insulation of walls and roofs, color reconstruction. The drawing of outdoors areas in gardens and pedestrians paths led people to respect rules to play and socializing.

4 Villa Fastiggi, Eco-sustainable district

Villa Fastiggi, Pesaro (PU) ECO-SUSTAINABLE DISTRICT - 330 eco-sustainable dwellings of various sizes (from 50 to 90 sqm)

The project of the new building settlement comes from the deep knowledge of the place, acquired according to an analytical reading of environmental factors (air, surface and underground waters, soil and subsoil, natural environment and ecosystems, landscape, historical and typological aspects) and climatic factors (thermo-hygrometric climate, sun-air impact, availability of natural light, acoustic climate, electromagnetic fields).

One of the fundamental problems was to avoid it being a traditional kind of allotment. The objective was to make citizens perceive a new way of realizing an urban transformation. In particular, the most relevant issues concerned the reduction of noise pollution and air quality. The urban regeneration has been developed through the application of the Bio-architecture Regulation which was one of the first in Italy to be adopted by a public administration.

Main stakeholders and beneficiaries of the practice:
The technicians of the Municipality of Pesaro, The citizens of the neighborhood.

The commissioning housing cooperatives have been involved in a virtuous process that has led to the sharing of objectives and the recognition of the concrete advantages of the sustainable approach in the design, implementation and management of settlements and building bodies. A decisive role is also played by the supervisory bodies, some of which have shown themselves, more than others, to be sensitive to the innovations introduced in the projects.

Evidence of success
Redevelopment of the urban area with greenery, through the creation of systems of bicycle and pedestrian paths that enhance the visual and perceptual of landscape respecting botanical-vegetation elements.
Creation of a road system to provide a general reorganization of the transport system of the entire area.
Creation of a building system that guarantees to all the lodgings an adequate solar radiation and a correct internal distribution to control the sun-air impact.

Difficulties encountered
Create a sustainable urban transformation that fit harmoniously in an already urbanized context and represent an urban reconnection of an existing space. The eco-sustainable project is characterized by the protection of the environment and the rational use of resources and potentialities of the site.

Potential for learning or transfer
Administrations have a crucial role in promoting eco-sustainable urban transformations because they undergo the whole process by outlining the fundamental lines of the transformation itself. In addition, the administration is able to give voice to citizens and their expectations. It is important to build an adequate regulatory framework that can allow the concrete implementation of interventions and it is essential for the success of the project to apply a participatory model that involves all stakeholders. In drawing up the project all the environmental elements that emerged from the analysis of the site were taken into consideration.

Design phases were carried out with a multidisciplinary approach in coherence with the aims of the project “SHE”. It was the occasion to elaborate and experiment the new “regulation for the use of bio-architecture techniques”, of the Municipality of Pesaro, that defines criteria to take advantage of the incentives for bio-architecture.

5 Resource Efficient cities implementing ADvanced smart citY solutions

The project aimed at testing new solutions when renovating buildings. Expected results: -Energy-saving for heating: 50-53%

The main goal of the READY project was to reduce the energy demand and emission of CO_2 in the building sector. To achieve the abovementioned goals, the following actions were accomplished:

- Demonstration of a holistic approach for low-cost retrofitting of residential and office buildings. The plan was to renovate 376 apartments to comply with national and EU targets. The apartments were located in the Araby area in Växjö, including Alabastern and Bärnstenen sub-areas.
- Development and demonstration of new solutions for low-temperature district heating along with management ICT systems,
- Development and demonstration of new energy-efficient systems, such as combined heat pump for heating and cooling, new photovoltaic thermal hybrid solar collectors, and second life reuse of electric-vehicle batteries in buildings,
- Using energy smart solutions for kitchens,
- Demonstration of new solutions for wastewater energy recovery.
- Influencing tenants' behavior to further reduce energy consumption using the "Interface of Life" platform. The platform aimed to provide information to tenants about the impact of their behavior on energy consumption when operating buildings.

The project stakeholders included:

- Växjö municipality
- Växjöbostäder
- CA fastigheter
- Linnaeus University
- Energikontoret Sydost
- Växjö Energi
- Wexnet

Resources needed

Provided funding to Växjö was about 6,855,000 euro

Evidence of success

Using new and energy-efficient materials and technologies allowed reducing the total energy consumption by 47.5% (from 160 kWh/m2 to 84 kWh/m^2), corresponding to 2.8 GWh energy per year. Total energy consumption comprised energy need for heating, domestic hot water, and electricity for lighting.

Difficulties encountered

The main challenge was to replace tenants in other residential apartments and keep the project on schedule.

Potential for learning or transfer

Växjö city have had significant benefits from participating in READY project. The measures proved the effectiveness of the applied solutions and technologies in reducing the total energy consumption. In addition, results have been transferred to other projects, such as Växjö City Hall and DIACCESS projects. New and energy efficient technologies, such as heat pumps and PV systems, are also used in constructing Växjö' City Hall building. Meanwhile, the DIACCESS project aims to develop smart and sustainable digital solutions, including smart heating system for Växjö city. Experiences, obtained from READY project in terms of developing low-temperature district heating system will be used when performing DIACCESS project.

6 Växjo City Hall and central station

Växjö City Hall and Central Station is potentially a zero-carbon timber building, due to its wooden construction, installation of renewable and smart systems.

The municipal and station house was built using wood and glass, reflecting the long tradition of the region in using wood for constructing new buildings. The sloping roof was selected for reducing the total area of the building's envelope, thereby reducing energy loss and cut the use of building materials and waste. In addition, the municipal and station house was equipped with an on-site integrated ground source heat pump and photovoltaic solar system. The second good practice achieved the Swedish Environmental Certification-gold level due to its excellent performance. The Swedish Environmental Certification is a tool for evaluating the energy and environmental performance of buildings during their lifetime.

Resources needed

about 66 million euro

Evidence of success

The building achieved the gold level of Swedish green building certification, known as Miljöbyggnader. In addition, Växjö City Hall and Central Station show the possibility of combining renewable and local materials with advance and energy-efficient technologies to not only improve the indoor environment but also reduce energy consumption, cost, and environmental impacts.

Difficulties encountered

The main challenge was/ is to control traffic issues since the city hall is located in the central part of the city.

Potential for learning or transfer

- The project will reduce the cost of the annual rent by 0.4 million euros than renovating the existing municipal building.
- The new city hall creates a better working environment for employees, which will in the future enable Växjö municipality to reduce sick leave, retain staff, and attracts new employees - as an attractive workplace with a modern way of working.
- The existing municipal building will be renovated and converted into a residential building with 250 apartments. Accordingly, it helps Växjö municipality to resolve issues concerning the shortage of residential apartments (specifically rental apartments).
- It provides possibilities for having 800 parking places in the city center.
- It contributes to the reduction of CO_2 emissions in Växjö municipality.
- The new city hall project aims to achieve the gold level of Swedish green building certification.

7 Reconstruction of the Zubří sports hall in the Zlín Region

Complete reconstruction of the sports hall with the support from Operational Programme Environment (ERDF)

Zubří Sports Hall is a town sports hall with facilities, which is used by the primary school as well as by the public and local sports clubs mainly for sports activities, more rarely for cultural activities.

The hall was in poor energy condition: in the winter a large amount of heat was leaking through the perimeter structures, in the summer the building overheated, the existing old air conditioning equipment was not operated due to its high noise and cost. The 21-year-old system of nine gas boilers was already very faulty. The indoor microclimate was very poor and the heating and operating costs were unbearably high.

Therefore, the town Zubří decided on the complete reconstruction of the building. The perimeter walls of the building and the floor in the terrain are insulated with thermal insulation. New windows and doors are equipped with triple glazing. The old boilers were replaced by heat pumps and air conditioning with recuperation, which altogether ensure a healthy indoor microclimate and a comfortable stay in the hall for athletes and spectators. Last but not least, a new storage tank for solar water heating was also installed.

OP Environment of the Czech Rep. (2014 - 2020) supports the measures under Priority Axis 5, specific objective 5.1: To reduce the energy demand of public buildings and increase the use of renewable energy sources. Energy Agency of the Zlín Region participated in the project coordination and processed the application for a subsidy.

Resources needed

Total implementation costs: CZK 48.618,303 (app. 1.945.000 EUR)
OP Environment: CZK 10.373.799 (app. 414.950 EUR)
Zubří municipality: CZK 38,244,503 (app. 1.530.000)

Evidence of success

Reduction of energy consumption for heating by 860.38 GJ / year, which is a decrease of 40% compared to the state before implementation.

Reduction of CO_2 emissions by 50.02 t / year compared to the state before implementation

Heating is provided by a cascade of five heat gas pumps with a total output of 187.5 kW, backup sources are two gas boilers with a total output of 94.2 kW

Ventilation is provided by 5 air handling units with recuperation with a total air output of app. 22,50 m^3/h

Difficulties encountered

- Dealing with unpredictable changes of the project during construction: changes are addressed not only in terms of construction and finance, but also in terms of public procurement
- Methodical guidance of sports hall staff in monitoring consumption and processing energy management of the building

Potential for learning or transfer

The Zubří Municipal Sports Hall is an example of a successful overall reconstruction, including a reduction in the energy demand of the building.

After the implementation, the costs of heating and operation have been significantly reduced, however, it is necessary to implement energy management - the methodological management of which is provided by Energy Agency of the Zlín Region.

Well-insulated insulation, replacement of the heat source and installation of HVAC with recuperation in the public sector building is important, as the general public as a user can know the transformation of the old building into a new one and learn more about the possibilities in the field of reconstruction.

Thanks to the financial support of the OP Environment , it is possible to implement such projects and thus increase the general public's interest in thermal insulation, replacement of heat sources and the use of HVAC with recuperation.

8 New construction of a fire station in a passive standard in the Zlín Region”

It is the first fire station in the passive standard in the Czech Republic and the first passive building of the public sector in the Zlín Region.

The former fire station of the professional Fire and Rescue Service of the Zlín Region was situated in the already unsuitable premises of the building owned by the town of Holešov together with volunteer firefighters. With its limited capacity and current layout, this building did not allow for the modernization necessary to ensure the ability of professional firefighters to act. Therefore, the need arose to build a new building of the fire station for the background of professional firefighters including a modern workshop, which also serves as a garage for modern firefighting equipment.

The requirements and goals imposed on the new building of the fire station in terms of energy self-sufficiency:

- to implement an environmentally friendly construction with low energy consumption and using renewable resources
- to create a quality indoor environment for the service of professional firefighters

These requirements have been fulfilled, and within 13 months, the station was built, including the necessary sports facilities and equipment.
The implementation of this project is in accordance with the Energy Action Plan and the Energy Efficiency Financing Plan of the Zlín Region developed by the Energy Agency of the Zlín Region. It is a modern building with low operating costs, built at a lower cost than similar buildings in a low energy standard.

Resources needed
Total implementation costs: CZK 59.9 million (app. 2,22 Mio EUR)

Costs breakdown:
OP Environment - ERDF: CZK 14.9 million (app 552.000 EUR)
Subsidy of the Zlín Region: CZK 5.0 million (app. 185.000 EUR)
State budget of the Czech Republic: CZK 40.0 million (1,48 Mio EUR)

Evidence of success

- the first building of the fire station in the passive standard in the Czech Republic
- the first building of the public sector in the passive standard in the Zlín Region
- non-renewable primary energy only 96 kWh / m^2.year
- specific annual heat demand for heating only 11 kWh / m^2.year with overall heated floor area 1,138 m^2

Difficulties encountered

- overcoming persistent prejudices in society towards the construction of passive houses
- the need to coordinate professional designers with energy specialists
- the need for methodical guidance of fire brigade personnel for the introduction of energy management of the building

Potential for learning or transfer
Proper preparation of the project, smooth implementation of public procurement, the use of modern building materials, products and structures, the use of quality and modern technologies as well as renewable resources are features to be followed by any other public administration as well as private investors.

The introduction and implementation of energy management of the building are very important for the proper operation of the building in a passive standard, too.

The public sector can serve as a good practice source for construction in the private sector. Therefore, it is important to show the functional objects in the passive standard on various realized examples. Significant financial support from the OPE subsidy program contributes to the implementation of such necessary projects, helps to raise awareness and thus stimulates interest in passive construction among the general public.

9 Reconstruction of the central heating system in Slavičín town

The project aimed at the reconstruction of the existing heat source and its pipelines in the town Slavičín, so that it was both ecological and economical.

The company BTH Slavičín s.r.o. is established, 100% owned and managed by the Slavičín municipality to operate the housing stock and supply heat to buildings from 33 boiler rooms using natural gas and one boiler room using both natural gas and biomass (wood chips).

The project aimed at:

- the replacement of heat pipelines in the Vlára housing estate,
- the abolition of the gas boiler room,
- the connection of the heat distribution to the central boiler room supplemented by another biomass source and a natural gas cogeneration unit.

A new control system for the entire system and the boiler room was installed to optimize the long-term cost of heat for the population, promote local employment and energy security, improve air quality, reduce dependence on fossil fuels, reduce CO_2 emissions, achieve heat savings and use local raw materials (in the form of wood chips) to produce heat.
The central boiler room (K3) was extended by another biomass boiler with an output of 1 MW and one co-generation unit with an output of 178 kW for natural gas, which can produce electricity and heat in island mode (the current state was a biomass boiler 1.6 MW and 2 cogeneration unit 2x160 kWe).
Then, another housing estate was connected to the system in the area, where the old gas boiler room was abolished.

Four-pipe heat distribution system was replaced by a two-pipe distribution and 16 object transfer stations were replaced, including their regulation and boiler room regulation.

Resources needed

Total project costs = CZK 35,889,000 (app. 1.435.000 EUR)
OP Environment subsidy = CZK 12,561,150 (app. 503.000 EUR)

Evidence of success
Energy savings were realized in the form of reducing losses in external distribution and thanks to decentralization of hot water preparation. By using local wood chips and selling electricity, the price of heat has hardly changed in the last 10 year
The system supplies app. 54,000 GJ / year, the annual heat supply from biomass is 36,533.13 GJ
Average annual energy savings: 163.66 MWh
Annual cost avings: CZK 3,133,220 (app. 120.000 EUR)
Annual CO_2 emission savings: 706.89 tons

Difficulties encountered

The municipality faced the demands of property owners to disconnect from the central heating system. The company needed to resolve how to optimize the price of heat and satisfy all customers with upgading the current infrastructure.

Potential for learning or transfer

The implemented variant takes into account not only economical and ecological aspects, but also social impacts on the population. The chosen variant ensured an acceptable price of heat in the best possible way for all customers in the long run.

Other inspiring results include

- Stability of heat prices for the population
- Diversification of local sources of heat and electricity supporting energy self-sufficiency
- Reduction of fossil fuel consumption and its replacement for RES
- Support of local employment
- Long-term economic sustainability of the heat source even with decreasing heat consumption due to thermal insulation of buildings
- Long-term stabilization of the price of heat
- Strengthening the energy self-sufficiency of the city
- Ensuring the reliability of heat supply
- Positive impact on the climate

10 District Heating system reconstruction in Brumov-Bylnice

Designing an optimal variation of district heating system for the part of the Brumov-Bylnice municipality area, incl. enhancement of local energy supply chains.

The great part of public buildings, as well as 5 private buildings, were heated by central town heating plant having the heat output of 1 MW from biomass and 6.8 MW from 4 boilers utilizing natural gas. The condition of the boiler house was unsatisfactory and, as a result, the reconstruction inevitable.

The proposed options how to resolve this situation:

- decentralization of the heating system;
- a lease of the boiler house to a private investor;
- reconstruction utilizing combined financing from the municipal budget and EU funds.

Eventually, the option using combined financing from the municipal budget and EU funds was selected. This option ensured long-term reliable services for inhabitants, support to local employment and sustainment of financial sources for energy in the region. Additionally, cooperation in fuel supply and experience exchange in the field of renewable energy source construction with the Slovak partner (the village of Hornie Srnie) was intensified. Furthermore, annual energy costs were reduced by app 120.000 EUR. Energy self-sufficiency and independence of the town Brumov-Bylnice has been strengthened, too.

Other important aspects of the action:

- The reconstruction of the boiler room employed local construction companies.
- Fuel supply is from local sources, fuel transport is provided by local carriers.
- Funds obtained from the sale of heat will remain in the town for the further local sustatinable development.

Resources needed

EU funding = 607.000 EUR
(OP Cross-border cooperation Czech Republic - Slovakia);
Brumov-Bylnice municipality = 273.000 EUR

Evidence of success
2 new biomass boilers with installed power of 3 MW suppling with heat 13 municipality buildings as well as 20 apartments blocks
5.550 MWh of energy shifted from fossil fuels to biomass energy annually
Annual energy savings = 778 MWh
Annual CO_2 savings = 926 tons
Annual energy costs savings app. 120.000 EUR
Dual fuel source will contribute to the reliability and durability of the system
The implementation supported the international cooperation in low carbon areas development

Difficulties encountered

The central boiler room was in unsatisfactory condition and it was necessary to design and implement an optimal variant from three following

- decentralization of the system,
- lease to a foreign investor,
- reconstruction from municipality budget in combination with EU funds.

Potential for learning or transfer

Thanks to the chosen and implemented variant, quality services were provided to the population, local employment was supported, municipality budget was stabilised and cooperation with the Slovak partner (Hornie Srnie municipality) was deepened in fuel supply and exchange of experience in renewable energy sources.

An indispensable potential for the transfer of this experience is the saving of annual heating costs, which is estimated at least to 120k EUR, as well as support for energy self-sufficiency and independence of the municipality.

The results of the evaluation of individual variants confirmed the suitability of the reconstruction of the central heat source based on renewable energy sources, specifically wood chips.

The long-term sustainable energy price as well as the system reliability were ensured. The implementation of this project is an important outcome to beacon other regions in terms of benefits for the border area, which faces high unemployment.

11 Decreasing the energy demand in Uherské Hradiště hospital

A set of 8 consequent investment projects on RES and energy efficiency leading to a considerable decrease of the energy demand in a large hospital area.

The individual pavilions of the hospital were in a very poor condition from the energy point of view: high heat consumption, overheating in summer etc. The heat and hot water sources in the central A set of 8 consequent investment projects on RES and energy efficiency leading to a considerable decrease of the energy demand in a large hospital area.

Boiler room were old and inefficient. All this led to large heat losses.

Therefore, 8 large-scale investment projects were gradually implemented under OP Environment 2007-2013 and OP Environment 2014-2020.

1. Reduction of air pollution in Uherské Hradiště - reconstruction of the central boiler room and area heat distribution, including the installation of 2 pieces of solar panels for the preparation of hot water.
2. Uherské Hradiště hospital - Implementation of energy saving measures - insulation of 5 hospital pavilions
3. Complex insulation of the Malinovského hostel - hostel insulation for hospital staff
4. Uherské Hradiště hospital - hostel Na Nožkách - realization of energy savings - insulation of the hostel for hospital staff
5. Uherské Hradiště hospital - pathology building - realization of energy savings - insulation of the pathology pavilion
6. Uherské Hradiště hospital - photovoltaic power plants - CO I - installation of 180 pieces of PV panels on the roof of the central building
7. Uherské Hradiště hospital - photovoltaic power plants CO II - installation of 123 pieces of PV panels on the roof of the central building II
8. Uherské Hradiště hospital PV and HVAC 14 - installation of 345 PV panels for electricity production and HVAC with recuperation

Resources needed

Total implementation costs including project preparation:
CZK 142.630.574,- (app. 5.486.000 EUR)
OP Environment: CZK 48.823.436,- (app. 1.878.000 EUR)

Evidence of success
reconstruction of the central boiler room and area heat distribution
insulation of 8 hospital buildings
installation of 648 pieces of PV panels
total heat savings for heating 44,828.59 GJ / year
total CO_2 reduction of 2,999.44 tons / yearEUR

Difficulties encountered

- Public opposition to the waste combustion¨
- Economic barriers - high financial investment demands
- Insufficient knowledge of designers in the field of low energy standards
- Obstacles on investors´ side in the willingness to build beyond the minimum standards set by legislation.

Potential for learning or transfer

Implementation significantly reduces the costs of heating and the operational costs of the hospital and thus saves public funds spent on operations in health care. The installation of PV panels increases the hospital's self-sufficiency and reduces electricity consumption from non-renewable sources. Thank to the insulation and installation of air conditioning with recuperation, the internal microclimate of the building is improved.

For these measures to be fully operational, good implementation of energy management is important. Methodical management of energy management is provided by EAZK.

The OP Environment subsidy program enables the implementation of such diverse projects, which in addition to quantifiable financial and energy savings and reduction of greenhouse gas emissions bring another significant element - a pleasant environment is created in the hospital contributing to the well-being of all users, which is so important in their treatment process.

12 Improving the performance of district heating system in the city of Zaprešić

A comprehensive tailor-made approach to reconstruction of district heating system in Zaprešić

A comprehensive tailor-made approach to reconstruction of district heating system in Zaprešić as an outcome of H2020 KeepWarm project and continuous work on Interreg Danube CSSC Lab project which includes educational aspect, feasibility studies, effort in legislation changes and triggering of investments (continuous work with DHS operator HEP Toplinarstvo and local/regional public authorities). Firstly, education of technical, economic and communicational personnel took place where experts in field of district heating held several trainings on different topic.

Parallelly, technical personnel and REGEA gathered all relevant information to create feasibility studies where the best approach for renovation of heating systems is chosen.

After extensive negotiation process, HEP Toplinarstvo opted out for two scenarios where solar thermal energy collectors will be integrated – rooftop installation on highschool's gym and large scale ground installation in order to achieve around 30% of solar fraction within the system.

Throughout trainings and feasibility studies, major capacity building of DHS operators/owners took place, but one of the most important aspects is a full support to stakeholders (HEP Toplinarstvo) in order to achieve investments by using own resources or other financial resources such as EU grants, national funds, etc. DHS operators has built capacity in developing business and financial plans, as well as obtain specific knowledge related to RES integration.

Resources needed

This good practice requires human resources in terms of conducting trainings in different topics, development of feasibility studies, providing support to DHS operators/owners, active engagement in policy making process and dissemination of good practice examples within other DH networks.

Evidence of success

Throughout the project, excessive project documentation has been created as a proof of innovative concept where a tailor-made approach has targeted all crucial parts (technical, financial, legislation, organisation) in order to achieve energy transition in DH sector. Also, extensive knowledge on solar thermal collectors have been acquired which will serve as an input for new project (CSSC Lab) where innovative model is defined and will be built during 2021.

Difficulties encountered

Several difficulties have been encountered in negotiation with public authorities where numerous legal aspects had to be taken into account. Huge amount of stakeholders is involved in the process, so coordination has to be on the top level.

Potential for learning or transfer

Firstly, a process of creating the tailor-made trainings resulted with the very positively evaluated trainings where DHS operators stated that they have gathered a lot of useful information which will help them in their field of work. Furthermore, feasibility study which are focused on optimization problems and integration of renewable energy sources are definitively an approach which is needed in the whole EU since heating sector is heavily dependent on fossil fuels. This good practice shows that tackling both production and supply of heat is an excellent approach where reconstructed production side and increased energy efficiency (which lowers flow and return temperature) enable higher penetration of renewable energy sources which seemed very unfeasible before. Full support in terms of achieving investment is provided by REGEA where a mutual goal of all stakeholders is to implement best evaluated scenarios in feasibility studies.

13 NEWLIGHT - refurbishment of public lightning

The ELENA NewLight project has enabled the refurbishment of public lighting in two Croatian regions resulting in savings of over 2.2 MEUR

The ELENA NewLight project has enabled the refurbishment of public lighting in two Croatian regions. The activities within the practice have involved the development of energy audits, action plans and tender documentation for the refurbishment of public lighting systems based on ESCO, design and build, leasing and traditional procurement processes. 57 municipalities have joined the initiative which will result with an investment of close to 3MEUR. The developed processes and documentation can serve as a template and basis for the development of similar initiatives in Croatia and wider.

Resources needed

The initiative has been funded trough the ELENA mechanism. The value of the project is close to 705.000 EUR with a funding rate of 90%.

Evidence of success

This practice as initiated the refurbishment of over 54.000 luminaries (74% of those in the 57 participating municipalities) with an installed power of over 5MW. The resulting efficiency increase will result in energy savings of over 22 GWh annually as well as a CO_2 reduction of over 5.200t. This will also mean a savings of over 2.2MEUR annually for the municipal budget. The implementation of the refurbishment is ongoing and the majority of the contracts have been signed and implemented.

Difficulties encountered

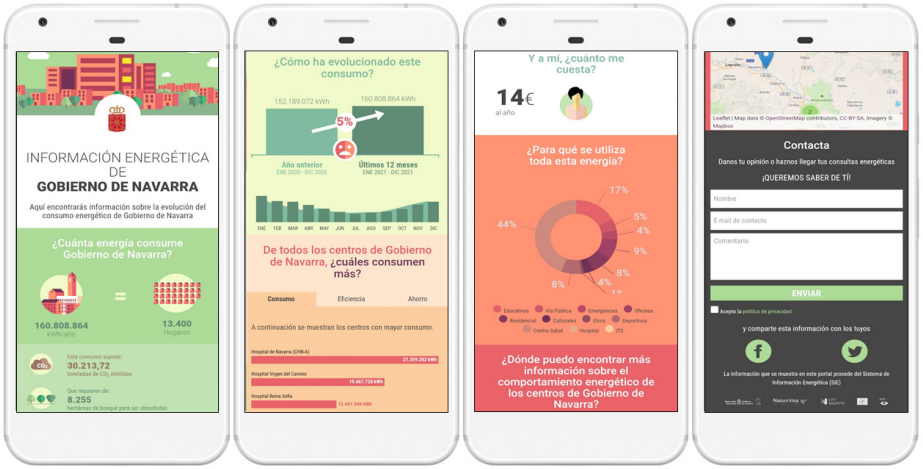
The primary challenge has been the adoption of novel procurement processes within the municipalities. This challenge has been successfully overcome trough communication.

Potential for learning or transfer

The developed process and documentation can be easily adopted to other regions or countries. The mechanisms put in place are universally applicable and the issues of efficiency in public lighting is still relevant across Europe.

7 TOOLS

14 Navarra Government Energy Information System



This platform is a managing platform for the upgrade of energetic performance of public buildings that offers open information to citizenship.

The need of a better knowledge about public building heritage energetic performance in order to define measures and investments to adapt them to climate change and upgrade their energy efficiency was identified under the Navarra 2030 Energy Plan. Also the convenience of rising awareness among citizens.

Government of Navarra conducted a deep analysis to obtain concrete data of all the public buildings owned by the regional government, concerning their monthly energy consumption, energy source, as well as the savings achieved since the reference date (2005). Then, an implementation plan for each of the buildings was designed, foreseeing the expected gains in energy efficiency.

All this information is compiled in a unique platform so that the transition to LC of public buildings is centralised and allows the monitoring of the action plans, with private access, assessing their impact and the savings achieved.

Furthermore, the information is reflected in an open website, serving also as a tool for accountability by the Administration.

To overcome the technical nature of energy data, the web is designed in an understandable and attractive way: the information is graphic, broken down by building and sorted by the type of use (sanitary, educational, sports, offices, etc.) to facilitate comparisons. Thus, it raises the awareness of the citizens, meets transparency and serves as loudspeaker to disseminate the actions carried out by the administration in energy matters.

Resources needed

The implementation of the platform cost € 13,400 (VAT excluded) and the annual maintenance is € 11,200 / year (VAT excluded).

Evidence of success

All the buildings of the Navarra Government are listed in the portal, 17 of them are deeply analysed.

Management tool, results achieved comparing 2018 and 2020, thanks to the platform the following results have been achieved, but part of this energy shaving is due to Covid19 pandemic situation:

- Annual consumption invoiced: -19.36% (-31,270,428 kWh)
- Annual amount invoiced: -14.39% (-1,873,020 €)
- Annual emissions: - 51.09% (-14,990 tCO_2)
- Open portal 21 comments and 2,259 visits

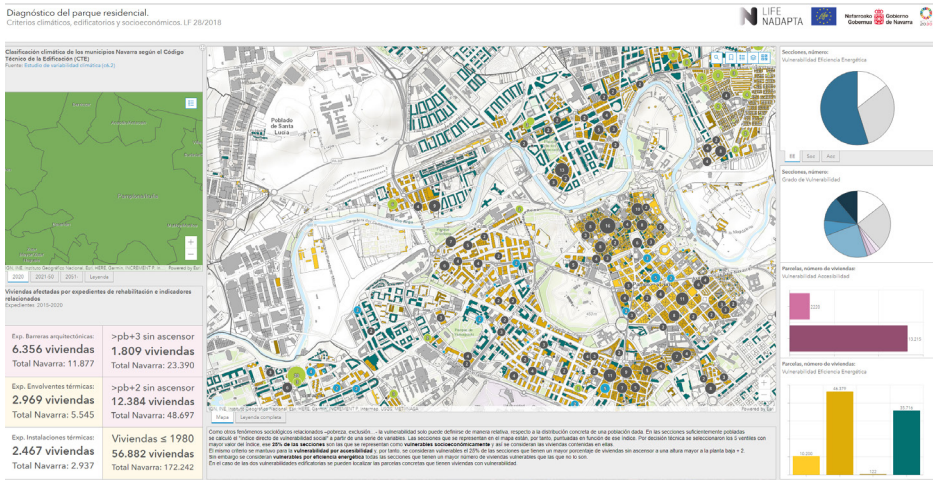
Difficulties encountered

- Updating and maintenance of the website.

Potential for learning or transfer

In fact, a similar system could be applied in any region. The portal is developed to be applied in any region, city council or administration. Several city councils in Navarra have already implemented it.

15 Diagnosis of the residential built environment in Navarra



GIS Viewer: physical and social diagnosis of the urban and rural built environments in Navarra

FLIFE NAdapta project intends to foresee changes that may occur through the development of adaptation measures that will both limit the negative effects resulting from those changes and take advantage of the positive ones.

Within this project, there is a specific area to adapt the built environment to climate change. A roadmap of innovative management models to be implemented in urban and rural areas that must be adapted to the climate change has been developed. For that reason, it is important to increase knowledge of the built heritage of Navarra in order, from an in-depth knowledge of it, to define the measures and investments to adapt the built park to climate change, to increase energy efficiency and to generate policy coordinated for its implementation through the roadmap already mentioned.

The diagnosis will be done by the GIS viewer developed under LIFE NAdapta. It collects Navarra region and all residential stock at the level of cadastral parcels with an important battery of physical data on the dwellings in each parcel and socioeconomic data at the census tract level. In this viewer, the climatic classification of each municipality of Navarra and its foreseeable evolution based on the scenarios are also collected.

This viewer allows the access to municipalities' data to characterize their level of vulnerability to CC and enables to set criteria for prioritizing energy efficiency actions and monitoring the adaptation results to be achieved in future actions.

Resources needed

The methodology of data analysis to be followed: 18,148.79€
The implementation and updating are done by internal staff of NASUVINSA.

Evidence of success

The viewer is an important tool to prioritize areas in each municipality. Thereof, NASUVINSA staff, within ELENA-PRIMAVERA project, is using the viewer to prioritize the areas in each municipality where energy efficiency and climate chage adaptation actions will be implemented. In fact, in October 2021, the viewer has been used in 21 municipalities where PRIMAVERA team is working. More than 11.000 dwellings are involved.

Difficulties encountered

- Prioritizing and selecting the data required to obtain reasonable results.
- Updating and maintenance of the website.

Potential for learning or transfer

In fact, a similar system could be applied in any region. The viewer is developed to be applied in any region, city council or administration, but always adapting to the characteristics of the scale.

16 Protocollo ITACA, building a culture of change towards environmental sustainability in constructions

ITACA
Istituto per l'innovazione e trasparenza degli appalti e la compatibilità ambientale

UNI ENTE ITALIANO DI NORMAZIONE

The Protocollo ITACA is a tool for assessing the level of energetic and environmental sustainability of buildings designed to verify their performances.

The Ministerial Decree of 11 October 2017 defines "Minimum Environmental Criteria (CAM) for the procurement of design and construction services for the new construction, renovation and maintenance of buildings for the management of public administration construction sites. . The Itaca Protocol on the environmental sustainability of buildings is used to evaluate non-residential buildings and the adaptation of public buildings to the "Minimum environmental criteria". The update (UNI/PdR 13:2019) has already been published and has been prepared in collaboration with Uni (the Italian standardisation body). It represents a tool for certification and accreditation, on a voluntary basis - acknowledged by many Italian regions, including the Marche - to formulate a summarized assessment of the level of environmental sustainability of buildings, useful for the designer, for control activities and guidance of the public administration.

Resources needed

Regional Law 14/08 defines the certification based on ITACA Protocol to incentive building sustainability by economic aid and incentives (urbanization charges reduction, construction costs and volumetric increases) according to the score obtained by the application of the Protocol, DGR 1689/11.

Evidence of success

In 2009 Marche Region issued a call for tenders for € 100,000.00 for high environmental quality residential building projects certified by Itaca Protocol. Interventions concern new constructions and recoveries. From 2012 Marche Region received about 180 applications related to access the volumetric increases and about 50 applications to access the incentives referred to R.L. n.14/2008. The regional register of certifiers currently has 621 members. The protocol is in use in many Italian regions.

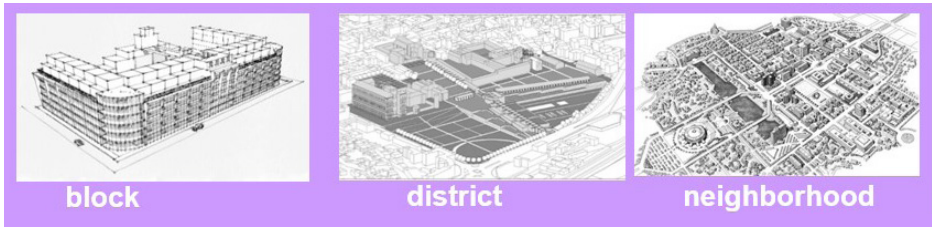
Difficulties encountered

Protocol offers a reference in assessing residential and non-residential buildings based on legislation, technical regulations, application experience, proposing a methodology for the performance classification buildings based on criteria certain in measurement and enhancement of sustainability.

Potential for learning or transfer

This methodology affects all designing levels at different scales, not only limited to the built environment but also open to spatial planning policies and strategies. This involves technical standardization, conformity assessment and accreditation and the definition of shared standards, the training of professionals able to influence the design process, the timely and objective verification of the results achieved, certification skills and accreditation of players. It is necessary to promote updating, training and dissemination courses for professionals on these tools. The realization of the process requires the full involvement of: national and local public bodies, professionals and private companies trades. This methodology is easily replicable in different territorial contexts. It is based on an assessment tool in line with national and EU technical and legislative standards. Public administrations can use the methodology to apply incentives and activate training courses.

17 ITACA Protocol Urban Scale



ITACA Protocol Urban Scale is a multi-criteria assessment system for the evaluation of environmental sustainability of an urban context.

Starting from a set of basic assessment items, the ITACA Protocol Urban Scale aims to provide a final performance score, indicative of the sustainability level of the urban settlement. The constituent elements of the evaluation method can be summarized as follows:

- a set of evaluation items, called criteria;
- a set of quantities, called indicators, which allow to quantify the performance of the urban area in relation to each criteria. The criteria were distributed in a series of thematic areas that try to define the complexity of urban quality; governance; urban morphology; landscape integration; quality of the design (bld./site); public spaces; urban metabolism; biodiversity; adaptation; mobility / accessibility; social and functional diversity; economic-social effects.

The objective of this protocol, which will act in synergy with other protocols relating to building sustainability and facilitate appropriate responses to urban regeneration, is to provide a cross-scale assessment that will measure the sustainability level of interventions in urban environments ranging in size from the block to the city. This protocol will be useful for public planning bodies and all those stakeholders in developing or transforming urban areas. In order to implement its use also in support of financing programs at national level for urban regeneration, the Protocol has been simplified with the elaboration of a synthetic version.

Resources needed

Human Resources used to develop the Urban Scale Protocol total: 0.50 FTE (full-time equivalent) for each year of project development (March 2013- December 2016). Resources needed to implement and adjust the SU Protocol total approximately 0.20 FTE (May 2020-ongoing).

Evidence of success

It is a reference for legislation, technical standards, application experience and the Italian way of building and planning, methodology for the performance classification of buildings and urban areas, based on a stable and certain parameterization criterion in measuring and enhancing sustainability for a rational and conscious choice. The latest syntetic version was approved on Dec 20 and is for free use. It was applied on a sample of 20 municipalities of various sizes of the Tuscany Region.

Difficulties encountered

It is an instrument based on legislation and technical regulations on sustainable urban planning and points the utmost attention in compliance with the reference legislation. The main challange is to systematize the different technical and urban regulations to simplify the evaluation process.

Potential for learning or transfer

This methodology has to affect all of designing levels at different scales, open to spatial planning policies and strategies.

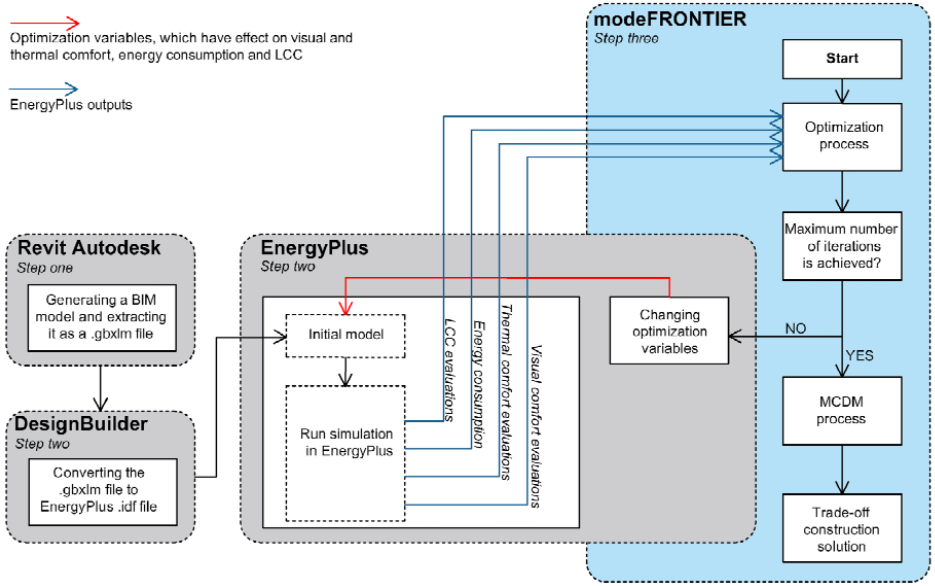
This involves technical standardization, conformity assessment and accreditation and the definition of shared standards, the training of professionals able to influence the design process, the timely and objective verification of the results achieved, certification skills and accreditation of players.

It is necessary to promote updating, training and dissemination courses for professionals on these tools, with particular reference to public procurement.

The realization of such an ambitious process requires the full involvement of both national and territorial public bodies, as well as professionals, both in the scientific and research field, and private companies trades.

This methodology is easily replicable in different territorial contexts. The use of uniform evaluation criteria can be transferred in programming of public funding for urban regeneration.

18 Decision making method



A decision-making method to improve buildings sustainability performance

The decision-making method enables one to compare multiple design alternatives and select an optimal one based on trade off between visual comfort, thermal comfort, energy consumption, and life cycle cost. Any such trade-off design alternative (i) fulfills the national energy requirements, (ii) provides a comfortable indoor environment, and (iii) has relatively low life-cycle costs.

Resources needed

The decision-making method is the output of a doctoral research project with a total budget of 500 000 euro.

Evidence of success

The decision making method was successfully tested and validated in a construction company in Sweden. However, the method only allows the analysis of the objective criteria for evaluating visual comfort, thermal comfort, energy consumption and life cycle cost. The evaluation of subjective criteria relies still on creativity of architects and designers when designing new buildings or renovating the existing ones.

Potential for learning or transfer

The decision making method can be used in different geographical areas with various climate conditions. Its application can also be benefitial when constructing a new building or renovating an existing one.

8 STRATEGIES

19 Navarra Social Housing

524 social housing units constructed up to the energy standards to minimise energy consumption and to reduce CO_2 emissions protect the environment.

Rental social housing in Navarra region presents these facts: 1/ The demand largely exceeds the offer; 2/ The cases of energy poverty have increased, which leads to health problems of the tenants and pathologies inside the houses due to lack of ventilation (in order to keep the warm).

In addition, the EPBD 2010/31/EU (amended in 2018) states that all the new public buildings have to be built under nZEB standard from 2019 onwards to diminish CO_2 emissions.

As a result Navarra Government (NG) established a Social Housing Plan, which responds to all these existing problems. The ultimate and primary objective of the Navarra Social Housing Planis to improve the quality of life of the Navarre citizens who demand a social housing.

Another objective was to be a pioneer in terms of energy commitment within Spanish regions. In Spain, this nZEB standard is defined with parameters, which comprises: Isolation, thermal bridges, mechanical ventilation with heat regeneration, airtightness, and energy efficient windows.

NG decided to build 524 dwellings under Passive House standard in different locations and phases, where rental housing stock demand is increasing. Generally, the plots, could be municipal or regional. In addition, in some specific cases, it is been testing new financial schemes between private owners and public administion. Stakeholders and beneficiaries: European Investment Bank (EIB), Administration (NG, Municipalities), construction companies, architects and tenants.

Resources needed

Total investment 80M€ (50% financed by EIB, the rest by NASUVINSA):
1. EIB-European funding - M40€
2. Navarra de Suelo y Vivienda, S.A (NASUVINSA) Own funds - M40€
Period: 2017-2020

Evidence of success
Dwellings affected by the project: new dwellings built (524 dwellings).
Total investment (80M€ -50% financed by EIB)
Employment generated: created or maintained around 300 jobs

Difficulties encountered

To respond to an increasing housing rental demand, NGr equired an unprecedented housing plan. A loan to the construction with EIB was signed . The investment in these dwellings was a bit higher (7% up than a standard renovation), but energy poverty and maintenance costs will be reduced.

Potential for learning or transfer

We believe that the situation described above is quite typical for every region and therefore, the practise is easily replicable.

As previously mentioned, this plan will serve to reduce energy poverty, maintenance costs and respond to the growing increase in the demand for social rent, as well as full-commitment of reducing CO_2 emissions. Problems that are mostly repeated throughout the different countries.

However, this type of plan requires a firm commitment from the regional government.

This GP will spearhead nearly zero emissions buildings in Navarra housing sector and will become a driver for other authorities and private sector to follow.

20 Joint SEAP Vallesina Sustainable Energy and Climate Action Plan for 11 municipalities in Marche Region

Multi-level governance for the development of multi-municipal strategies and action plan for GHGs emission reduction (Joint SEAP) in small municipalities.

Around 60% of Italian towns are rural small towns, with lack of staff capacity, low economic resources, aged stable population and with lack of innovation – sharing common challenges with all municipalities members of the Joint SEAP Vallesina - Sustainable Energy and Climate Action Plan for a group of 11 municipalities from Marche Region. The joint SEAP approach fosters institutional cooperation and joint approaches among local authorities operating in the same territorial area. Comprehensive and cross-cutting SEAP offers flexibility for the signatories. Need of timely, active, transparent and inclusive stakeholder involvement for SEAP implementation. Reaching objectives of the practice Achieving more effective results in terms of energy and climate change mitigation promoting a joint approach than an isolated one, as in some circumstances opportunities for high-impact actions can be more easily identified within the administrative boundaries of an aggregation of neighbouring local authorities Main stakeholders and beneficiaries Municipalities and all relevant stakeholders involved in SEAP development and implementation (i.e. regional agencies, local business, NGO, etc.) This GP is in charge of Sviluppo Marche (SVIM) in collaboration with Consorzio Intercomunale Servizi CIS Srl (in-house providing services company and Joint SEAP technical coordinator).

Resources needed

Human resources used to develop the Joint SEAP: 0,75 FTE (full-time equivalent) for each year of development of the action: Feb 17 – Mar 19. The resources required to implement it is defined in the SEAP for each specific action that are ongoing and upgrading on climate adaption strategy and actions.

Evidence of success

Public lighting in 8 municipalities (1.010,00 tCO_2/a reduction): replacement of 6000 lighting fixture with LED bulbs; providing solar/photovoltaic street lights; information panels; Wi-Fi cameras; weather sensors/devices; electric vehicle charging station.

Development of the inter-municipal cycle-line at the district level.

CIS Srl, with the Polytechnic University of Ancona is testing an innovative methodology for energy audit and energy efficiency for public buildings

Difficulties encountered

Challenges for creating and sharing common vision, strategies and measures between several (n.11) local governments, each one pursuing their local needs and interests.

Potential for learning or transfer

Transfer already done within the Interreg Policy Learning Platform (2019), addressed to: 9 German-speaking municipalities of Belgium, Government of the German-speaking community.

Transfer between the EU Covenant of Mayors community (Regione Marche and Sviluppo Marche Srl are CoM Territorial Coordinators) during workshops, events and learning activities (i.e. SVIM has been selected for the EU Covenant of Mayors peer-learning programme 2021).

21 Vickleby

Several passive houses were constructed in Öland by using local materials to avoid transporting construction materials, thereby reducing carbon footprints.

Vickleby project considered energy and climate issues at both local and national scales. Using local materials, such as wood and limestone, along with energy-efficient technologies allowed addressing traditional, environmental, and economic architectural design values in Öland. Using limestone on facades reduced the maintenance costs when comparing with traditional wooden facades in Sweden. An interview with a real estate agent showed that wood along with limestone mirror the traditional and local architectural style in Öland and create a sense of welcome.

The passive houses were equipped with an integrated ground source heat pump (Thermia Diplomat Optimum) and a mechanical ventilation system to improve the energy performance of the houses. The heat pump fine-tunes the operation continuously. The optimum regulation ensures that the heat pump is always allowed to operate under ideal conditions. Any such system allows one to reduce the annual heating costs up to 80 percent.

Resources needed

- Between 2000 €/m^2 to 2500 €/m$^{2.}$

Evidence of success

First, Vickleby addressed the traditional and social architectural design values by using local materials in the construction of the detached houses, thereby enhancing owners' satisfaction with the overall design.

Second, Vickleby exploited an efficient integrated system to both improve the energy performance of the detached houses and improve indoor environment quality. The total energy consumption of passive houses in Sweden must be at most 26 kWh/m^2.

Difficulties encountered

Discussions were proceeded first with Kalmar municipality to use local limestone as façade materials. Öland includes several historical sites, accordingly, additional evaluations had to be planned and performed in detail to avoid damage to Öland's contemporary and historic architecture.

Potential for learning or transfer

The project addressed both traditional and environmental architectural design values in constructing the detached houses in Öland. Any such practice can be adopted in other regions with different architectural styles, characterized by features, which make buildings historically identifiable. Accordingly, using local materials along with energy-efficient technologies helps one to satisfy different architectural design values.

22 Rental housing by ETC Bygg

ETC Bygg is changing the construction of apartment buildings to climate-positive ones in Sweden.

The houses are almost entirely built from sustainably produced wooden building elements and also contain innovative solutions such as wood-based panels in bathrooms instead of tiles, and kitchens built from recycled materials. In addition, tenants have the possibility to cultivate their own vegetables in their balconies.

These rental houses are equipped with solar panels, which produced more electricity required for operating the houses. furthermore, tenants are able to charge their El-cars using onsite El-stations.

The construction of these houses is financed in an innovative way, through crowdfunding. Private people have been able to buy B-shares in ETC bygg with a guaranteed interest rate of approximately 2 percent per year. So far, 784 people have bought B-shares worth SEK 80 million, which financed the construction of similar rental houses in Västerås and now is mortgaged to build in Växjö.

Resources needed

- 120 million Swedish crowns

Evidence of success

The houses are built using a flexible system that is already adapted to different cities Västerås and Malmö. Materials, such as plastic, concrete, and plaster are avoided in the production of these houses. A combination of solar panels, battery storage, and mechanical ventilation with a heat recovery system creates low-energy rental houses. These houses are self-sufficient in solar energy all year round.

Potential for learning or transfer

The rental houses:

- are almost entirely constructed with wood and recycled materials, thereby contributing to the achievement of the national and regional targets,
- are supported by solar panels to reduce the houses' dependence on the grid,
- are financed in an innovative way.

23 Zagreb district heating system renewal – policy and financing perspective

Renewal of the Zagreb district heating system distribution network from Croatian Operational programme Competitiveness and cohesion, 2014-2020, ITI mechanism.

Project assumes renovation of a significant share of the district heating distribution network, characterized by significant water and energy losses. In 2017 total heated surface was 5,6 million sqm and delivered energy was 1,3 TWh. Energy loses were close to 15% and water loses close to 40%. Project assumes revitalization of 68 km of the network by the mid of 2023. Project brings added value to achievement of national and EU targets related to energy efficiency and GHG reduction as it foresees total energy savings of 0,201798PJ and significant decrease of the water losses. Croatia opted to use the so called Integrated territorial investments scheme, pursuant to article 7 of the ERDF regulation which enables the member states to use this mechanism dedicated to urban development. One of the specific objectives City of Zagreb, as a centre of the Urban agglomeration and intermediary body, opted to use was the increase of the efficiency of the district heating system. It was a multi layer exercise that involved national level ministries, City of Zagreb (multiple departments) and final beneficiary, district heating company HEP Toplinarstvo, ltd. Project is now in the execution phase with two main elements, construction works and raising of awareness on the potential that district heating systems have in the decarbonization process.

Resources needed

The practice required significant efforts on multiple levels of governance as it is run through the scheme that represents novelty in usage of structural funds in Croatia (also Europe). Project total value is 93m€ and ERDF co-finance is 56,2 m€.

Evidence of success
Project will deliver a revitalization of 68 km of district heating distribution network. Water and energy losses will significantly decrease, energy losses decreased by 0,21PJ.
DG Competition approved the state aid (based on FS and CBA).
All licenses have been issued.
Grant agreement has been signed.

Difficulties encountered

There were numerous challenges in the preparation and execution of the project. Biggest challenge was related to the set up and usage of the Integrated territorial scheme in Croatia (as this project was the single biggest in the portfolio). Stakeholders coordination posed a challenge as well.

Potential for learning or transfer

Learning potential is strong, first in relation to financing this type of project from ESI funds. Significant efforts were put in the project development from its roots in strategic planning phase when project was introduced on the list of major projects in Operational programme to its formal approval by the EU and national competent authorities (DG Competition and relevant ministries). Project is a good example of cooperation between local, regional, national and EU authorities with private sector and citizens on the path to deliver energy and climate related goals.

24 Green spatial plan of the city of Karlovac

Modification of traditional spatial plans to green ones for sustainable future

The City of Karlovac has recently completed its Sustainable Energy and Climate Action Plan and is now in the process of modifying its spatial and zoning plans. The City has recognized the potential synergy between the two actions and is, with the support from the North-West Croatia Regional Energy Agency, integrating them into the first Green spatial and zoning plan in Croatia. The overall concept is to empower and enable local and regional governments to explicitly set and bindingly enforce their development pathways with a focus on sustainable development and environmental protection, using tools already at their disposal.

Within the project, a set of guidelines for the integration of energy and climate measures into the cities spatial and zoning plans will be developed, backed by a set of assessments and analysis, and subsequently implemented. The final result of the action will be a Green spatial and zoning plan which will define and mandate the implementation of climate change mitigation and adaptation measures within the City limits. This will include measures which will go beyond the state of the art. These measures will include the definition of low carbon or carbon free zones, limitation on the expansion of the use of fossil fuels for heating, mandate the implementation of building scale renewable energy production or use of green infrastructure and so on.

Resources needed

The planning phase requires limited resources to:

- Develop energy and climate guidelines;
- Integrate energy and climate measures into spatial plans.
- The implementation phase requires significant resources to:
- Support the implementation of the proposed energy and climate measures

Evidence of success

The process is still ongoing. A first draft of the suggested zoning changes and the energy and climate measures has been prepared and presented to the City of Karlovac. This is the first action of this kind in Croatia, where SECAP measures are directly connected to the most important spatial planning and execution activities.

Difficulties encountered

As this is a pilot project in Croatia, it consisted of several new concepts in the field of spatial and urban planning and was, as such, a learning experience both for the City of Karlovac and REGEA. It was a challenge to adapt some of the measures to the language of spatial planning.

Potential for learning or transfer

The learning and transfer potential of this practice is very strong. All municipalities, cities and regions have spatial planning practices across Europe and often lack the capacity or experiences to properly integrate energy and climate into them. This can be a lighthouse example of how to develop and implement green spatial plans thus enabling local and regional governments to explicitly and directly tailor their development pathways. Potential is even stronger if properly connected with budgetary planning and with the ex-ante documents in relation to usage of structural funding for energy and climate issues.

25 Green Mobility Brdovec - study of new mobility concepts in the Brdovec Municipality

The study considers mobility concepts for achieving sustainable green solutions (7 aspects included in 20 different measures - 120 MHRK worth investment)

The study aims to consider the topic of mobility in the Municipality of Brdovec in order to comprehensively, systematically, methodologically and interdisciplinary understand the challenges and in the context of integrated sustainable urban development to offer effective solutions for new green mobility XXI. century; at the same time respecting the local context and needs of the inhabitants of the Municipality of Brdovec as well as the regional context (Municipality of Brdovec as part of the wider Zagreb area) and inevitably the national and European context. The study forms the Concept of a new green sustainable mobility of the Municipality of Brdovec through the Analysis. From the Concept, which consists of 7 segments, comes the Decision proposing the implementation of 20 measures for the creation of Zelenomobilni Brdovec. The measures propose to invest a total of estimated 120 million HRK in the establishment of public bus transport with electric buses, in the creation of cycling infrastructure - a network of bicycle routes, in transport infrastructure and green energy with new mobility models and in connecting elements (integration, informatization, digitalization, communication, education) through an estimated implementation period of at least 48 months.

Resources needed

- 120,000,000 HRK (16,000,000 €)
- The Brdovec Municipality
- North-West Croatia Regional Energy Agency
- External Expertise (University of Zagreb; planning consultancy office ELIPSA S.Z)
- Combination of own resourcing and co-financing through national and EU mechanisms

Evidence of success

This will be an ongoing project in next several years as a baseline for other necessary documentation. Study accepted in 12/2020.First part includes successful application to EU Grants (total of HRK 7,675,734.92) for the project "RAIL RIDE - construction of a bicycle path along the railway." The project is currently in development phase, while other parts of study are closing financial plan.

Difficulties encountered

Challenges related to aligning proposed measures with current and future urban development plans. Additionally, challenges in terms of electrification of public transport and renovation of necessary infrastructure including chargers, PV systems, innovative bikeshare and carshare concepts.

Potential for learning or transfer

There is a high learning curve of this project where REGEA and Municipality of Brdovec developed a clear methodology which includes detailed analysis of current state, inclusion of large number of stakeholders through questionnaires and local working groups, accessing good practice examples and finding possible financial opportunities. This concept can be replicated to other municipalities and cities in the region of Urban Agglomeration Zagreb where measures are directly in alignment with relevant Urban Mobility development strategies and plans.

NOTES

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