



BUILD2LC Project
**Boosting Low Carbon Innovative Building
Rehabilitation in European Regions**

Topic Report on:
Innovation

How to accelerate innovation uptake for energy rehabilitation

The topic report is a communication action for the general public, to show the main conclusions and results of the events being held with stakeholders in relation with BUILD2LC topics.

Sevilla, 30th November 2017

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1 About BUILD2LC

The recent framework strategy of the “Energy Union” of the European Commission indicates that 75% of European households are energy inefficient. There is also great potential for energy savings in public buildings of the EU. The BUILD2LC project will contribute decisively to achieve the EU energy goals, with its overall objective to increase the energy rehabilitation of buildings, and pave the path that facilitates the transit towards the new standard of nearly Zero Energy Buildings (nZEB).

The key innovative aspect of BUILD2LC is its multidisciplinary approach, that counting on different complementary expertise at Local (Gloucestershire County UK, and Gorenjska SI), Regional (Andalusia ES, Rzeszow PL, NorthWest Croatia HR and Jämtland-Härjedalen Region SE) and National (Lithuania LT) level, will allow achieving the energy goals and a sustainable development of the construction sector, based on improving the competitiveness, generating qualified employment, promoting innovation, and alleviating fuel poverty, in line with the European objectives for smart, sustainable and inclusive growth.

The project, with a high replicability impact will design innovative financial instruments, adapted to the needs of citizens, new mechanisms that contribute to a more competitive business network, special programmes to support innovation, and innovative collaboration actions, focusing on vulnerable groups. Homeowners, business sector, policy makers, local authorities, knowledge institutes and vulnerable groups will benefit from the project.

BUILD2LC will develop a complete learning process to facilitate an effective knowledge flow among regions, with a bottom-up approach methodology, counting on the regional stakeholder groups. More than 70 best practices and almost 70 events involving nearly 400 stakeholders, will establish 7 different Regional Action Plans covering a population of more than 15 million inhabitants and improving energy efficiency over 25% at the participating regions.

Aims

The main objective of the BUILD2LC is **to increase the energy rehabilitation of buildings to reduce energy consumption and enhance policies to favour the creation of a market of specialised companies in this sector**. To achieve this objective, it is necessary to reinforce the competences of partners in the following sub-objectives:

1. Encourage the demand and promotion of investments, facilitating that citizens undertake energy rehabilitation activities.
2. Promoting the competitiveness of the business network: reformulating business models (ESCOS) and integrating all actors in the value chain of the energy rehabilitation sector.

3. Improve the skills of workers aimed at new market niches of energy rehabilitation of buildings.
4. **Encourage innovative solutions, the use of new materials, boosting public procurement, and the cooperation between companies and knowledge institutes.**
5. **Eliminate barriers that impede the rehabilitation of buildings, especially those of a normative or administrative nature.**

Therefore, the exchange of experiences between partners, some of them occurred during this Interregional Meeting will be aimed at:

- ✓ The promotion of innovation in the energy rehabilitation sector in line with the priorities set in the smart specialisation strategies of the participating regions. The increase in innovative projects, innovative public procurement processes and better knowledge of society of these solutions will also be project results.
- ✓ Boosting mechanisms to support innovation in equipment and systems of higher energy efficiency in buildings with special relevance to the role of public administration and promotion of innovative strategic projects, demonstration projects and pilot projects in buildings

2 Introduction to the topic: innovation

The main objective of the BUILD2LC project is **to increase the energy rehabilitation of buildings enhancing the implementation and change of policies**. The project is focused on four different topics:

- New financial instruments
- Professionalization of the construction sector
- Activation of demand and combating energy poverty
- Innovation

BUILD2LC addresses the topic *innovation* focusing on the encouragement to uptake innovative solutions, the use of new materials, boosting public procurement, and the cooperation between companies and knowledge institutes. Therefore, the exchange of experiences between partners will be aimed at boosting mechanisms to support innovation in equipment and systems of higher energy efficiency in buildings with special relevance to the role of public administration and promotion of innovative strategic projects, demonstration projects and pilot projects in buildings.

Innovation is a very broad concept, and should not only be understood as technological innovation; it could refer to financial, management or communication innovation with regards to energy efficiency in buildings. The focus of the Innovation topic within the BUILD2LC is ways of working to facilitate the creation and dissemination of innovation in buildings and the construction sector.

Topics that were addressed during the meeting are e.g.

- Academic session on the innovation system and large scale transitions.
- The role of an innovation strategy and circular economy in Region Jämtland Härjedalen.
- Workshops on the role of innovation in order to reach near zero-energy buildings.
- Good practices exchange between partner regions.
- Study visits.

All aspects of *innovation*, whether technological, financial, or the development of mechanisms, stimulate activity and engagement across sectors.

3 Interregional Meeting in Östersund, Sweden

The BUILD2LC Interregional Meeting titled '***How to accelerate innovation uptake for energy rehabilitation***' was held in Östersund on 12th - 13th September 2017 in accordance with the agenda shown in *Appendix 8.1*. The Seminar attracted 40 delegates, and speakers including Build2LC partners and their stakeholders.

This section summarises the key outcomes of the meeting.

Summary of the Welcome Session

Susanné Wallner, Regional Council at the Jämtland Härjedalen Region, Joaquín Villar, Lead Partner, Andalusian Energy Agency and Anneli Kamb, Build2LC PM at Region Jämtland Härjedalen, opened the seminar. They explained the value of the Build2LC project, as outlined in the Foreword and welcomed the delegates.

Susanné Wallner, one of the regional commissioners, opened the meeting by welcoming everyone to Jämtland Härjedalen. She mainly works with regional development, which in her case means to work with the companies and make sure that everything is working well for them. Wallner explains that at the moment there is great development in the region, and in particular a lot of new buildings are being constructed.



She further explains that most of the construction is concentrated to the tourism destinations in Åre and Härjedalen municipalities. Tourism is one of the most important sectors in the region and each year the region hosts 2.9 million guest nights in Jämtland Härjedalen, which is a lot compared to its inhabitants of 127.000. As the region is aiming to be fossil fuel free by 2030, sectors like tourism with large building stocks will be very important to reach this goal. Therefore, projects like Build2LC are very important for the sustainable development of the region, as we can reach this goal faster by learning from each other.

Elin Nirjens, the meeting moderator for the day, invited **Joaquín Villar** as lead partner and **Anneli Kamb** as Swedish partner to talk about the meeting and the project.

Joaquín Villar explains that the project is an Interreg Europe project and the main objective is to increase the energy rehabilitation in Europe. For this to promote innovation is very important, but also important to have a holistic approach. This is why several meetings have already been organised within the project: *new financial*

instruments in Lithuania, *professionalization of the construction sector* was addressed in Poland, and *activation of demand and energy poverty* in the UK. This meeting with innovation as the theme is the last opportunity to share experiences. These exchanges will be the basis for the ambitious action plans that the partners will develop and implement in the coming years.

When asked what his expectations of the day are, Villar says his main expectation is to learn about the many actors within the innovation field who are participating in the meeting. As innovation is a key element in sustainable construction it is important that these actors meet and can start creating these interregional collaborations and share their many experiences.

Kamb welcomes everyone to the meeting on behalf of the Swedish partner, and explains that her expectations of the day are that everyone will get the opportunity to learn something new, get inspired and have interesting discussions during the day.



Anneli Kamb, Joaquin Villar and Elin Nirjens.

Nirjens also asked the participants to write down their own expectations for the day on post its and put them on the wall on their way out. There were many different kinds of expectations, but the most reoccurring were

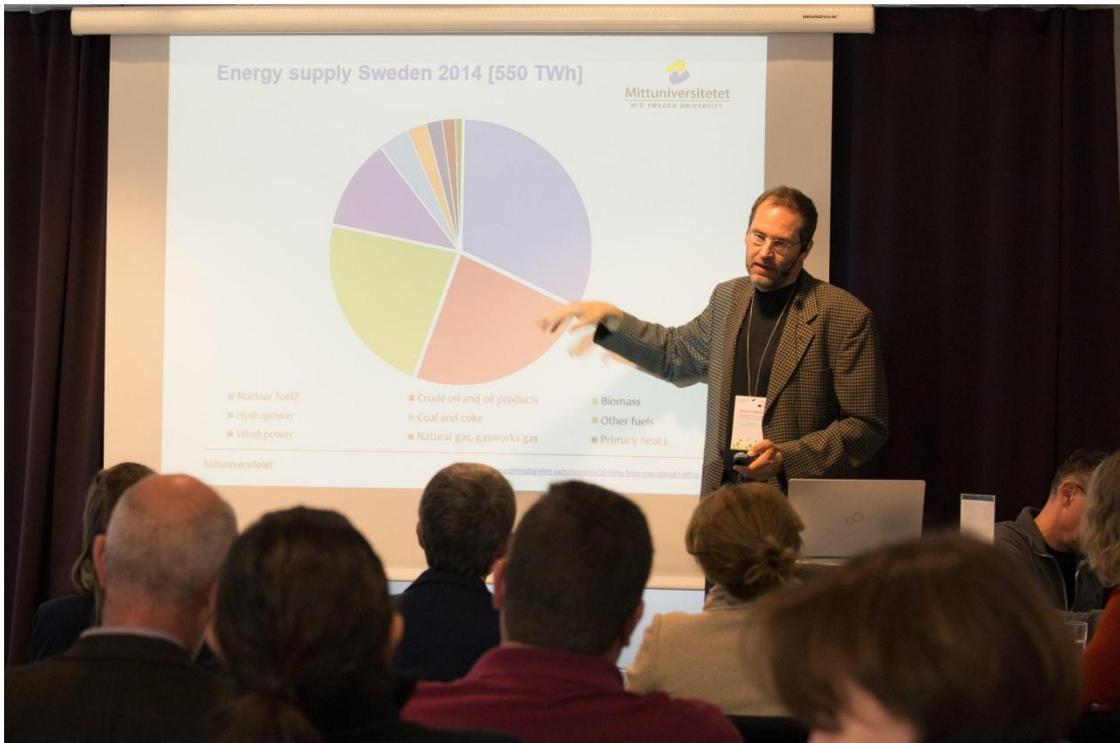
- “Opportunity to share ideas and learn from existing good examples”
- “Collaborations” and “New projects among partners and stakeholders”
- “Inspiration!”
- “Better understanding of innovation in energy efficient field” and “... building sector”
- “Concrete innovation development”
- “Have fun!” and “See a bear”



Master speech by Torbjörn Skytt, Mid Sweden University:

- ***Energy and housing - Swedish and regional conditions***

Dr Torbjörn Skytt from Mid Sweden University started the presentations of the day by giving an overview of the Swedish energy system and the housing market. The picture below shows the energy supply in Sweden in 2014, stating that that has a lot of biomass (green), but also a lot of fossil fuels (red and blue). The electricity production in Sweden on the other hand is 50% hydro and wind power and 40% nuclear power, meaning it's mostly carbon neutral.



Moving on to the housing market, Dr Skytt explained the different climate/temperature zones we have in Sweden, given that it stretches so far from north to south. These zones have different thresholds for energy use in the building regulations, varying more than 50% from south to north. Typically in Sweden today, demands are on the level of 70-80 kWh/m² for heating and hot water, with bio fuel, electric heating and district heating being the main energy sources.

Summary of Session: Innovation management from global to local level

Erik Noaksson, Innovation strategist Region Jämtland Härjedalen:

- ***Region Jämtland Härjedalen Innovation Strategy and SMICE***

Erik Noaksson presented the regional innovation work of Jämtland Härjedalen. The basis for his presentation was the [regional innovation blog](#), where all the different aspects of the regional innovation work can be found. He explained the process of developing the [regional innovation strategy](#), which is important to know in which direction you're



going. He explained that they quickly moved forward to creating an [innovation programme](#), to be able to start doing the work needed.

Noaksson also presented the newly started projects [SMICE](#), which is a new Mid-Nordic infrastructure to promote borderless circular transition in the regions of Trøndelag (Norway) and Jämtland Härjedalen. The mission is to contribute to a more sustainable mid-nordic region, with a focus on circular economy and bio-economy. Here on the website, dedicated people in the region can get in touch with each other and be inspired by their own and others' successful work and progress. The idea is to connect dedicated people in the region to facilitate active co-creation.

Find out more:

- [Stakeholder map](#)
- [Onepager](#) - progress report
- [Film](#) explaining the Appreciative Inquiry methodology used in SMICE
- [Sustainable Cleveland](#) that uses the same method but in an urban context vs Jämtland Härjedalen, which is rural/sparse

Joaquín Villar, on behalf of Joint Research Centre (European Commission):

- ***Interregional collaboration to boost innovation uptake in energy rehabilitation in buildings***

Joaquin Villar explained why a Partnership on Sustainable Buildings is important; the building sector is the largest energy consumer in Europe (40% of energy and 36% of CO2) and over 75% of energy savings could be achieved; but only 0,4-1,2% of the stock is renovated each year. The partnership is an alliance between European regions to boost new markets and take advantage of regional opportunities for specialisation in sustainable construction. Currently 47 entities are part of the partnership, and it is lead by the Andalusian Energy Agency.



Currently the partnership is exploring project ideas in different themes (see below). The first project ideas are planned to be developed by the end of 2017.

- Eco construction, bioclimatism and insulation of buildings
- Renewable energy integration in buildings
- Systems of maximum energy efficiency use in buildings and cities

Carlos García Delgado, Civil Engineering and Building Technical Officer. Technological Corporation of Andalusia:

- ***An example of regional Public Private Partnership to fund RTDI projects***

The Technological Corporation of Andalusia (CTA) is an example of a Public-Private Partnership (PPP) that was created in 2005 in order to promote and facilitate the transfer of knowledge and technology between different actors, promote innovative culture, and evaluate and fund R&D and innovation.



Carlos García Delgado explains that the partnership consists of several actors who each act as a gearwheel, each capable of starting processes that in turn gets the other actors (gearwheels) moving. To date the CTA have funded up to 625 projects, out of which 22% were carried out in collaboration between agreement of the interested companies. In total, 157 M€ have been granted in funds, and the total project budgets have been 474M€ so far.

Lillian Strand, Norwegian University of Science and Technology:

- ***Transitions in the construction sector***

Lillian Strand presented some of her results from her research about transformation in the construction sector. She introduced us to three paradoxes that come with the ambition of building zero emission houses, using the example of Trøndelag, Norway:

- The difficulty to choose technical innovation How to choose innovation;
- Demand without local supply – ends up not creating job opportunity;
- Rebound effect: when energy is saved in the building envelope, people get a higher disposable income and increases consumption.

These paradoxes combined is the innovation challenge. Because of how the system works we run the risk of higher emissions after the renovation is done. The innovation challenge is also the energy system.

Lillian also presented some approaches to go about it. It is important that the industry and the market shall be stimulated simultaneously to reach required effect. For instance, through campaigns, free expert advice and socio-cultural approaches to promote local supply and cooperation.

One good practice where the social-cultural approach has been taken into practice is in *Ecohouse* in Antwerpen, Belgium. The house is built with several high-tech energy saving solutions which are shown in the house. The house has a café and get a lot of visitors that are exposed to energy saving information and also other environmental information. Visitors are encouraged by a local point system, where you get points when visiting. The points can be used for example to go to the local cinema and similar activities.

In order to accelerate innovation, Lilian's advice was to connect stakeholders along all dimensions from the supply chain to end users, since innovation can happen anywhere.

Summary of the Workshops - *Paving the way to nearly Zero Energy Buildings*

To quote one of the speakers at the event, "Innovation is about people meeting". Therefore, the idea of this workshop was to create the space for creative and free discussion, between people with different backgrounds and with different ideas to deliver the best outcomes on innovation.

During the workshop the participants were assigned to three different groups, with 25 participants in total. The smaller groups help with collaborative work, where everyone is given a chance to contribute through both talking and writing.



The workshop focused on positive and optimistic feelings, by letting the participants envisioning a desirable scenario far into the future, escenary 2050. By doing this one could let go of the current barriers and problems, where everybody commonly get stuck when you want to create a change. This format tends to help people stay with the positive feelings and.

So, what would they like if they could dream big?

The groups were given A3 papers with instructions for this first stage, and were encouraged to take notes directly on these papers.



REGION JÄMTLAND HÄRJEDALEN

BUILD2LC Interreg Europe

European Union European Regional Development Fund

Paving the way to nearly Zero Energy Buildings technology...

How would you like the built environment to be in 2050?
Imagine and describe the dream scenario of your region and Europe!

Remember:

- Envision a desirable scenario
- Let go of the current barriers and problems
- Focus on positive feelings and possibilities
- Allow yourselves to dream big!

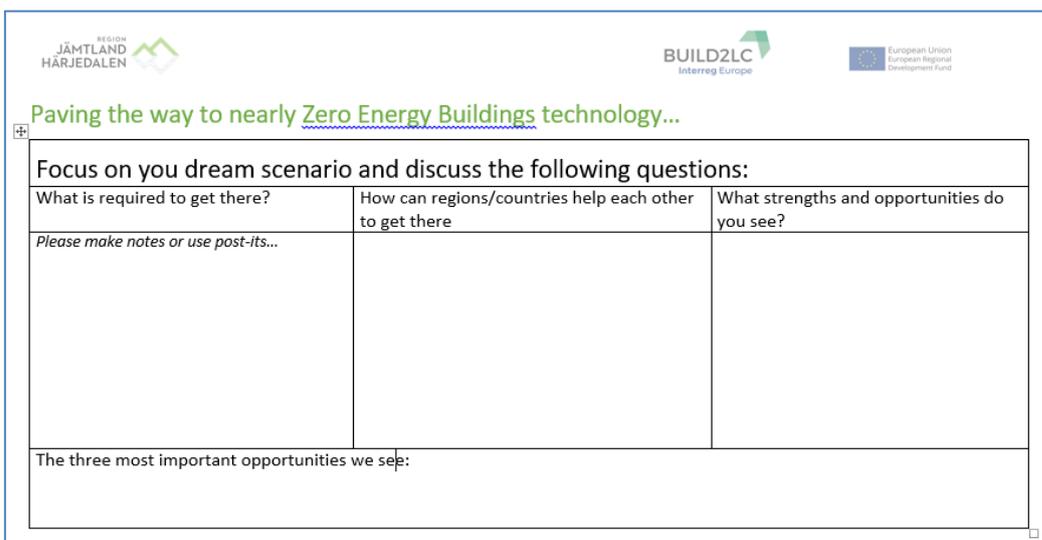
Please, use this space to make notes and gather your post-its!

Once the vision is clear, they moved on to discussing what will need to be done to reach such a future; what could they themselves do, which actors are needed, what strengths can they identify etc.

Two groups were focused on financing and one on technological aspects. More precisely the themes were:

- Innovation uptake for the buildings of the future
- Innovation Funding (I and II)

Again the groups were given A3 papers with instructions, see below.



REGION JÄMTLAND HÄRJEDALEN

BUILD2LC Interreg Europe

European Union European Regional Development Fund

Paving the way to nearly Zero Energy Buildings technology...

Focus on you dream scenario and discuss the following questions:

What is required to get there?	How can regions/countries help each other to get there	What strengths and opportunities do you see?
<i>Please make notes or use post-its...</i>		

The three most important opportunities we see:

The groups were then asked to share the three most important opportunities that they found during their discussions. In many ways, they have envisioned similar future

scenarios, which put smiles on people's faces. And they, in some ways, had found similar opportunities as well, see below.



Outcomes from Technology uptake workshop group

Dream scenario:

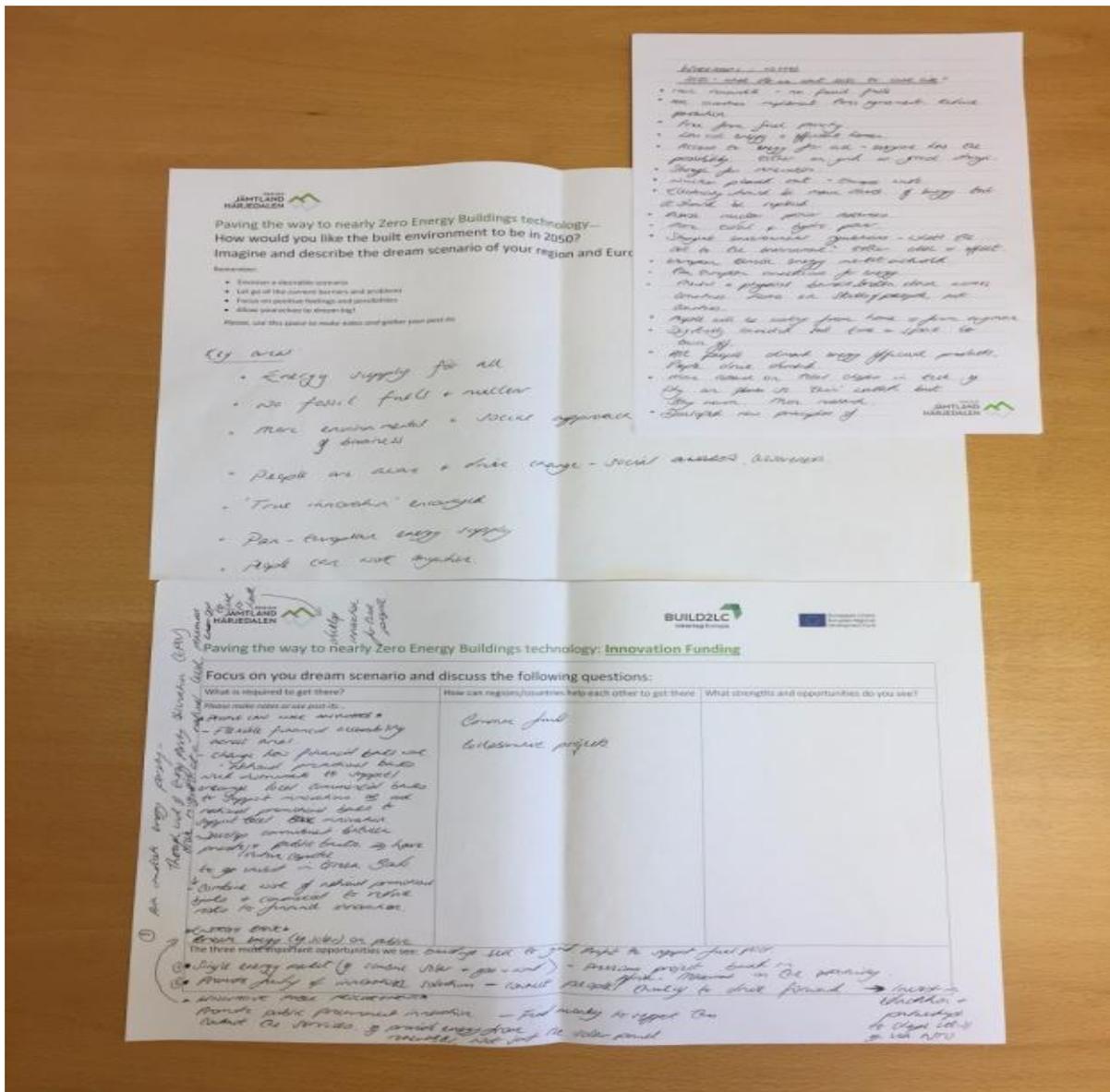
- Affordable dwellings
- Fresh clean air
- High quality life
- Possibility for everyone to grow their own vegetables
- New houses should be nZEB or passive houses
- Energy supply should be renewable and efficient
- Healthy houses with safe materials (no chemicals)
- low maintenance solutions
- equal pay for everyone or no money

Three opportunities

- Use our existing media and social media to spread GPs and bad practices (how no to do things) e.g. short films to educate the population
- The technology is already here, we need to use it we need knowledge and therefor education and training (clients, customers and construction sector)
- Increase the price of energy is needed
- It needs to be cool to be aware (cool to be a nerd)

Three opportunities

- Single energy market, learn from previous project in Africa (that didn't go so well)
- Aim to eradicate energy poverty, first stage is recognition on national level in all countries in Europe
- Promote innovative solutions, driven by demand from the people (if they demand it, it will be provided)
-



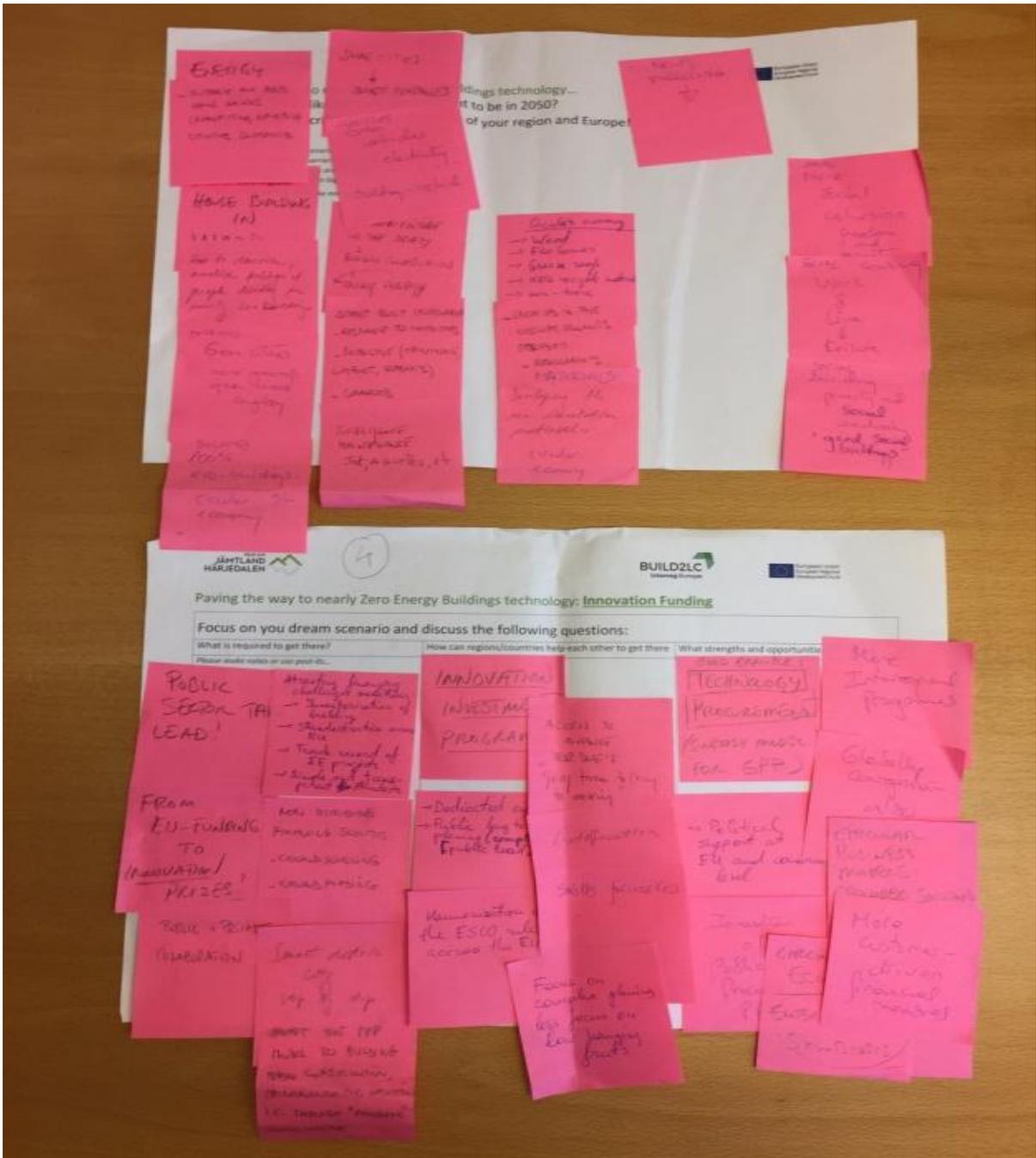
Outcomes from Innovation funding 2

Dream scenario

- 100% eco buildings, some regions wood
- Citizens view important, more friendly, more oriented with social questions
- More balance between work and leisure
- Avoiding poverty through more social buildings
- More focus on growth in the cities and buildings, focus on smart cities
- Importance of circular economy, no toxic materials and energy efficient
- Having things in the buildings before the problems arise

Possibilities (more than three)

- In the short term funding will be similar to today, but changing slowly to adapt
- Much more public private funding, crowd funding and circular funding models
- Public procurement PPI processes are successful
- More flexible support for SMEs, soft funding for SMEs, ESCOs, and new ways for funding
- Skilled workers as well, not only funding, not only on funding, but also providing support, knowledge and....
- Much more customer and citizens driven processes
- Huge potential in the sector due to its size
- More cooperation across the borders (within Europe and other continents)



Summary of Session: Good Practices in Innovation

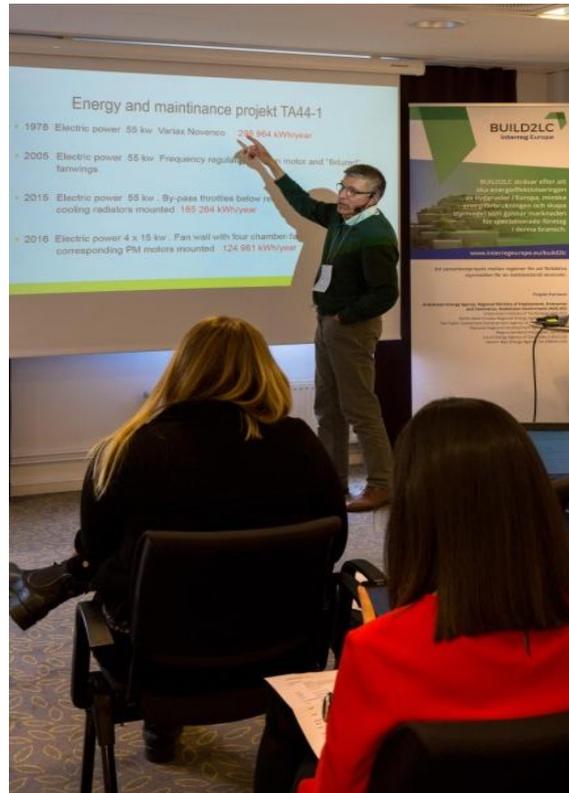
Stefan Östlund, Region Jämtland Härjedalen

- ***Hospital of Östersund – large energy savings with innovative ventilation solutions***

Stefan Östlund is the managing energy engineer of the Hospital of Östersund. He presented some of the renovation solutions and thus reduction of energy demand, that has been done in the hospital's ventilation system during the past 40 years.

From a yearly energy consumption of nearly 297 000 kWh in 1978 it has decreased to 125.000 kWh in 2017. Every renovation work has been carried out during ongoing hospital activities in the operation rooms, with very high demands on ventilation compared to ordinary buildings. This has made the work even more complicated.

The investments have had an average pay-off time of 15 years. In comparison to what is possible in most businesses this is a long time. Since the hospital has long-term owners and a long-term perspective to work from, it has been possible to do.



Richard Jessup and Howard Thomas, Stride Treglown

- ***Innovative Practice at Stride Treglown, UK***

Stride Treglown is a company offering the whole range from architecture, landscape design, town planning to project management and building surveying. Richard and Howard presented three examples of successful renovation projects and several cases where they have been hired as building surveyors.

The company has heavy experience from working with several kinds of buildings; school buildings, historical buildings, student residences are some examples.

Both Richard and Howard emphasized the importance of communication in building- and renovation projects. When they work they make sure to identify what is wanted, make agreements and make sure that quality doesn't get dropped if subcontractors are used.

From their experience it is not all about innovation and technology, it is also about the process. Without a well working process the wished effect is dropped.



Juan Manuel Castaño, European Passive House Platform

- ***Passive Houses in Mediterranean climate & Spanish Passive House Platform***

Juan Manuel Castaño represented the international non-profit organization “Passivhaus Building Platform”. The organization has 500 members and its main purpose is the dissemination of the passivhaus standard.

Passive houses are implemented all over the world, in all kinds of climates and in all types of buildings. In some regions as the Region of Brussels or Heidelberg city (Germany) it is already compulsory to build new passive houses.

The definition of a passive house, according to the standard, is a house with a maximum heating demand at 15 kwh/m2 and heating load 10 w/m2, a maximum cooling demand at 15 kwh/m2 and cooling load 10 W/m2.

A passive house is a clear path to Nearly Energy Zero Buildings (NZEB) and certification works as a quality assurance. Since it is the same calculation procedure it is possible to make global comparisons.

Air tightness has been introduced in Spain quite recently. Despite some skepticism at the beginning it has worked well. A conclusion is that contractors need to be trained and informed. The production cost is about 0%-7% higher than regular houses, which is not a problem if the profit from the market price selling is included.



Karin Söderberg, Municipality of Östersund

- ***Storsjö Strand – sustainable new city district in Östersund***

Karin Söderberg, Project manager in Urban development at Östersund municipality, talked about one of her projects, Storsjö strand. The project started in 2009 with the ambition to build 800 new apartments. The municipality had high ambitions to implement sustainability in the project. This was a big challenge since the area was polluted from industrial activity.

The project has reached success thanks to the planning process which has focused more on cooperation and communication than normal. The developers and architects have been part of the project from the beginning, which has been crucial to reach the goals. High energy performance has been central demands from the beginning, as well as other sustainability aspects such as choice of material, storm- and rainwater treatment and soil purification. The project has also managed the certification for green building.

The extended planning process was made possible by grants from the state.



4 Study Visits

During the interregional meeting in Östersund, visitors from Build2LC partners (stakeholders and partners' representatives) attended two Site Visits.

Sportstech

Sports Tech Research Centre in Östersund is a multidisciplinary research centre with a focus on the development of and verification of products, material, technology and methods in the field of sports and outdoor activities. But the working methods and cooperations with companies could also be applied to other sectors, such as the development of new materials in the construction industry. Kajsa Nilsson, TITEL and X TITEL Gave us a presentation about Sports Tech Research centre and a tour in the labs.

Research

Sports Tech Research Centre are engaged in research relating to innovative development and verification of products, materials, technology. The ability to test products in the same condition as in the ones in which they will be used is a vital aspect of product development

Education

Sports Tech Research Centre are closely linked to the engineering program in mechanical engineering at Bachelor's and Master's level at the Mid Sweden University. During the education, students have opportunity to work in the various labs often in cooperation with industrial and outdoor companies, for example during the degree project.



Corporate collaboration

By cooperating with Sports Tech Research Centre, companies and organizations can gain access to the labs and work with researchers and research engineers to develop and test products and materials.

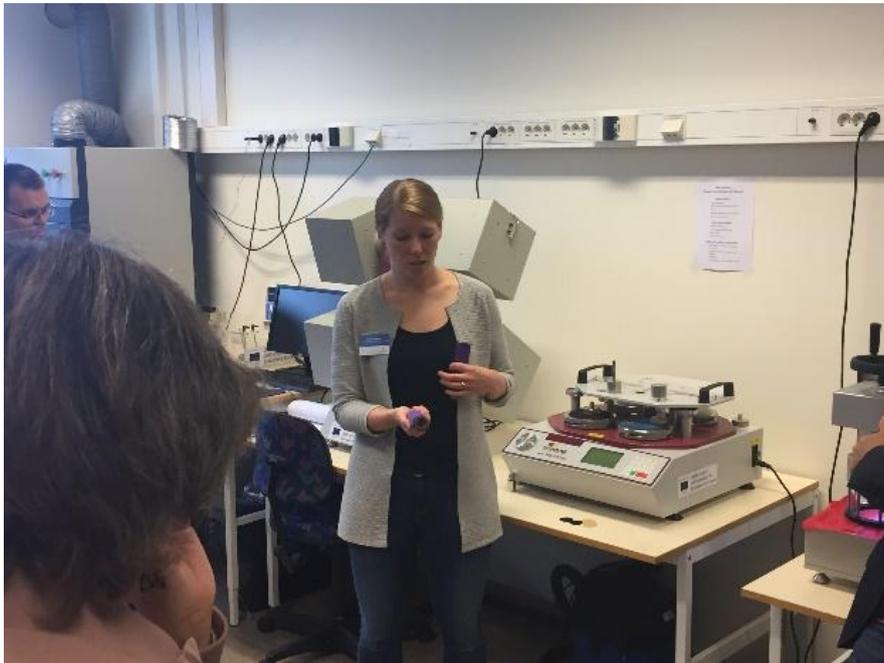
Labs

- Wind tunnel

The wind tunnel houses one of the largest treadmills in the world, an enormous fan and advanced climate function which enables study the impact wind, moisture and movement has on materials, products and humans in interaction with equipment. All were given the opportunity to experience the force of the wind inside the tunnel. It was popular and some entered the tunnel several times. Today, the tunnel is mostly used to test sports and outdoor equipment, however it would just as well be used to test new construction materials for buildings.

- Additive manufacturing - 3D printing

The lab can produce prototypes and small series productions using, among other things, 3D printers for plastic and metal. It allows ideas and prototypes to be tested and refined before they start manufacturing.



- Materials testing

The lab has several machines to test realistic load of different materials and products, among other things apply water pressure to materials to check its waterproof ability, abrade it with sandpaper to simulate harsh wear, or tear the it apart in freezing temperatures and study the changes in material properties.

Kajsa Nilsson told us about how the lab is used by both companies and students and that they often cooperate. For example, Kajsa Nilsson was a student herself at the Mid Sweden University some years ago. She collaborated with the local company Woolpower which produces woolen clothing. She developed a new material of wool that can be used to carry wool soles.

We discussed how wool can be used as an insulation material and that wool is a common waste product from food production. Some sheep species provide good milk but have wool that is not suitable for clothing.

Storsjö strand

Ecological and social sustainability has been the key words during the development of the Storsjö Strand area. In 2009 the municipality of Östersund received a grant from the state which made it possible to move towards a more sustainable and innovative spatial planning. The municipality started a project which aimed to develop working methods and processes, two outcomes of this work were a Sustainability program based on the BREEAM certification system and a Design program. Similar planning processes sustainability programs could be developed for retrofitting an area with older buildings.

These documents contain requirements that take more environmental considerations than legal requirements. The documents were formulated in such a way that they could easily be converted into contracts. These contracts have since been signed by developers who wanted to buy the land and build houses there. In this way, the urban development project has contributed to greater consideration for the environment.

The group were shown around the construction site by Karin Söderberg from Östersund municipality and Gabriel Duvenskog from Persson Invest (developer).



The group was also shown around one of the apartments by a tenant, who welcomed everyone into his home. He told the group how pleasant the apartment is to live in when it is made out of wood, as it is very quiet and has great indoor climate.



5 Good practices

The key innovative aspect of BUILD2LC is its multidisciplinary approach, that counting on different complementary expertise at local (Gloucestershire County UK, and Gorenjska SI), regional (Andalusia ES, Rzeszow PL, Croatia and Jämtland Region, SE) and national (Lithuania and Croatia) level, will allow achieving the project goals.

The project achieves its objectives based on a complete learning process to facilitate an effective knowledge flow among regions, with a bottom-up approach methodology, counting on the regional stakeholder groups.

Regions and countries participating in the project identify Good Practices categorized in the four topics addressed by the project. For the BUILD2LC project purposes we consider the definition for Good Practice according Interreg Europe Programme:

Good practices is defined as an initiative (e.g. project, process, technique) undertaken in one of the programme's priority axes which has proved to be successful in a region and which is of potential interest to other regions. Proved successful is where the good practice has already provided tangible and measurable results in achieving a specific objective. Although the Interreg Europe programme primarily refers to good practices, valuable learning also derives from bad practices where lessons learnt can be taken into consideration in the exchange of experience process.

There is no limit on the number of good practices to be collected among the consortium members. As a requisite, a total minimum number of 70 shall be collected, an average of 10 for every region.

Hereinafter we present the compilation of Good Practices for the topic: **Innovation**. A Good Practice can potentially match several topics at the same time. **24 Good Practices** in topic the have been collected among all the partners.

GOOD PRACTICES IN THE TOPIC 'INNOVATION'	
ANDALUSIA	
A6	Manantia: A+ eco-business building with Andalusian patio concept
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PODKARPACKIE	
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P4	Podkarpackie Low-Energy Consumption Technologies Transfer Centre's Passive House
CROATIA	
C1	Reconstructed public buildings in City of Zagreb under the ZagEE project
C4	Monitoring and verification of energy consumption and achieved savings through Energy Information System - ZagEE project; Error! No se encuentra el origen de la referencia.
C6	Development of buildings stock register – ZagEE project
C7	System for monitoring, measuring and verification of energy savings (SMIV)
C9	Croskills: Lifelong training plan for building workers
C11	Bračak Energy Centre
JÄMTLAND HÄRJEDALEN	
J3	Heating control with forecast
J7	Zerooil – with bio oil – a region without fossil heating oil
J10	Sports Tech Research Centre
SLOVENIA	
S6	Education "European Energy Manager - EUREM"
S7	Complete renovation of apartment buildings - System Dominum
REST OF EUROPE	
O2	Solar thermal installation- ESCO model

GOOD PRACTICE FICHE Region: Andalusia	
Title of the good practice:	A6. Manantia: A+ eco-business building with Andalusian patio concept
Partner region:	Andalusia
Location data	Granada, Andalusia
Topic of the practice: <ul style="list-style-type: none"> o Innovation 	
Description of the practice <p>Manantia Ecobusiness Centre is a “A+” energy performance office building in Granada, Andalusia, Spain. The design strategy was conceived to meet three fundamental requirements:</p> <ol style="list-style-type: none"> 1. Comfortable workplace. 2. Program flexibility. 3. Respect for the environment. <p>The basic design was based on the typically Andalusian central patio, inspired in the Arabic architecture of Alhambra palace, as a source vertex. This is a contemporary approach of the Andalusian traditional terraced patio house. Among other strategies, the patio is the climatic “heart” of the house and acts as a climate regulator element, useful both in winter for heating and summer for cooling purposes. The patio ensures natural lighting to all areas of the building as well.</p> <p>Granada has a typical continental-mediterranean climate, with hot and dry summers and cold winters. As a medium dry place, temperature differences along the day can reach up to 20°C.</p> <p>Other strategies implemented to ensure maximum energy efficiency and use of resources are:</p> <ul style="list-style-type: none"> • Design according to LID (Low Impact Development), appropriate guidelines for the optimal use of solar energy, wind studies and acoustic-sound techniques. • Water resources: reuse of water and gray water treatment, efficient gardening equipment. Consequent reduction in water consumption. • Energy and pollution: reducing the emission of greenhouse gases, optimization of energy efficiency, use of renewable energy, heating and cooling active and passive systems, green roof and tempering indoor temperature by usage of water bodies. • Resources and materials: use of certified materials low environmental impact. • Indoor environmental quality: efficient optimization of ventilation systems, control of pollution, thermal comfort enhancement, natural light maximization and high performance artificial lighting regulation. • Integrated building control system. 	
<div style="display: flex; justify-content: space-around;">   </div>	
Main features	

GOOD PRACTICE FICHE Region: Andalusia

- More than 1.500 m² living surface and a 1.000 m² green roof.
- The central patio has four water sources as thermo-regulators, inspired in the nazarí-arabic Alhambra palace fountains.
- The green roof, which is in fact an urban orchard, reduces the cooling needs in summer by 15% thanks to a low transmittance factor, $U=0,33 \text{ W/m}^2\text{K}$. Plants are typically Mediterranean with low water demand.
- Raw materials come from local sources when possible. For example, the façade material was extracted in a nearby marble quarry (Sierra Elvira), patio timber has a green sustainable source certification and some wall materials were reused and recycled from other construction works.
- Sun blockers to create shade, mainly to avoid direct sunlight to the windows in summer while letting the sunshine in winter.
- Grey water (waste waters from basins) treated onsite to satisfy the own building gardening requirements.
- Underfloor heating and cooling based on high-performance very low enthalpy geothermal energy (geothermal heat pump – ground source heat pump) dwelling 127m depth – 12°C constant temperature along the year.
- Ventilated facade to optimize heat intake with different performance depending on the season.
- Free cooling when possible based on high ventilation usage.
- Solar water heating.
- Efficient and healthy lighting.
- SCADA integrated building control system.

Most of these features can be directly implemented in existing buildings.

Performance indicators linked to the practice

- Number of households with improved energy labelling: 1
- Number of households with improved energy consumption classification: 1
- Number of households engaged in support programmes: 1
- Annual energy savings in households: 450.000 kWh
- Reduction of the use of fossil fuels in the building sector: 78%

Indicators of success linked to the practice

The Manantia Ecobusiness Centre performance has been tested during 2013-2015 showing a perfect matching with the previously estimated performance. The building consumes around 12.000 kWh on a monthly basis compared to the 55.000 kWh of the reference ordinary building (+450.000 kWh saved every year). This way, the granted A+ performance has been confirmed.

The consumption profile shows that more than half of the energy demand comes just from simple ventilation and transport of air much more than heating and cooling needs, which would be quite abnormal in ordinary buildings, where heating and cooling are the main power consumers.

- The total building cost sums up to 780.840 € (517,11 €/m²) compared to an ordinary reference building that costs 411.257 € (272,35 €/m²), +90% extra cost.
- Pay-back period is estimated in 7-8 years compared to the reference ordinary building.
- IRR > 10% (Internal Return Rate) after year 15.

The project was jointly conducted by *Otero Construcciones* company (Manantia is its company's headquarters and acts as their lighthouse onsite project) and Ayllón Engineers. The project enhanced the professional qualification of both companies and helped to enlarge the catalogue of successful sustainable projects.

GOOD PRACTICE FICHE Region: Andalusia	
Total affected surface: 2.890,92 m ²	
Evidence of success	
<p>Manantia reduces the energy consumption from 219,55 to 47,90 kWh/m², -78,2% compared to a benchmark building and a very similar reduction in CO₂ emissions.</p> <p>According to the Spanish National Energy Efficiency Action Plan 2011-2020, the tertiary sector (offices, commerce, services, excluding domestic uses) demands 45% of electric power supply in Spain, taking administrative and office buildings half of the demanded electric energy¹. Any serious strategy to reduce the power demand to gain energy efficiency at national level should focus on the main consumers: offices and administrative buildings.</p> <p>Thermal comfort in Manantia is much better than in ordinary buildings and increase productivity at work and quality of working life. This reduces health problems and ergonomic problems for workers and costs regarding work sick leaves for the companies.</p>	
Factors that might hamper the transfer	
<ul style="list-style-type: none"> • Buildings sustainable design depends completely on the local weather profile. Therefore, it shall be done taking carefully into account the local climate. • We do not recommend transferring completely this model except in similar climates (from Mediterranean to Continental climate). On the other hand, some features are fully transferable as an example of innovation regardless of the type of building or the local climate. • Initial larger investment could hamper the transfer. Though equipment related to sustainable building requirements is getting cheaper, A+ buildings demand higher investment costs that need to be financed. Fortunately, private banks seem to be lately more sensitive to finance “green projects”. • Some renewable sources are not available depending on the region. We recommend considering other equivalent solutions to gain similar results. For example, if solar radiation is low, using biomass for heating water. 	
Time required to complete the BP	1 year
Contact details to obtain further information on the practice	
Contact name	Joaquín Villar
e-mail	joaquin.villar@juntadeandalucia.es
Organization	Andalusian Energy Agency
Type of Organisation	Regional public government energy agency
Website	www.agenciaandaluzadelaenergia.es/know-the-agency http://www.construccionosotero.com/en/2011/08/22/manantia-eco-business-centre-in-cortijo-del-conde-business-park-in-granada/
Fiche completed on date:	9 August 2017

¹ <https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive/national-energy-efficiency-action-plans>

GOOD PRACTICE FICHE Region: Andalusia	
Title of the good practice:	A7. Shallow Geothermal Heating and Cooling at the Parliament of Andalusia
Partner region:	Andalusia
Location data	Andalusia
Topic of the practice:	
<ul style="list-style-type: none"> ○ Innovation 	
Introduction	
<p>The Andalusian Parliament is the legislature of the Spanish Autonomous Community of Andalusia. The seat of the Andalusian Parliament is located in Seville, the capital city of Andalusia. Its building is the former historic Hospital of the Cinco Llagas (Five Wounds Hospital). Built as soon as in 1546, and used as a hospital until 1972, this large building was retrofitted to be the seat of the Andalusian Parliament from 1992.</p> <p>Sevilla has a Mediterranean-oceanic climate with short mild and wet winters and long, hot and dry summers, being probably the hottest spot in Europe. Cooling needs are essential but heating is very necessary also.</p> <p>Description of the practice</p> <p>Heating and cooling needs of the Parliament are assisted with a geothermal shallow energy installation (very low enthalpy geothermal energy) by exchanging heat with underground shallow waters. This practice is an example of the availability of incorporating high technology to historic and heritage buildings. It is a safe and eco-friendly method of extracting heat from underground water (or bedrock) in order to heat or cool buildings.</p> <p>The water reservoir lies 10-20 meters above the ground at a very constant temperature of 18-22°C along the year. This temperature stability is critical for a high performance. This way, the water reservoir acts as a “seasonal heat reservoir”, giving back away in winter the heat injected in summer. Standard air-based heat pumps, on the contrary, operate poorly during heat waves that raise temperatures above 40° every summer.</p> <p>Exchange of heating is based on water-water transference with the underground body waters, much more efficient than the normal air-air model from standard heat pumps, and no water consumption (close circuit). Heat is extracted from underground waters in winter (18°C underground water temperature, +5°C typically outdoors) and re-injected in summer (22°C underground water temperature, +40°C typically outdoors). The reservoir intake is separated 150m from the re-injection zone to assure a very constant temperature and, therefore, avoid the thermal depletion by assuring a regenerative cycle.</p> <p>Most of these features can be directly implemented in existing European historic buildings.</p>	
Performance indicators linked to the practice	
<ul style="list-style-type: none"> ○ Number of households with improved energy labelling: 1 ○ Number of households with improved energy consumption classification: 1 ○ Number of households engaged in support programmes: 1 ○ Annual energy savings in households: ○ Reduction of the use of fossil fuels in the building sector: 	

GOOD PRACTICE FICHE Region: Andalusia	
Indicators of success linked to the practice	
<ul style="list-style-type: none"> ○ This solution assures high comfort and energy savings compared to standard HVAC alternatives. ○ The geothermal facility saves energy both in winter and summer due to the energy demand reduction, but also because in medium seasons (spring and autumn) there is simultaneous production of both heating and cooling. The thermal devices can produce 7°C and 45°C water at the same time at the same machine, avoiding the use of chillers and boilers. ○ Optimal zone mapping thanks to the decentralised fan-coils network that reduces pump power needs. ○ External extreme temperatures do not affect the coefficient of performance of the heat pumps because the water reservoir keeps a stable temperature. ○ Sensible water savings compared to standard air-air HVAC alternatives that need evaporative cooling in a typically dry Mediterranean zone. 	
Evidence of success	
Factors that might hamper the transfer	
<ul style="list-style-type: none"> ○ Availability of an underground water reservoir. Nevertheless, a bed rock model could work in its absence. ○ Initial larger investment could hamper the transfer. Though equipment related to sustainable building requirements is getting cheaper, it demands higher investment costs that need to be financed. Fortunately, private banks seem to be lately more sensitive to finance “green projects”. ○ Heritage restrictions on historical buildings. ○ Environmental regulation on drilling works and underground water bodies. 	
Time required to complete the BP	1 year
Contact details to obtain further information on the practice	
Contact name	Joaquín Villar
e-mail	joaquin.villar@juntadeandalucia.es
Organization	Andalusian Energy Agency
Type of Organisation	Regional public government energy agency
Website	
Fiche completed on date:	9 August 2017

GOOD PRACTICE FICHE		Region: Andalusia
Title of the good practice:	A8. Technological Corporation of Andalusia: regional RTDI funding Public-Private Partnership	
Partner region:	Andalusia	
Location data	Andalusia	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> ○ New financial instruments ○ Innovation 		
Description of the practice: <p>The Technological Corporation of Andalusia -CTA- is a Public-Private Partnership (PPP) established in 2005 by the Andalusian Regional Government, as an instrument to:</p> <ul style="list-style-type: none"> • Create a joint collaborative platform to integrate Research Institutes, University Researchers, Innovative Companies, Banks, Saving Banks, Institutions, and Regional Government. • Identify knowledge and technology capabilities and requirements from companies and research groups. • Promote and fund R&D and Innovation projects which results in commercial products and services. <p>CTA's goals are to facilitate the transformation of Andalusia towards an economic region with greater added value and contribute to picture Andalusia as a competitive region in strategic R&D and Innovation areas facilitating the attraction of economic wealth and technological resources. the transfer of knowledge and technology between Public Research Groups/ Centres and Companies, in order to generate economic and/or social benefits is, this way, essential.</p> <p>RTDI financing</p> <p>CTA finances R&D business projects which are economically or socially viable in sectors of strategic importance for Andalusia. Projects must subcontract at least 15% of their budgets to public. Projects are financed using their own funds and also help to seek additional funding from Regional, National and European funding sources.</p> <p>The innovation cluster</p> <p>CTA is a strategic partner for innovation. It helps businesses, universities, public authorities and other bodies to successfully achieve their R&D objectives and valorise the results. CTA supports an innovation cluster comprising 158 member companies regardless of their size or area of business and help them to successfully plan an overall strategy for innovation: from their R&D requirements and the formulation of projects to the search for business partners and the funding required to achieve their aims.</p> <p>Advanced innovation services</p> <p>Apart from managing innovation funding opportunities for their members, CTA is specialist in technology transfer and the evaluation of R&D.</p> <ul style="list-style-type: none"> ▪ CTA helps businesses, universities, technology centres, public authorities and other bodies to achieve the maximum results from their R&D initiatives and transform the results into wealth creation and concrete business activities. Preferential terms for member companies. ▪ The services provided include: strategic R&D advice; evaluation of innovative initiatives; support for the internationalisation of R&D; consultancy in processes involving Procurement of Innovation by Public Bodies; support for technology scouting and studies and reports concerning ad hoc innovation. <p>Strategic Activity Sectors</p> <ul style="list-style-type: none"> - Aerospace and Productive Processes - Agrifood - Biotechnology - Building and Civil Engineering 		

GOOD PRACTICE FICHE		Region: Andalusia
<ul style="list-style-type: none"> - Energy and Environment - Information and Communication Technologies - Leisure and tourism industry 		
<p>Construction Sector</p> <p>Given its importance for the Andalusian economy, construction and civil engineering is a traditional area of industry which could benefit considerably by adopting innovation to increase competitiveness. Sustainability is one of the key challenges facing a sector in which the principal areas of innovation include the use of intelligent technology in buildings and inhabited spaces (smart infrastructures; Building Information Modelling – BIM, etc.), as well as the optimisation of the consumption of resources throughout a building’s entire life cycle (materials, energy) and the minimising of environmental impact.</p> <p>Examples of projects supported by the Corporation include the application of artificial intelligence to reduce the number of accidents in the sector, façades covered with highly efficient energy glass and the recycling of waste material to use as road asphalt.</p>		
<p>Performance indicators linked to the practice</p>		
<p>Indicators of success linked to the practice:</p> <ul style="list-style-type: none"> ▪ Funded projects: 625 ▪ 22% projects carried out in collaboration ▪ University Public Research Groups involved: 341 ▪ Total funds granted: 157 M€ ▪ Total projects budget: 474 M€ ▪ Sectors: <ul style="list-style-type: none"> ✓ Aerospace and Productive Processes: 126 ✓ Agrifood: 66 ✓ Biotechnology: 74 ✓ Building and civil Engineering: 38 ✓ Energy and Environment: 155 ✓ Leisure and Tourism: 26 ✓ ICT: 140 		
<p>Evidence of success.</p> <ul style="list-style-type: none"> • CTA pioneered their unique model for the transfer and development of regional innovation and their methods have attracted interest from governing bodies and institutions from other Spanish regions as well as from abroad. 		
<p>Factors that might hamper the transfer:</p> <ul style="list-style-type: none"> • CTA was a huge effort pioneered by the Regional Government. It is strongly advisable to establish a strong alliance among public sector, private sector, innovation actors and universities before. • The region needs some critical mass. We recommend to replicate a supra-regional /national if the region is not very populated. 		
Time required to complete the BP	2 years	
Contact details to obtain further information on the practice		
Contact name	Joaquín Villar	
e-mail	joaquin.villar@juntadeandalucia.es	
Organization	Andalusian Energy Agency	
Type of Organisation	Regional public government energy agency	
Website	www.agenciaandaluzadelaenergia.es/know-the-agency	
Fiche completed on date:	7 September 2017	

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
Title of the good practice:	G4. Cynefin	
Partner region:	Gloucestershire, UK	
Location data	Wales, UK	
Topic of the practice: Thematic coverage		
<ul style="list-style-type: none"> • Activation of demand and combating energy poverty • Innovation 		
Description of the practice:		
<p>Cynefin was a Welsh Government programme that aimed to explore new approaches to the delivery of long term improvements to community well-being across Wales. It broke away from the traditional competitive, style delivery models for community development, driven by targets and reporting, and aimed to engage and collaborate with communities and across sectors to share services and goals.</p> <p>The Cynefin project covers a very wide range of projects including:</p> <ul style="list-style-type: none"> • <i>Stronger Resource Efficiency for desirable communities: How local innovation in asset stewardship ensures a green and prosperous economy</i> • <i>Tackling poverty</i> <p>All details can be found: http://www.cynefinwales.org.uk/resources.html</p> <p>The Cynefin programme was built around three main aims:</p> <p>Place –to deliver real improvements to the wellbeing and quality of life of people in deprived areas, through engagement, involvement and empowerment of communities to develop sustainable place-based projects.</p> <p>Process – to explore and support novel ways of working and to demonstrate how cross sectorial working and creating new partnerships could inspire creative solutions to deeply engrained issues.</p> <p>Policy – to provide evidence and real-time learning about delivery, policy barriers and policy drivers to inform local and national policy development.</p> <p>Cynefin employed eleven “Place Coordinators” who each engaged with a deprived community in Wales. Within these communities, the Place Coordinator:</p> <ul style="list-style-type: none"> • facilitated the community to build a shared vision for what was needed to improve the quality of life in their area • facilitated collaboration between the existing organisations, service delivery agents, third/private sectors and residents, to work together to come up with creative solutions • provided real time feedback and learning into the programme and policy development <p>Evaluation and active learning was built into Cynefin from the outset. The programme managers worked alongside an independent research and strategy consultancy to develop a learning framework to capture the multiple benefits and added value of the Cynefin ways of working, which was reported on a quarterly basis following feedback from Place Coordinators, stakeholders and management. This pioneering evaluation process allowed continuous flexibility to make changes throughout the programme and to feedback to policy makers.</p>		
Programme management and governance		
<p>The Cynefin management team consisted of representatives from Severn Wye and Welsh Government, who worked together to enable real-time information flow and learning. In addition, a Place Leadership and Advisory Group was established to both steer and share learning from and with Cynefin, which brought together academics, local authorities, and senior practitioners already working in a place-based way.</p>		

GOOD PRACTICE FICHE

Region: Gloucestershire, UK

Strengths

- The programme had no predetermined targets; to ensure that the work in each area would arise from engagement and dialogue with all community stakeholders.
- The Place Coordinators did not deliver community projects but instead facilitated collaboration, built capacity and empowered communities to take on projects themselves.
- As independent facilitators, Place Coordinators have been able to identify duplication and synergies between service providers and to bring them together to work in an integrated, collaborative manner.
- By involving the community and stakeholders throughout the process, a sense of ownership of work streams, services and assets is created, which ensures that continuance of projects is more likely to be achieved.

Weaknesses

- Small grants to support community engagement activities, pilots or to collect local data may have allowed early investigations of work streams to progress more rapidly
- Phased funding of the programme (based on results) particularly at early stages did not support the transformational change and long-term approach required to tackle deep issues in a sustainable way, beyond the initial 1st year trial the additional 2 years was beneficial but in reality this type of programme requires a minimum of 4 years funding.

Lessons learned

- Early engagement with all stakeholders is essential to build long-lasting relationships
- Creating a shared vision and mandate between all stakeholders and then empowering all to take action is necessary
- Independence from specific programmes, funders or vested interests but with high level government backing was essential.
- Permission to challenge the status quo and roam across public sector silos was required to provide creative and joined-up solutions to complex issues
- Trusting, responsive and constructively critical management was needed to support the delivery officers this also required flexibility from the funders and the space and freedom for delivery officer to be responsive to place context

Performance indicators linked to the practice

- **Number of households engaged in support programmes: 3899 residents**

The monitoring approach consisted of a narrative account based mainly on qualitative evidence and case examples, produced as a quarterly report by an independent consultancy firm. This was supported by a set of 11 cross-cutting indicators that covered a range of place and process outcomes.

Indicators of success linked to the practice:

The quantitative data showed that, by mid-March 2016, Cynefin had: catalysed 59 workstreams (although some had become inactive) and over 270 new working groups, networks and partnerships; actively engaged more than 10,000 individuals and organisations; secured over 38,000 hours of time for Cynefin-linked activities from individuals and organisations (including public sector bodies); unlocked over £1.73 million of funding; and enabled over 2600 community members and professionals to receive mentoring and training. Several places were waiting to hear the outcome of funding applications and therefore the final figure for funding secured for Cynefin-linked activities will ultimately be higher.

3899 residents were actively involved in Cynefin-linked activities. This rose from 541 in the first quarter to 3899 by the end of the fifth quarter. 8097 hours were contributed to activity with residents. £2670 was directly linked to residents whilst the majority of funding went to charities and the public sector to support residents.

Evidence of success.

Cynefin was able to feed into the development of National policies, including the Environment Act,

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
<p>Public Health Bill and Wellbeing of Future Generations Act. Communities were empowered to take action to improve quality of life and wellbeing in their places.</p> <p>Public Sector bodies were trained and supported to understand and consider new ways of working internally and within their communities. This acted as a forerunner to the 5 Ways of Working they are now required to demonstrate under the Wellbeing of Future Generations Act – Involvement, Collaboration, Long-Term, Integration and Prevention.</p> <p>One of the key elements of Cynefin was that success was not defined by hitting KPIs and targets – when you measure a piece of work by predefined targets and measures that’s what you get but it doesn’t always actually deliver the changes you need. Cynefin was about understanding what was needed for the people in those communities and helping them to achieve that – we were most accountable to those we were supporting and not those measuring our performance. The best evidence of success therefore comes directly from them.</p> <p>See communities telling us themselves why and how Cynefin worked for them at http://www.cynefinwales.org.uk/resources.html#collapse-869</p>		
<p>Factors that might hamper the transfer:</p> <p>Cynefin was an entirely new way of working for community developers, managers, evaluators and funders. The approach developed throughout the 3 years and required commitment, bravery, training and support for all. Now we understand how it worked and why we have a reasonable understanding of the critical factors/ Whilst many of these can be factored into delivery e.g. flexible targets, funding structures, engagement training etc., many factors are also related to behaviour, ethos and approach. This approach requires a high level of trust, willingness to take risk and learn from failure.</p>		
Time required to complete the BP	3 years	
Contact details to obtain further information on the practice		
Contact name	Simone Lowthe-Thomas	
e-mail	SimoneLT@severnwye.org.uk	
Organization	Severn Wye Energy Agency	
Type of Organisation	Independent, not for profit sustainable energy education charity	
Website	www.severnwye.org.uk http://www.cynefinwales.org.uk	

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
Title of the good practice:	G5. Target 2050	
Partner region:	Gloucestershire, UK	
Location data	Stroud Local Authority area, UK	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> • Activation of demand and combating energy poverty • Professionalization of the construction sector • Innovation • New financial instruments 		
Description of the practice: <p>What was the reason for commissioning the project?</p> <p>Stroud District Council were aware that there was a need to increase the rate of retrofit in their properties in order to meet the 2050 carbon reduction targets. As many buildings in the district are old and there is wide range of property types, many existing households did not fit the standard retrofit options available so uptake of incentives was not as high as it could be. This also applied to businesses and community buildings which were facing financial pressures and were important hubs for the community both socially and economically. As a result, Stroud District Council commissioned Severn Wye Energy Agency to complete the Target 2050 project. The name was inspired by the headline National target for a 60% reduction in carbon dioxide emissions on 1990 levels by 2050.</p> <p>What is Target 2050?</p> <p>A programme of local activity which was developed to complement what was provided through the market and/or national programmes. This consisted broadly of:</p> <p>Target 2050 Homes: Development of a targeted approach to achieving deep carbon cuts in existing homes.</p> <p>Target 2050 Business: Bespoke advice for SMEs, with on-site surveys and action plans. This was designed to complement the Carbon Trust provision by targeting those whose annual energy spend was below their threshold for face-to-face support.</p> <p>Target 2050 Community Buildings: On site surveys, advice and help with finance for measures to improve energy efficiency and promote renewables in community buildings.</p> <p>The programme also incorporated completion of the Eco-Management Scheme (EMAS) for the local authority's own operations and support for development of forward-looking planning policy through mapping of heat loads and resources for renewable energy against housing needs.</p> <p>How did Target 2050 Homes work?</p> <p>The project aims were:</p> <ul style="list-style-type: none"> ○ Providing an effective framework for significantly reducing carbon emissions for the domestic sector ○ Providing a significant range of examples of how existing technologies might be used to achieve deep carbon cuts in existing homes, while preserving built heritage and character ○ Stimulating the local market for sustainable energy retrofit ○ Alleviate fuel poverty by 'future-proofing' local homes ○ Enabling local suppliers to participate in this area of economic activity <p>The main features of the programme were the development and delivery of:</p> <ol style="list-style-type: none"> 1. An <i>expert advice programme</i> to support whole house sustainable energy retrofit. This included a home survey, a report and follow-on support. 2. Ongoing support for an <i>installer network</i> covering a range of relevant technologies with an inclusive, capacity building ethos. Installers were provided with support, networking events and advice through events, meetings and newsletters. All installers had to be accredited to named 		

GOOD PRACTICE FICHE

Region: Gloucestershire, UK

organisations and were able to explain the financial support mechanisms in place as part of their work, increasing the benefits for both consumer and installer.

3. A *set of case study homes*, broadly representative of the range of building types in the area, to illustrate the barriers and solutions to achieve deep carbon cuts through sustainable energy retrofit. 23 from 200 homes were selected based on a clear set of criteria. Each home had a full energy survey, an action plan, support to install as many measures as possible during the project including applications for grants where applicable. Up to £6000 additional support towards the cost of measures from a dedicated fund was also available. Low income households were able to apply to another allocated local authority fund to largely, or completely, cover the cost of installations.

The participating households Monitored their energy use and provided meter readings to the project team. They also took part in a behavioural change programme and had regular contact with the project team and each other through meetings, events and a website.

A further 37 exemplar homes have been developed through the extension of the Stroud Target 2050 approach into neighbouring areas.

4. An *effective communications programme* to make knowledge and experience available throughout the community. The behavioural change programme aimed to complement the core advice service through:

Feedback: Enabling and encouraging households to monitor energy use, to see what they have (or have not) achieved and take further action. Participating households were asked to log energy use on a monthly basis and this was fed back to them annually. More immediate feedback was to be provided through a locally-developed energy monitoring system known as “EMU” (Energy Monitoring Utility).

Peer group support: Motivating households to maintain energy saving behaviour through interaction with the other households in the group, developing a sense of being part of a club, and physically enabled via the project website, newsletters, social gatherings and events.

Sense of agency: A term sometimes used with regard to pro-environmental behaviour, in that if people feel empowered that they CAN make a difference if they make certain decisions, then they are more likely to do so.

5. A *pilot PAYS (Pays As You Save) loans programme*, to test consumer interest in this approach and learn practical lessons about delivery. During the final year of the programme the opportunity arose to join the Department of Energy and Climate Change Pay As You Save (PAYS) pilot, and Stroud District was one of just five pilots selected. It was relatively straightforward to apply the approach to the Target 2050 programme, as the appropriate partnership was already in place, together with a relevant advice approach with the requisite quantification of potential savings, and an installer group covering the necessary technologies. The District Council Environmental Health team adapted their grants and loans programme to meet the needs of a long-term loan repaid in monthly instalments, alongside the Council tax billing system, and put the necessary legal framework in place. A charge was registered against the property on the Land Registry to provide security for the loan in case of change of ownership. The PAYS loans programme was used in combination with bespoke advice about other grants and funding mechanisms available. This created a trusting relationship and avoided homeowners feeling overwhelmed.

How did Target 2050 Community Buildings work?

The project’s main focus was to ensure the uptake of energy efficiency and renewable energy measures in all participating community buildings, creating a number of ‘exemplar’ halls that demonstrate that an energy-efficient hall is a better asset to the community, a more viable business opportunity and can act as a catalyst for change across the community.

Support, advice and an on-site energy audit plus written report was offered to 30 Stroud District village halls and community buildings over the two years on a ‘first come, first served’ basis.

Severn Wye contacted all halls in the district in Year 1 and invited them to fill in a short application form. The first 10 eligible applications received were offered a full energy audit in Year 1 with remaining halls being put through to Year 2 when another recruitment campaign was carried out to fill the remaining places. All participating halls were required to provide Severn Wye with at least one year’s worth of fuel bills prior to audit to help determine energy consumption patterns, check tariffs and any standing charges.

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Region: Gloucestershire, UK

Once a building had been accepted onto the scheme, Severn Wye carried out an on-site energy audit accompanied by a relevant member of the committee and/or caretaker. The walk-round survey examined all elements of the building fabric and heating systems and involved discussion with the hall representative regarding building history, hall user type and frequency, any heating or lighting control systems, how they are used in practice and any plans for the future. Severn Wye then produced an energy audit report designed to provide a useful, accessible, comprehensible summary of the main features of the building in relation to energy use.

The report then moved on to a section that provided a summary of the recommended actions that could be taken.

Severn Wye advisors remained available to the halls for ongoing support with the implementation of the projects. This further support included help with applications for funding, obtaining permissions, identifying installers, assessing quotes, preparing business plans and consulting with local residents and community members.

To assist halls with the installation of identified measures and technologies, Stroud District Council offered participating halls a capital grant towards the realisation of the project.

In Year 1 Stroud District Council made £20,000 available through the Target 2050 programme and £55,000 through a regeneration programme. Halls were able to apply for up to £3,000 without match funding but for amounts above £3,000 and up to the maximum of £35,000, match funding of no less than 50% was required. All grants in Year 1 were administered by the Council.

In Year 2 the grant level was altered due to reduced funding available and halls were eligible for up to £3,000 (max. 75% of total project costs) from a total grant pot of £30,000. Severn Wye took over the administration of the grants in Year 2. The audit reports included full details of complementary funding sources, both local and national, to which halls could apply for matching funds.

Where required, direct follow-up assistance was given with applications to organisations including the Gloucestershire Environmental Trust (which awards grants from Landfill Communities Fund monies), and other government, private sector and charitable funds.

At the time of the project, there was significant public grant funding available for renewable energy installations, principally the Low Carbon Buildings programme. This has since ended and been replaced by the Feed-In Tariffs.

During the second year of Target 2050 Community Buildings, Severn Wye organised a number of energy days and events when the participating halls could come together to discuss the issues they were facing in implementing their sustainable energy projects and any lessons learnt. This was useful in encouraging halls to work together especially as many were facing very similar challenges.

How did Target 2050 Businesses work?

The project had four key elements:

1. To fill the gap in service provision. Only businesses with an annual energy spend of more than £50,000 were eligible for free, face to face, energy saving support at the time the project commenced.
2. The essence of the project was to work with local SMEs to identify opportunities for them to reduce their energy consumption/CO2 emissions at the same time as reducing the rate at which their energy bills were increasing.
3. One very important aspect was to provide ongoing support up to the point at which measures were actually installed within businesses. To support this, a local sustainable energy installer network was established to deliver recommendations made in the energy reports.
4. The final element of work was to integrate this project with wider environmental support services available to businesses. By creating close working relationships with other service providers such as Business Link it was possible to achieve this.

The project proved very popular and successful. 120 Stroud-based businesses signed up to the scheme over four years with 93 receiving a full package of support.

The scope of this programme was developed from experience of two previous programmes: the Carbon Trust on-site support to larger businesses with an annual energy spend of more than £50,000, and the Carbon Trust/Energy Saving Trust partnership SME advice pilot, Action Energy ,

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which ran from 2002 to 2004.

In both cases it was the business that was left to interpret the energy report, identify the specific energy saving measures (specific type of lighting, motor, pump or boiler) and then find a quality installer to undertake the work. As a result, many businesses did not get to the point of implementing the measures recommended, and energy and carbon saving potential was not realised.

The Target 2050 business service provided:

- o free on-site energy surveys
- o a tailored report of findings
- o development of bespoke 'energy action plans' with each business
- o follow up support to research specific technologies
- o identification of qualified and accredited installers
- o help with reviewing quotes for works being considered

Initially our service was aimed at those businesses with an energy spend of £5,000-£50,000. As the project progressed, this was broadened to be available to businesses with an energy spend of less than £5,000 at the request of the Federation of Small Businesses and other partners.

At first it was difficult to recruit businesses to the scheme with many companies appearing suspicious of an unknown agency approaching them. However, working with known and trusted organisations such as Business Link and the Council has greatly increased the number of companies joining the project.

The top five measures installed by Target 2050 businesses were:

1. Improved monitoring of energy use
2. Development of an energy policy
3. Installation of more efficient lighting
4. Increase in levels of draught proofing
5. Undertaking competitive tendering for utilities

Performance indicators linked to the practice

- o Number of households with improved energy labelling
- o Number of households with improved energy consumption classification
- o **Number of households engaged in support programmes: 102 (see overleaf)**
- o (%) Reduction of annual primary energy consumption in public buildings
- o **(kWh) Annual energy savings in households: 70,290 kWh/year energy savings**
- o Number of households with improved energy consumption classification

Indicators of success linked to the practice:

What were the key outcomes of the Target 2050 Homes project?

- o The surveys indicate the potential to achieve an average annual reduction of 58% in CO2 emissions, 57% in energy consumption and £960 on fuel bills, by applying known and available measures
- o **102 of the households surveyed are known to have gone on to install energy saving measures which could reduce their energy consumption and carbon emissions by an average of 24%, and their fuel bills by £406**
- o Of the 50 case study homes, the ten with the greatest savings potential as a result of the measures already installed could achieve carbon savings of 41-74%, energy savings of 22%-70% and fuel bill savings ranging from £186 to £2,160
- o The top ten homes all addressed heat loss in one form or another. Five of them switched their main heating fuel and a further four improved the efficiency of their heating by replacing their gas or LPG boiler
- o Between £14,000 and £47,000 was invested in each of the top ten homes
- o No obvious direct correlation was found between the amount of money spent and the carbon savings achieved, due mainly to the wide variation in practical opportunities for improvement, as well as differing priorities and restrictions for each household.

What were the key outcomes of the Target 2050 Community Buildings project?

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The project results show a significant uptake of a wide range of measures including:

- Fifteen lighting and glazing upgrades – these are relatively straightforward measures that can be usually installed within the £3,000 Target 2050 grant
- Six upgraded heating systems and controls – for halls that are on mains gas, upgrading to a more efficient boiler with proper controls is very often the most cost-effective solution
- Three solid wall and sloping ceiling insulation measures – it is very encouraging to see some of the halls tackling the difficult issue of insulating solid walls and sloping ceilings. The capital grant was key to these going ahead
- Three ground source heat pumps, five new solar PV systems installed or approved, and a solar thermal hot water system helping halls to generate renewable energy and reduce costs into the future

The savings made during the project were:

- 70,290 kWh/year energy savings
- £4938 cost savings
- 28.6 tCO₂/year carbon savings
- £105,210 lifetime cost savings (based on 2008 energy prices)
- 630 tCO₂ lifetime carbon savings (assumes 60% of units exported; benefits quantified are savings only)

A small number of halls used the opportunity to obtain capital grants and technical support to install several measures simultaneously as part of a significant refurbishment. These became the 'exemplar' halls and continue to be a source of inspiration and motivation to other halls and the wider community.

Several of these halls have been nominated for awards and all have reported lower bills and warmer, better-used halls and interest from users as to why and how the changes have been made. All of these halls were successful at using the Target 2050 capital grant to lever in significant resources from other funders.

Another key result of the project was the amount of external funding that has been 'levered in' to the district as a result of the programme. The grants and support offered by Target 2050 enabled these halls to apply for the remaining funds from a wide variety of sources. By May 2012, in excess of £191,000 was levered in by Target 2050 Community Buildings. The figure increased further once all projects were completed. The vast majority of this funding has been directed at local Target 2050 Installers' Network companies which have carried out the work. This has been of benefit to the local economy and increased the experience and portfolio of these local businesses.

What were the key outcomes of the Target 2050 Businesses project (2007-2011)?

- 1,300,000+ kWh of energy
- Cost savings of at least £99,500
- Saving of 490+ tonnes of CO₂ emissions
- 93 businesses accessed the full service
- 22 smaller businesses offered telephone advice only
- 46 businesses signed action plans

Evidence of success.

Target 2050 Homes

Target 2050 Homes has provided the basis for an effective longer term targeted approach to achieving deep energy and carbon cuts in existing homes, including:

- An advice approach and advisor experience in identifying and prioritising a range of energy and carbon saving measures in a range of house types, and with a range of households, including development of a tailored home energy report and provision of 248 detailed home surveys
- A significant range of 50 case study homes, illustrating what can be achieved and how, and the practical barriers and solutions encountered in applying solutions
- A model for dissemination through events and seminars, case studies, and 'open homes', raising awareness of the opportunities with both householders and installers

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- Stimulation of the market for sustainable energy retrofit through development of a local installer network, which now has over 100 members installing a range of energy efficiency and renewable energy measures
- An understanding of the costs and householder perspective on investing in improvements, and the practical issues as regards financial support mechanisms, through the experience of managing grants programmes and the PAYS pilot, and in supporting households in identifying finance and obtaining quotations for works

The overall conclusion is that there is significant value in moving forward with an integrated non-profit local partnership model which builds further upon these positive features. By extending this to neighbouring local authority areas, we aim to achieve some economies of scale while maintaining the benefits of local knowledge and a personalised service.

The evaluation of the PAYS pilots indicated householder preference for a programme led by public/non-profit providers that are commercially impartial, and the importance that they placed on practical knowledge and expertise. In the emerging market for sustainable energy retrofit, this depends upon an open and transparent sharing of experience, and a culture of continuous learning and improvement.

While a streamlined customer journey is a positive ideal, the value of allowing for multiple entry points to a service should be recognised, and to facilitate this it is important to engage all key actors and to ensure that communication lines remain open so that problems can be resolved as they arise.

Target 2050 Community Buildings

In addition to the outcomes shown above, the Target 2050 Community Buildings project demonstrated that the provision of bespoke and expert advice, coupled with capital funding, can kick-start community buildings into action and enable important improvements to be made quickly. Many halls are then able to build on these successes and lever in further funding to complete the transition into exemplar buildings that are cheap to run, nice to use and can encourage the uptake of sustainable energy measures in the wider community.

Since the completion of the project in Stroud, the approach has since been expanded to other areas, including Swindon, Wiltshire, the Forest of Dean, Wales and Herefordshire, with similar success.

Target 2050 Businesses

Further to the savings mentioned above, there was a 32% increase in Target 2050 businesses consistently checking energy bills against meter readings and 18% increase in businesses using actual meter readings rather than estimated readings when paying invoices.

The programme has helped almost 100 organisations to take a serious look at their energy use and their potential to generate renewable energy. The extensive follow-up support and advice provided ensured that the businesses went on and implemented a wide range of actions that have resulted in significant ongoing cost savings for many of these companies.

By reducing demand and increasing local renewable energy capacity, the Target 2050 project has helped local companies to be:

- more financially secure through difficult times
- less vulnerable to energy price hikes in the future
- more streamlined and self sufficient

The project also further boosted the environmental credentials of not only the businesses and installers involved but the whole of Stroud district.

The Target 2050 Business scheme has since been used to develop similar programmes in other districts, including future paid-for services where funding is not accessible. Following the project, Stroud District Council continued to offer a 50% subsidised service to their small and medium sized businesses.

Factors that might hamper the transfer:

The transfer of the **Target 2050 Homes** project to other partners is very possible providing the partnerships between active agencies are strong and planning is detailed. It is also important to

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consider the scope of area covered. The ideal programme should ensure that it is:

- tailored to the practical realities of the existing building stock and its complexity and imperfections
- designed to deliver to the real and multiple practical needs of households and home-owners
- able to engage with all key actors in the supply chain, and deliver to their needs
- intelligent, and can flex and develop as providers learn, markets develop, and external factors change
- open and transparent, allowing benefits

The transfer of the **Target 2050 Community buildings** project to other partners is very possible. However, partners should account for the fact that timescales for the implementation of measures in community buildings can be very protracted. The community buildings in the UK are run by volunteers working in their own time (often around work commitments) and with limited resources. Partners will need to account for this if the set-up is similar. The following key themes and learning points emerged from the project and would be worth considering in other partner areas:

- Help with simple behavioural change and better heating control usage is crucial
- Learning to deploy the 'sustainable energy hierarchy' when planning improvements
- Finding reputable installers
- Provide support in negotiating with planners, with regard to heritage buildings
- Communication with hall users and the wider community about the improvements
- Capital grants were vital in making small measures happen quickly, as well as enabling larger ones
- Critical under-utilisation of halls leads to very long payback times for some measures
- Improved halls report better utilisation, raising income and reversing the negative cycle
- Small savings make a big difference to constrained budgets

The transfer of the **Target 2050 Businesses** project to other partners is very possible, providing a number of factors are considered. For example, it is crucial that there are financial gains for the businesses concerned. It's also important to consider how businesses are engaged. The Target 2050 Business project took a while to take off until it was linked in via organisations that businesses trusted and used regularly. Once this happened, the uptake increased rapidly. Further points to consider are noted below:

- The private sector is driven by the need to generate profit and the reduction of overheads and running costs are critical to this objective. As a result there is often a healthy appetite amongst businesses to reduce energy costs although very often support is needed to identify the most effective options
- Giving detailed illustrations for the potential for year on year cost savings within the individual business energy reports was also key to achieving commitment to install measures from business owners
- Where capital investment was required for measures, particularly for those with longer payback periods, the availability of financial support mechanisms such as grants, loans and tax incentives greatly increased the likelihood of uptake.
- The focus on no-cost measures and especially improved monitoring proved very important – the end of project surveys showed a 32% increase in Target 2050 businesses consistently checking energy bills against meter readings and an 18% increase in businesses using actual meter readings rather than estimated readings when paying invoices
- The ongoing financial savings for local businesses involved are significant, with Stroud-based businesses now saving almost £100,000 on energy bills annually. This is money that would otherwise have predominantly passed out of the district to electricity, gas and fuel suppliers but is now helping these businesses to be more competitive and survive in difficult economic times.

It became apparent early on in the project that recommendations would be prioritised not solely on the basis of cost or saving potential but also on the wider business impacts. This shows that whilst businesses are prepared to consider energy saving initiatives, these will always be secondary to day-to-day priorities.

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
Time required to complete the BP	2-3 years depending on how many themes are completed	
Contact details to obtain further information on the practice		
Contact name	Neil Towler or Paul Sheridan	
e-mail	neilt@severnwey.org.uk or pauls@severnwey.org.uk	
Organisation	Severn Wye Energy Agency	
Type of Organisation	Independent SME and not-for-profit sustainable energy education charity	
Website	http://www.severnwey.org.uk/fileadmin/Resources/SevernWye/Publications/Target_2050_Homes - Report.pdf http://www.severnwey.org.uk/fileadmin/Resources/SevernWye/Publications/Target_2050_Community_Buildings - Report.pdf	

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
Title of the good practice:	G8. Link to Energy	
Partner region:	Gloucestershire, UK	
Location data	Gloucestershire, UK	
Topic of the practice: Thematic coverage		
<ul style="list-style-type: none"> • Activation of demand and combating energy poverty • Professionalization of the construction sector • Innovation 		
Description of the practice:		
<p>Severn Wye Energy Agency initially set up a local network of installers in 2007 recognising the need for a more holistic approach in delivering project funded energy efficiency improvements to householders, businesses and communities in the region, so as to ensure the maximum take up of installed measures. In 2011 this network of ‘Link to Energy’ installers were made more readily available to the public with the setting up of a new, user friendly website www.linktoenergy.org.uk</p> <p>Improvements and adaptations were made to the website in 2013 as part of the ‘Countdown to Low Carbon homes’ European project and again in 2015 to ensure that it was up to date with current website design and capability requirements.</p> <p>As of January 2017, The Link to Energy website has 122 registered installer members and 15 supply chain members. This will increase in line with secured funding to increase our support to SMEs through our European Structural Investment funded Target 2020 programme.</p> <p>Registered installer members are able to offer a full range of energy efficiency and renewable energy improvement measures to domestic, business and communities across Gloucestershire and South Gloucestershire. This includes everything from loft and cavity wall insulation to external insulation, gas boilers, heat pumps, solar panels and cooling systems for businesses.</p> <p>Supply chain members typically offer self-installed measures such as LED lighting and chimney balloons. It is also possible to view and order technologies such as solar batteries and heat batteries.</p> <p>Of the 137 members, the vast majority are based within Gloucestershire and South Gloucestershire. Each Local Authority area within Gloucestershire has installer or supplier members represented, ensuring that Local economies are benefitting from improvements being made to homes and businesses.</p> <p>The vast majority of Link to Energy members are SMEs with a small number of larger companies offering services in the area. These members are typically included to ensure that householders are able to access funding schemes such as the Energy Company Obligation (ECO).</p> <p>The Link to Energy website includes functionality that allows users to locate installers local to them. A postcode area or location can be entered providing a list of installers, the closest to them being at the top of the list. These results can be filtered by technology or measures and a contact form with the customer details and requests can then be sent to one or more of the recommended installers simultaneously. This generates an email to the installer and the project manager who then follows up with the installer or the client as to the outcome. Automated reminders are sent to both the installer and the client if the installer hasn’t been in touch within the agreed three working days.</p>		

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The Link to Energy website includes information pages and installer searches specific to businesses and community groups. This allows these organisations to locate and contact only those installers that can service their requirements. Case studies of local businesses that have made energy improvements can also be read or downloaded.

The domestic section of the Link to Energy website incorporates additional information including advice pages on:

- Installer accreditations
- Finding the finance
- Home energy assessments
- Home energy improvements
- Over 50 local case studies of homes that have made energy efficiency improvements
- Information and links to the Warm & Well scheme

The Link to Energy site also includes functionality that allows Severn Wye Energy Agency to report on the following:

- The number of enquiries sent by Local Authority area
- The total number of installations completed by Local Authority area
- Site visitor statistics and analytics
- The value of work completed by Local Authority area
- The numbers of technologies and measures that users are requesting quotes for

Regular networking and information events are provided to support all registered Link to Energy installers. These are held quarterly, though additional events have also been included when new incentives or funding schemes have dictated that more information would be useful to local installers, the launch of the Green Deal for example. Speakers and topics discussed at installer events have included:

- Updates on projects of interest from Severn Wye Energy staff
- Installer members promoting their own products and services
- External speakers covering areas of interest to local installers

Speakers have included representatives from:

- The Federation of Master Builders
- Local Authority staff
- Insulation and heating product manufacturers
- Sector skills body – construction skills
- South Gloucestershire and Stroud (SGS) College

Several funded training sessions for local installers have also been held in the region. This has included:

- External wall insulation manufacturer training
- Internal wall insulation manufacturer training
- 'Winning the Contract' understanding public sector procurement for SMEs

Installers are in regular contact with the scheme manager via email, telephone and during face-to-face meetings to ensure customer referrals are managed well and to pass on information relating to local, regional and national updates that may be of interest or relevance.

The Link to Energy website includes a section dedicated to installer members that incorporates the following:

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- An overview page for potential new installers and suppliers to learn more about the service
- A news and events page
- Useful information – this includes information specific to installers.
- A document library
- A Link to Energy Twitter feed

Future Link to Energy Service developments aim to include the following:

- A quarterly installer newsletter distributed to all members
- Research to understand the training requirements of local installers and to ensure that relevant and required courses are made available in the region
- The Development of existing relationships with bodies such as SGS College, the Federation of Master Builders and the sector skills councils to allow delivery of courses

The existing Link to Energy installer network database allows domestic, business and community customers to obtain quotations from installer members, and ultimately have improvement measures installed. The database incorporates an automated system that allows **Warm & Well** to determine the value of completed work and to request a referral fee from the installer where a lead has provided work to them. This referral fee has historically been set at 3% (+VAT) of the total value of the work completed. This rate allowed us to draw a small income whilst not penalising the installer. This avoids significant additional costs being passed onto the client.

The online installer database incorporates a number of reporting facilities that allow Severn Wye to report on completed job and referral fee values across the individual local authority areas, or for the region as a whole. These can also be broken down by domestic, business or community work.

Note: Links to other examples of good practice are shown in **bold letters**

Performance indicators linked to the practice

- o **Number of households engaged in support programmes: Link to Energy Installers have supported 353 households** as direct referrals from Severn Wye Energy Agency between April 2013 and April 2017. The value of these installations amounts to £1,333,297.40.
- o Number of households with improved energy consumption classification
- o (kWh) Annual energy savings in households
- o Number of households with improved energy consumption classification

Indicators of success linked to the practice:

Since 2013 over 1200 householders, businesses and community groups have used Link to Energy sending over 3000 enquiries to installer members.

Direct referrals from Severn Wye Energy Agency between April 2013 and April 2017 resulted in Link to Energy Installers supporting 353 households. The value of these installations amounts to £1,333,297.40.

Evidence of success.

In 2012, Link to Energy was selected as an exemplar service by the ‘Green Skills Alliance’ (made up of the UK Sector Skills Councils) for developing best practice around skills, training and innovation for the low carbon audience. A report was produced in 2014 detailing the Service provided at that time.

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
Factors that might hamper the transfer:		
<ul style="list-style-type: none"> ○ The time and finance required to design and launch an online portal that allows customers in a specific area to find and contact appropriate local accredited installers ○ The ongoing required management of the service to ensure the success of relationships made between installers and customers ○ The ongoing promotion of the site to ensure the service presence in the area it serves 		
Time required to complete the BP	1 Year	
Contact details to obtain further information on the practice		
Contact name	Neil Towler	
e-mail	neilt@severnwye.org.uk	
Organization	Severn Wye Energy Agency	
Type of Organisation	Private SME and not for profit sustainable energy education charity	
Website	www.linktoenergy.org.uk	

GOOD PRACTICE FICHE		Region: Gloucestershire, UK	
Title of the good practice:		G9. SustainCo (Sustainable Energy for Rural Communities)	
Partner region:	Participant Name	Country	
	Liaison Committee for Sustainable Energy (CLER) www.cler.org	France	
	(GERES) Groupe Energies Renouvelables, Environment et Solidarites	France	
	Severn Wye Energy Agency	UK	
	Caritasverband (CARITAS) Frankfurt, Germany -	Germany	
	Focus Association for Sustainable Development	Slovenia	
	Energy Agency of Plovdiv (EAP) Bulgaria	Bulgaria	
	Institute de l'Ecologie en Milieu Urbain (IDEMU)	France	
Location data		England and Wales	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> Professionalization of the construction sector Innovation New Financial Instruments (Cost Optimisation) 			
Description of the practice: <p>SustainCo supported the European vision for the energy performance of buildings, that by 2020 all new buildings should be nearly Zero Energy Buildings (nZEB) The SustainCo project aims to raise awareness of, and support development of, low energy building projects, with special emphasis on rural areas.</p> <p>SustainCo aims to increase the visibility of both new-build and renovation, with the aim of capacity and confidence building in the public sector. Activities included:</p> <ul style="list-style-type: none"> Development of Toolkits which focus on technical and financial aspects of nZEB in relation to energy efficiency and renewable energy usage. Promotion of nZEB case studies. Capacity building for energy professionals - development and hosting of a capacity building event and training for project developers including conferences, seminars, training and site visits. Support of nZEB Pilot Projects. Supporting Covenant of Mayors signatories in rural areas. 			
Performance indicators linked to the practice <ul style="list-style-type: none"> Number of households engaged in support programmes: 1278. 1274 households had support from the enquiry service. 4 households were used as domestic case studies and received energy advice and support. Number of households with improved energy consumption classification: 96. Up to 96 buildings only in UK were renovated and improved their energy consumption classification. (%) Reduction of annual primary energy consumption in public and domestic buildings Capacity building for energy professionals 			

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
Indicators of success linked to the practice:		
<p>The SUSTAINCO web-based technical and financial toolkits were developed to serve as guide on how to achieve nZEB standard in retrofit or new-build houses.</p> <p>Severn Wye produced five detailed case studies on nZEB buildings.</p> <p>In the UK, Severn Wye led three training events, one capacity building conference, and two workshops with study tours to nZEBs. These events built knowledge and capacity in relevant target groups (developers, architects, planners, etc.) on current and upcoming nZEB standards.</p> <p>During the lifetime of the project Severn Wye's SustainCo Advice Team facilitated more than 1300 enquiries with respect to advice on nZEBs.</p>		
Evidence of success.		
<p>Of the participants who attended events run by SustainCo, 94% were satisfied with the overall quality. 72% of participants were likely to change their current working practices.</p> <p>Average overall results of Case Studies in the project- households:</p> <ul style="list-style-type: none"> • Investment cost: 1 226 €/m2 • Primary energy need: 76,5 kWh/m2/a • Annually Heat Demand: 15 kWh/m2/a • Investment cost of RES: 124 €/m2 • Annual RES generation: 63 000 kWh/a (86% coverage Primary energy need) <p>Average overall results of Case Studies in the project – public buildings:</p> <ul style="list-style-type: none"> • Investment cost: 1 277 €/m2 • Primary energy need: 127 kWh/m2/a • Annually Heat Demand: 41 kWh/m2/a • Investment cost of RES: 82 €/m2 • Annual RES generation: 49 000 kWh/a (16% coverage Primary energy need) 		
Factors that might hamper the transfer:		
<p>Not all countries had a definition of what an nZEB is. It was important to research current government position and for the purpose of project we had to propose a definition for the UK.</p>		
Time required to complete the BP	36 Months	
Contact details to obtain further information on the practice		
Contact name	Sarah Dittmann	
e-mail	sarahd@severnwye.org.uk	
Organization	Severn Wye Energy Agency	
Type of Organisation	Private SME and not for profit sustainable energy education charity.	
Website	www.severnwye.org.uk	
Fiche completed on date:	09/03/2017	

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
Title of the good practice:	G10. Your Green Future (YGF)	
Partner region:	Gloucestershire, UK	
Location data	South West and Midlands, UK	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> • Activation of demand and combating energy poverty • Professionalization of the construction sector • Innovation 		
Description of the practice: <ul style="list-style-type: none"> ○ <i>Education of young people and inspiring them to pursue jobs in the green sector, including jobs in construction and installation.</i> <p>Your Green Future is a 2-day sustainability event aimed at engaging secondary school students (aged 11-18) on the role of sustainability in innovation, retail, energy, construction and waste and how their careers in the future might help to develop a low carbon future.</p> <p>The UK low carbon economy is growing at 7% a year and this continued growth sees new skills needed at all levels. Yet businesses say they do not have the skills to meet growth, notably critical Science Technology Engineering & Maths skills (predicted shortfall of 50% by 2020 - Institution of Mechanical Engineers). To address these challenges it is vital that young people entering work are able to play their part. They need to be informed of the opportunities that are open to them, and given the necessary support to gain the appropriate qualifications and skills. This is not currently being achieved. For instance in 2015 we surveyed 669 young people from across the South West & Midlands and only 30% knew what a low carbon economy was and few could identify industries that have a link to its development.</p> <p>Enhancing young people's prospects, including providing them with a clear view on the current job market and training opportunities, will also help prevent youth unemployment - in 2015 young people are nearly three times more likely to be unemployed than the rest of the population and our survey of 669 young people found that 85% would like to speak to more people about job opportunities.</p> <p>These challenges were a call to action and our response was 'Your Green Future', which was developed in 2010 by a consortium of organisations, including Severn Wye Energy Agency, Rotary and InterClimate Network, who were overseen and driven by John Davidson OBE. In 2012 Severn Wye Energy Agency became the lead partner, in order to further develop existing approaches and deliver events throughout the UK.</p> <p>Each event involves up to 500 secondary school students working with over 30 businesses as together they tackle sustainability in a series of fun, interactive workshops. Each day usually includes:</p> <ul style="list-style-type: none"> ○ A key note speech ○ Workshops ○ An interactive exhibition hall where students have a focused activity which involves speaking to organisations. 		
Performance indicators linked to the practice <ul style="list-style-type: none"> ○ Number of households engaged in support programmes: 3611 students have been involved in Your Green Future. Using the 90% mean of the proportion of students and teachers making changes to their energy behaviours in the Young Energy People! Project (another Best Practice example), it is anticipated that 3250 households would have been engaged. ○ Education – a better understanding of how integrated sustainability already is within business and what the needs are in the future to help create a low-carbon economy. There may be an indirect impact on energy behaviours at home following some activities at the 		

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
event.		
<p>Indicators of success linked to the practice:</p> <p>The West of England and Solihull YGF events have become a permanent feature of both the local authorities and local secondary schools calendars. They are incredibly well received and popular with many of the businesses who support the event as a way of engaging with the next generation of employee's and an opportunity to promote their organisation in their local area.</p> <p>A key element of each event is the pre and post event surveys which are given to each student. Prior to the event we ask the students which industries they think are involved in a sustainable economy to which they often answer energy and engineering but when we ask these questions after the event the results are very different, they still understand the importance of energy and engineering but they also appreciate its role in retail, construction, waste and land management.</p> <p>A number of businesses use the event to fulfil their Corporate Social Responsibility objectives and send their graduates to it as a training exercise; however, we are looking at working with the University of the West of England to provide attending mentors with a qualification along the lines of communicating science.</p>		
<p>Evidence of success.</p> <p>Severn Wye Energy Agency has held:</p> <ul style="list-style-type: none"> ○ 13 events ○ Over 130 schools have attended the events ○ Over 3000 students aged between 12-18 ○ Over 270 Businesses have supported the events 		
<p>Factors that might hamper the transfer:</p> <p>These are expensive events to fund*, often in the region of £25,000; however, if funding was available then the event is readily transferrable as long as there are sufficient schools and businesses local to the event.</p> <p>*Funding for the UK events comes from a wide variety of funders including the national lottery, local authorities, the rotary club and private sponsorship.</p>		
Time required to complete the BP	4-6 months per event	
Contact details to obtain further information on the practice		
Contact name	Karen Robinson	
e-mail	karenr@severnwyenergy.org.uk	
Organisation	Severn Wye Energy Agency	
Type of Organisation	Private SME and not-for-profit sustainable energy education charity	
Website	www.yourgreenfuture.org.uk	

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
Title of the good practice:	G11. Countdown to Low Carbon Homes	
Partner region:	Gloucestershire, UK (worked with Cyprus and Greece)	
Location data	UK- Stroud District Council, Forest of Dean District Council, Wiltshire Council, and South Gloucestershire Council <i>Cyprus- as a relatively small country, the focus area was the whole country rather than one town or city</i> <i>Greece- The focus area was Thessaloniki in Northern Greece</i>	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> • Activation of demand and combating energy poverty • Innovation • New financial instruments 		
Description of the practice: <ul style="list-style-type: none"> ○ <i>Eliminating administrative barriers</i> <p>Overview</p> <p>Running from January 2012 to December 2014, Countdown to Low Carbon homes was an action research project. Its aims were to research, develop and communicate an integrated practical delivery approach to community-scale sustainable energy retrofit of homes, focusing on delivery by small to medium enterprises (SMEs).</p> <p>By exploring the whole ‘retrofit journey’ from planning stage to implementation and post installation energy use, the Countdown to Low Carbon Homes project aimed to find ways to make domestic retrofit easier and more mainstream, in ways that benefit local businesses. To do this, the project partners worked with households, installers and other key decision makers involved in domestic retrofit in their communities to gather evidence on the situation at a local level.</p> <p>Funding and set up</p> <p>Countdown to Low Carbon Homes was funded by the ERA-Net Eracobuild programme. ERA-Net Eracobuild is a network of national R&D programmes focusing on construction and the sustainable built environment, with the aim of developing synergies between national programmes by sharing strategies and establishing joint programmes and projects.</p> <p>Countdown to Low Carbon Homes was funded under the Sustainable Renovation theme, addressing the challenge of sustainable renovation of the existing built environment, and providing opportunities for industries, research, academic and other organisations to take part in multilateral cooperation in this field.</p> <p>Key areas of work</p> <ol style="list-style-type: none"> 1. Research <p>To better understand the whole ‘retrofit journey’ from planning stage to implementation and beyond, the research teams in Greece, Cyprus and the UK recruited and worked with households, installers and other key actors involved with the sustainable energy retrofit of homes. Action learning techniques were used in a variety of ways to work with key actors, record the results and use these to refine processes and support activities.</p> <ol style="list-style-type: none"> 2. Installer Network <p>A local installer group for energy improvements to buildings had been established in partnership with Stroud District Council in 2007, to build local capacity for the measures that were less common in the UK at the time such as micro-renewables, solid wall insulation and high efficiency windows suitable for traditional buildings, and as a means for homeowners to find installers in the local area. Members were included on a list that was made available to homeowners and meetings were held to share knowledge and discuss industry developments. This network was further developed as part of the Countdown to Low Carbon Homes project, and branded ‘Link to Energy’</p>		

GOOD PRACTICE FICHE

Region: Gloucestershire, UK

3. Local loans pilot

As part of the delivery model Severn Wye developed and piloted a loan scheme offering households alternative sources of finance for their improvements. Severn Wye enlisted the expertise of Hungarian consultancy GESB to help develop the loan product, with the aim of adapting the approach they had used successfully in Hungary-the Revolving Retrofit Guarantee Fund – to the UK owner-occupier market. By June 2014, both local pilots in Stroud District and South Gloucestershire were underway.

4. Community scale delivery of home energy improvements

A guide to community scale delivery of home energy improvements was set up, to support organisations aiming to implement a community scale delivery model. In developing this model, Severn Wye aimed to ensure that homeowners would be supported through the whole retrofit journey, from awareness raising and outreach to develop interest, through advice and assessments, sourcing installers and finance, and post retrofit user behaviour. This involved developing appropriate support processes at each stage of the journey and ensuring the right systems and procedures were in place.

Performance indicators linked to the practice

- **Number of households engaged in support programmes: 52 households were engaged in action research**

Indicators of success linked to the practice:

There are three outputs from this project:

- a research report which captures the work with households, installers and other key actors at local level
- a set of case studies charting the journeys of households in Cyprus, Greece and the UK that made energy improvements to their homes
- a guidance toolkit for community scale delivery of home energy improvements

These are available at: <http://www.countdowntolowcarbonhomes.eu/index.php/gb/>

By June 2014, both local pilots to deliver the local loan projects in Stroud District and South Gloucestershire were underway.

Evidence of success.

1. Research

The research report captures the work with households, installers and other key actors at local level. Its conclusions include reasons, triggers and obstacles for considering retrofit alongside other results. This can be used by other organisations to guide their projects and inform ways of working.

2. Installer network

The installer network was further developed, and has since been used to facilitate grant funding programmes.

3. Local loan pilot

By June 2014, both local pilots in Stroud District and South Gloucestershire were underway. A significant amount of learning came from setting up these projects, including the legislation surrounding these projects. The learning from this is included in the guide to delivering community scale retrofit.

4. Community scale delivery of home energy improvements

The outputs provide information and guidance for other organisations setting up community scale delivery of home energy improvements. The key aim of this was to ensure the organisations are aware of the main points that need to be considered to set up a project, including barriers and administration (areas addressed include: reaching homeowners, energy advice, technologies, installers, regulations, finance mechanisms and monitoring and evaluation).

Factors that might hamper the transfer:

GOOD PRACTICE FICHE		Region: Gloucestershire, UK
<p>For organisations looking to set up a project to deliver retrofit projects: the research report and guide provides information. It isn't a comprehensive guide but should be a useful starting point. Each section in the guide provides information on barriers that could hamper the set-up of a project. The research report and guide were written with the experience from three countries, but there could be additional/different barriers in other countries.</p> <p>For organisations looking to create a similar project to Countdown to Low Carbon homes: a key challenge was locating and working with the householders. There was not any additional funding for the householders through the scheme, and as such they gave their time and information freely without a key incentive. They were required to give detailed information (including energy use) and therefore there was an administrative burden for them. This was also replicated in the work with other stakeholders, as they were asked for their time and expertise without any identifiable benefits for them. The organisation setting up the project would also need to ensure they have detailed knowledge and experience in the area of energy efficiency, in order to set up detailed project outputs and provide information.</p>		
Time required to complete the BP	2 years	
Contact details to obtain further information on the practice		
Contact name	Sam Evans	
e-mail	same@severnwye.org.uk	
Organisation	Severn Wye Energy Agency	
Type of Organisation	Private SME and not for profit sustainable energy education charity	
Website	www.countdowntolowcarbonhomes.eu http://www.severnwye.org.uk/en/news/archive/article/countdown-to-low-carbon-homes-research-report-and-toolkit-launched.html	
Fiche completed on date:	08.03.17	

GOOD PRACTICE FICHE		Region: Podkarpackie
Title of the good practice:	P1. Expansion of energy infrastructure at the Higher School of Law and Public Administration using renewable sources of energy	
Partner region:	Podkarpackie Region (Poland)	
Location data	Rzeszów	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> ▪ Activation of demand and combating energy poverty ▪ Innovation 		
Description of the practice: <p>Innovative installation of photovoltaic cells installed at the campus of the Higher School of Law and Public Administration in Rzeszów. It is one of the largest facilities of heat pumps and photovoltaic cells in Poland.</p> <p><u>Objective</u></p> <p>The aim of the investment was the acquisition of electricity with a capacity of 150 kWp from solar energy using silicon technology (back-contract). The aim of the investment was also the construction of base stations for charging electric cars. The aim of the project was also to develop a functional program of retrofitting heat pump system with the possibility of passive - active cooling of selected rooms of the Higher School and the use of waste heat air for the regeneration of brine heat pump. The solutions, that have been applied in the Higher School of Law and Public Administration, are based on two renewable energy sources:</p> <ul style="list-style-type: none"> • The first, is the heat gained from the ground, from a depth of over 125 meters (30 wells) where specialized probes, connected to the pump, absorb the heat from the ground. The thermal energy for heating the building is taken from the ground by a system of thirty vertical borehole heat exchangers with a length of 125 meters deployed in the area surrounding the property. The existing pump system was modified and equipped with a system of passive-active cooling lecture halls. In addition, waste heat from air conditioners is used for the regeneration of heat source heat pump. • The second is the processing of solar energy to power low voltage. In total, photovoltaic panels cover an area of about 1200 square meters. <p>Important element of this project is the first stations for charging electric cars in Rzeszów. The most important part of the investment is the installation of innovative photovoltaic cells. There are almost 40 car ports, which were constructed at Higher School's main car park. These are special shelters, which are equipped with modern photovoltaic panels covering the area of about 840 square meters. Thanks to this there can be obtained electricity with a capacity of approximately 170 kW. Stations for charging electric cars allow simultaneous charging of 4 vehicles. The Higher School installed weather station measuring solar radiation, wind speed and air temperature, which main task is to optimize the activities of solar inverters. Optimization is to improve the MPPT (Maximum Power Point Tracking). The Higher School is powered by the local transformer station. The greatest demand for electric energy arises from the air-conditioning and ventilation in summer, when sunshine is the highest. Panel system reduces the need for power from the grid thus relieving it.</p> <p>Financial resources: ~ 1.500.000 Euro</p>		
Performance indicators linked to the practice		

GOOD PRACTICE FICHE		Region: Podkarpackie
<ul style="list-style-type: none"> - Number of households with improved energy labeling: 1 - Number of households with improved energy consumption classification: 1 - Number of households engaged in support programmes: 1 - (%) Reduction of annual primary energy consumption in public buildings - (kWh) Annual energy savings in households - Number of households with improved energy consumption classification: 1 		
Indicators of success linked to the practice: <ul style="list-style-type: none"> • Nominal power obtained from photovoltaic system: 150 kWp. Annually, this allows to obtain energy of 132 MWh • Estimated losses caused by temperature changes: 3.2% (in relation to the average local temperature) • The total losses of the photovoltaic system: 18.0% 		
Evidence of success. <ul style="list-style-type: none"> • Thanks to the technology, the Higher School of Law and Public Administration sets a new direction in ecology. According to calculations, the Higher School's own contribution in the installation will be paid back in 5 years. • Lowering the cost of maintaining the buildings will at the same time lower the cost of studying at the Higher School (saving money in lighting the building and rooms and running air conditioning system). • Extensive system of heat pumps and photovoltaic panels will also reduce the emission of pollutants into the atmosphere. • The project will also contribute to the promotion of innovative technologies. 		
Factors that might hamper the transfer: <ul style="list-style-type: none"> • Barriers and differences in legal systems and regulations between countries and regions • Climatic differences, different weather conditions, geological differences between countries and regions • Different labor and investment costs in different countries and regions • Longer process of building or binding materials in various countries and regions (climatic differences or law regulations). 		
Time required to complete the BP	2 years	
Contact details to obtain further information on the practice		
Contact name	Prof. Jerzy Połuszny	
e-mail	inwestycje@wspia.eu	
Organization	Higher School of Law and Public Administration	
Type of Organisation	private	
Website	www.wspia.eu	

GOOD PRACTICE FICHE		Region: Podkarpackie
Title of the good practice:	P2. Comprehensive use of renewable energy sources in the Community Center Association "Emmaus-Rzeszów"	
Partner region:	Podkarpackie Region (Poland)	
Location data	Przedmiescie Czudeckie	
Topic of the practice: Thematic coverage		
<ul style="list-style-type: none"> ▪ Activation of demand and combating energy poverty ▪ Innovation 		
Description of the practice:		
<p>This is the Centre for 25 homeless and unemployed people constructed by Association "Emmaus" in the period from 13.11.2013- 31.12.2014 – it is a collective residential building with a workshop.</p> <p>Within the Centre for Community, residents were given a chance to work. Association "Emmaus" prepared for these workshops: joinery, upholstery, recycling, tailor and electronics.</p> <p>Now in these workshops, among others, homeless and unemployed may repair furniture, appliances and other items collected during rebounds and passed by the local residents. After the repair, the items are sold - and the profits from the sale support the budget of the Association "Emmaus".</p> <p>Financial resources: ~500.000 Euro</p> <p>During the construction of the Community Center complex they used RES (Renewable Energy Sources), including:</p> <ul style="list-style-type: none"> • Photovoltaic power installation of 17kWp allows for the production of electricity. • Installation of central heating, underfloor heating and hot water-based ground source heat pumps with a capacity of 50 kW coupled with a system of solar panels with a capacity of 24 kW. • Lighting of car parks and alleys using hybrid lamps and street lights, in LED frames, powered by photovoltaic batteries • Modification of the ventilation system of the building (with the use of ventilation with recuperation) with heat recovery which allows to reduce losses by about 50 to 60%. • Installing the rainwater harvesting system for domestic purposes. • Remote supervision of the building's installations. 		
Performance indicators linked to the practice		
<ul style="list-style-type: none"> - Number of households with improved energy labelling: 1 - Number of households with improved energy consumption classification: 1 - Number of households engaged in support programmes: 1 - (%) Reduction of annual primary energy consumption in public buildings: 70% - (kWh) Annual energy savings in households - Number of households with improved energy consumption classification: 1 		

GOOD PRACTICE FICHE		Region: Podkarpackie
Indicators of success linked to the practice:		
<ul style="list-style-type: none"> The building is energy self-sufficient in about 70%, which generate savings which are used for financing statutory activities, 		
Evidence of success.		
<ul style="list-style-type: none"> The building is energy self-sufficient in about 70%, which generate savings which are used for financing statutory activities, The building is an example of environmentally friendly building standard in the region, A positive impact on the local community and the image of Podkarpackie Region. Building Association "Emmaus-Rzeszów" is one of the first that meets these standards in rural areas and one of the most modern in Poland. 		
Factors that might hamper the transfer:		
<ul style="list-style-type: none"> Barriers and differences in legal systems and regulations between countries and regions Climatic differences, different weather conditions, geological differences between countries and regions Different labor and investments costs in different countries and regions Longer process of building or binding materials in various countries and regions (climatic differences or law regulations) 		
Time required to complete the BP	+1 year	
Contact details to obtain further information on the practice		
Contact name	Krzysztof Serwiński	
e-mail	emausrzeszow@interia.pl	
Organization	Association "Emmaus-Rzeszów"	
Type of Organisation	private	
Website	www.emaus-rzeszow.pl	

GOOD PRACTICE FICHE		Region: Podkarpackie
Title of the good practice:	P4. Podkarpackie Low-Energy Consumption Technologies Transfer Centre's Passive House	
Partner region:	Podkarpackie Region (Poland)	
Location data	Rzeszów	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> • Activation of demand and combating energy poverty • Professionalization of the construction sector • Innovation 		
Description of the practice: <p>Presented building, will serve as the new headquarters of Podkarpackie Regional Chamber of Civil Engineers, and will play an important role as Podkarpackie Low-Energy Consumption Technologies Transfer Centre.</p> <p>Basic technical data: total net area of the building: 1,005.11 km^w, cubic net area of 4100,6m³.</p> <p>The energy performance of the building: The building was designed as a standard passive house:</p> <p>a) expected energy consumption for heating: 15 kilowatt-hour / m² / year.</p> <p>b) expected air tightness: n50 <0.3 exchange / h</p> <p>One of the main objectives of this structure is to develop the business of the Chamber, focused on the distribution of equipment and renewable energy technologies and training, organization of conferences and workshops in the field of knowledge engineering and construction art.</p> <p>Implementation of the Centre was launched in June 2016 by carrying out preparatory works, preparing the ground for further construction. The object will serve as office and exhibition. Documentation of the project was developed in a design office in Cracow with the active participation of the management of the Chamber. Apart from the typical function of serving the Chamber of Civil Engineers, there is an additional aim of promoting and educating in the field of energy-efficient building technologies and, therefore the level of the ground floor will be entirely intended for exhibition space and conference room.</p> <p>Project activities in the field of architecture, determining the minimum energy demand, associated primarily with the desire to achieve:</p> <ul style="list-style-type: none"> - High compactness blocks, the lowest ratio of surface envelope (A) to the volume (V) - High air tightness of the building envelope, - High thermal insulation of all external walls, - The correct orientation of windows: The preferred orientation is the south, providing the best lighting in winter and reduced overheating in summer. It is worth noting that the buildings most often overheat in the summer on the east side and the west, which results from the research of the angle of sunlight, - Appropriate selection of the surface of window openings - the size of window openings should be chosen so as to ensure a favorable intensity of daylight at this altitude, in accord with some basic activities performed in a given room. For example, in energy-efficient office buildings there is no rational justification to design glazing reaching down to the floor. - An effective system of external shading - movable awnings are installed at a significant distance from the glass set to ensure the widest gap ventilation. - Optimized design of the building - suitable for use. In buildings used in a continuous manner, a reasonable choice is a heavy construction. This type of construction makes buildings slower to 		

GOOD PRACTICE FICHE

Region: Podkarpackie

overheat during the summer and can be cooled at night through the ventilation system, often with limited need for air conditioning.

An important and unique feature of the presented object are applied bio-climatic solutions - including reused building materials and natural ventilation. The office on the first floor to a large extent has been designed with natural, non-fired clay blocks with the addition of sand. Other walls will be made of silicate blocks, plastered with lime plasters and light partition walls of plasterboard, plastered with clay plaster.

The above-mentioned materials, particularly brick clay, having a high ability to control the humidity in the room, which is especially important during the heating season. Unfired bricks are able, within two days to absorb 30 times more moisture than the fired ones. In addition, clay brick and silicate block materials have a high heat capacity and low radioactivity. For this reason, they can significantly affect the development of natural, healthy internal micro-climate. Noteworthy is the fact that for the production of unfired bricks there is required only a minimum amount of energy compared to other conventional building materials.

Another characteristic bio-climatic element is a skylight (centrally positioned above the main lobby), which in addition to its primary function will provide the possibility of natural ventilation and cooling. In addition, in the entrance hall has been placed high wall made of silicate bricks (white color) and clay blocks (green color), forming two-tone composition, referring to the aesthetics of external façades. In order to complement and underscore the project's approach, there has been designed a reception desk made from the beaten ground. The architecture of today is witnessing the formation of a new category of buildings. These are objects that can be described as pro-energy buildings. Energy of implementation should be the result of the search for the optimal solution planning, respectful of the most important aspects of utility, aesthetic and energy.

It is worth nothing that the final architectural form of the building, the selection of the deployment of photovoltaic cells and wind turbines, are an example of the fact that the utilization of renewable energy sources must not express itself only through thoughtless maximization of energy gain.

The methods of obtaining electricity from renewable energy sources:

- ✓ six wind turbines with a power of 2 kW each,
- ✓ three wind turbines with a power of 0,3 kW each,
- ✓ photovoltaic modules.

The duration of the project is approximately 12-15 months.

Performance indicators linked to the practice

- Number of households with improved energy labelling: 1
- Number of households with improved energy consumption classification: 1
- Number of households engaged in support programmes: 0
- (%) Reduction of annual primary energy consumption in public buildings:
 - ✓ Estimated energy consumption for equipment ventilation and heating and air conditioning is 21,700 kWh / year.
 - ✓ Estimated energy consumption for household is 28,300 kWh / year.
 - ✓ Estimated total balance of all the receivers installed in the facility is 50,000 kWh / year.
- (kWh) Annual energy savings in households: 0
- Number of households with improved energy consumption classification: 1

GOOD PRACTICE FICHE **Region: Podkarpackie**

Indicators of success linked to the practice:

In order to balance the annual electricity consumed in relation to energy produced from renewable energy sources, there will be used the following solutions:

- The six wind turbines with a vertical axis of rotation: Aerocooper 450 with a capacity of 2 kW, installed on poles, in the parking lot (the use of the device will be able to produce 12,000 kWh / year)
- Three wind turbines with a vertical axis of rotation: Aerocooper 220 with a capacity of 0.3 kW, installed on poles on the roof (expected production of energy 1,400 kWh / year)
- Photovoltaic cells, designed on top of the building and on car park's roof, having a total power of 47 kW. All photovoltaic modules are made of monocrystalline silicon cells with a front metallization: Front-Contact.

Evidence of success.

- VENTILATION
The building is expected to use a distributed ventilation system consisting of six air handling units, giving the possibility of precise and economical control dependent on the conditions prevailing in the zone. Air handling units are equipped with cross and double cross heat exchangers, with efficiency of heat recovery of above 80%. Central support office and a conference room are provided with an adiabatic cooling. In addition, air handling unit serving the office is equipped with ground, air heat exchanger, which is an additional source of supplemental cooling.
- Energy self-sufficiency
- Estimated energy consumption for equipment ventilation and heating and air conditioning is 21,700 kWh / year.
- Estimated energy consumption for household is 28,300 kWh / year.
- Estimated total balance of all the receivers installed in the facility is 50,000 kWh / year.
- Passive, NZEB house.
- Annual energy consumption for heating - 15 kWh / m2.

Factors that might hamper the transfer:

The transfer of good practice would involve a series of legal actions, construction and investment: purchase of land, building design, selection of the contractor, the construction of the building and use of the building for public purposes.

Transfer of this practice would last several years.

Time required to complete the BP **2 years**

Contact details to obtain further information on the practice

Contact name	Zbigniew Detyna
e-mail	secretariat@inzynier.rzeszow.pl
Organization	Podkarpacka District Chamber of Civil Engineers
Type of Organisation	private
Website	www.inzynier.rzeszow.pl

GOOD PRACTICE FICHE		Region: Croatia
Title of the good practice:	C1. Reconstructed public buildings in City of Zagreb under the ZagEE project	
Partner region:	Croatia	
Location data	City of Zagreb	
Topic of the practice: Thematic coverage		
<ul style="list-style-type: none"> • New financial instruments • Innovation 		
Description of the practice:		
<p>Zagreb – Energy Efficient City (<u>ZagEE</u>) project aims to refurbish 87 public buildings and 3.000 public lighting luminaries but also to perform capacity building activities (technical, financial, managerial) of city office employees and building managers. The project is an answer to poor state and high energy consumption of public infrastructure (90% of buildings below F energy class). Project was initiated in 2012 and funded under the Intelligent Energy Europe programme - Mobilizing Local Energy Investment Project Development Assistance (MLEI PDA) which assists local and regional authorities to develop sustainable energy projects. It aims to bridge the gap between sustainable energy plans and real investment by funding activities necessary to prepare, and mobilize finance for public investment programmes. MLEI PDA proved to be the most adequate technical assistance programme for ZagEE due to:</p> <ul style="list-style-type: none"> ▪ Minimum project size (7 vs 50 mil. € in ELENA) ▪ Eligible internal staff costs (ELENA – only external expertise) ▪ Project not eligible for JASPERS (not part of the ESIF Operational Programme) ▪ Right to use funding sources of its own preference (EEEEF – required PDA beneficiaries to take a loan from the EEEF) <p>One of the primary ideas behind ZagEE project was to assess and test different financing instruments/schemes that were available in Croatia since there was no relevant experience within the city with use of instruments such as soft loans, EPC and ESI Fund grants. From technical side, the project was used to assess various technical solutions for energy renovation of several types of public buildings (kindergartens, schools, retirement homes, municipal buildings). This way the city acquired valuable information regarding expected investment costs for refurbishment of buildings and financial structuring of future renovation plans. Total investment size was approximated at 29,3 million € (26,5 mil. € for refurbishment of public buildings and 2,8 mil. € for modernization of public lighting).</p> <p>Two partners formed a core team with members appointed by the Mayor of Zagreb: City of Zagreb - coordinator (with several offices in the team) and North-West Croatia Regional Energy Agency. Many different stakeholders (ministries, banks, SMEs) were engaged during the project in order to maximize the level of know-how and joint cooperation between partners.</p>		
Performance indicators linked to the practice		
<ul style="list-style-type: none"> • Number of households with improved energy labeling: 87 • Number of households with improved energy consumption classification: 87 • Number of households engaged in support programmes: 87 • (%) Reduction of annual primary energy consumption in public buildings: 49% • (kWh) Annual energy savings in households: 33.526 MWh/year • (%) Reduction of the use of fossil fuels in the building sector: 8.390 tCO₂/year • Other: Generation of renewable energy: 290 Mwh/year 		

GOOD PRACTICE FICHE
Region: Croatia
Indicators of success linked to the practice:

In total 87 buildings with 226.654 m² will undergo energy renovation with expected primary energy savings of 33.526 MWh/year, 8.390 tCO₂/year of avoided GHG emissions and average energy savings of 49% in public buildings and 72% in public lighting. The project will also contribute to generation of 290 MWh/year of energy from renewable energy sources. Considering the size of the project (almost 30 mil. €) ZagEE has also helped with development of the market for EE/RES contractors.

Evidence of success.

PDA for development of concrete energy renovation plans in cities and regions provides necessary financial spark to initiate large capital investments. Although financial structuring of the project should ideally be set before signing of the PDA contract, ZagEE proved that on underdeveloped markets where there are no tailor made financial instruments for energy renovation cities have to make the first step and create the demand for energy renovation instruments. A mandatory three-year period within which the investment has to be launched can be considered as a positive feature that creates an obligation and higher commitment level from local governments. PDA also offers very good opportunities for capacity building and training for public authorities so they can undertake similar capital investments in the future.

Factors that might hamper the transfer:

Replicability of PDA projects such as ZagEE is generally quite high, especially in other cities in the region. Biggest obstacle to transfer of good practices lies within specific local frameworks and available funding schemes in each country. Political consensus and commitment from all sides is a pre-condition that has to be met before the initiation of project in order to ensure execution of such long-term capital investment. Project implementation followed standard procedures for reconstruction of city infrastructure and therefore was quite straightforward to follow and replicate.

Time required to complete the BP
4 years
Contact details to obtain further information on the practice

Contact name	Mrs Melita Boric
e-mail	melita.boric@zagreb.hr
Organization	City of Zagreb
Type of Organisation	local government (with status of region)
Website	http://zagee.hr/ http://www.zagreb.hr/

GOOD PRACTICE FICHE		Region: Croatia
Title of the good practice:	C4. Monitoring and verification of energy consumption and achieved savings through Energy Information System - ZagEE project	
Partner region:	Croatia	
Location data	City of Zagreb	
Topic of the practice: Thematic coverage		
<ul style="list-style-type: none"> • Innovation 		
<p>The City of Zagreb developed its own Energy Information System (EIS) software with Končar – Electronic and Informatics Inc in order to establish a more integral solution for energy management of its own buildings. Although an energy monitoring system already exists on national level (called ISGE) the City decided to make a more complex and comprehensive software that would provide additional functionalities such as:</p> <ul style="list-style-type: none"> • Support in planning investments into energy refurbishment and monitoring refurbishment projects (measurement and verification of energy savings) • Interconnectivity with smart meters subsequent to creation of data bridges, which enables consumption monitoring on a daily basis • Early detection and alarming in case of breakdowns, unexpected events and poor energy performance of buildings <p>EIS enables simplified energy and water consumption and costs data access as well as easy graphical and tabular data representation and reporting from conducted analysis. Part of functionalities also includes a simple user interface for local energy efficiency plans data preparation and reporting.</p> <p>As a part of the integral renovation concept within the ZagEE project all buildings were equipped with smart meters and remote reading of energy consumption. 87 buildings will be remotely connected to EIS while remaining compatible with ISGE. Monitoring for changes in energy performance is important to evaluate the effect of improvements that have been made and to provide evidence of progress towards improved energy savings. Monitoring and verification of energy savings through smart meters and EIS is particularly important for those funding sources (HBOR-EIB EEFF 2007 facility) that require verification of building's energy savings through actual measurement of energy consumption after the refurbishment. Due to better energy management of public buildings the City can easily check whether consumption targets from Sustainable Energy Action Plan (SEAP) are being met and intensify its efforts if it is lagging behind expected progress.</p> <p>Second phase of EIS software development will include modules for making energy efficiency investment scenarios, cost assessment and cost control reports. An estimate of future energy spending will be based on various algorithms and multiple indicators monitoring. Parameters which represent the ratio of dependent and/or independent variables are configured by end user.</p>		
Performance indicators linked to the practice		
<ul style="list-style-type: none"> • Number of households with improved energy labeling: 87 • Number of households with improved energy consumption classification: 87 • Number of households engaged in support programmes: 87 • (%) Reduction of annual primary energy consumption in public buildings: 49% • (kWh) Annual energy savings in households: 33.526 MWh/year • (%) Reduction of the use of fossil fuels in the building sector: 8.390 tCO2/year • Other: Generation of renewable energy: 290 Mwh/year 		

GOOD PRACTICE FICHE		Region: Croatia
<p>Indicators above are related to other practices as well, specific allocation to this GP is not possible. <u>Specific indicators are as follows:</u></p> <ul style="list-style-type: none"> (%) Reduction of the use of fossil fuels in the building sector (%) Reduction of annual primary energy consumption in public buildings: 3% 		
<p>Indicators of success linked to the practice:</p> <p>Energy Information System for the City of Zagreb performs analysis and monitoring activities about critical consumption periods for all buildings within the system. EIS system alerts responsible persons for taking some actions respecting the severity of recognized event. This functionality represents mechanism for avoiding extreme and unwanted energy and water consumption costs and on average helps to reduce overall energy consumption of all buildings up to 3%.</p>		
<p>Evidence of success.</p> <p>EIS application currently has 957 public buildings connected to the system. With over 2000 public buildings owned by the City of Zagreb and only 100 of them with installed remote smart metering system the City will intensify its efforts in order to connect all buildings to the system. This measure is necessary in order to ensure better energy management of public buildings and upgrade its SEAP planning tools.</p>		
<p>Factors that might hamper the transfer:</p> <p>Energy management tools for public buildings are quite common but expensive applications. EIS software was developed with an international corporation and therefore is not an open source, freely licensed software. However, the basic concept and scheme of the software can be had and freely distributed.</p>		
Time required to complete the BP	4 years	
Contact details to obtain further information on the practice		
Contact name	Mrs Melita Boric	
e-mail	melita.boric@zagreb.hr	
Organization	City of Zagreb	
Type of Organisation	local government (with status of region)	
Website	http://zagee.hr/ http://www.zagreb.hr/	

GOOD PRACTICE FICHE		Region: Croatia
Title of the good practice:	C6. Development of buildings stock register – ZagEE project	
Partner region:	Croatia	
Location data	City of Zagreb	
Topic of the practice: Thematic coverage		
<ul style="list-style-type: none"> ○ Innovation 		
<p>Part of the project development assistance (PDA) obtained from the Intelligent Energy Europe programme - Mobilising Local Energy Investment (MLEI PDA) related to the ZagEE project was used to develop a buildings stock database (register), a comprehensive database of buildings which included all information and data available from previously performed energy audits as well as from regular gathering of data on energy performance and consumption of buildings within the City of Zagreb. Energy audits have been performed for all 87 buildings planned to be included in the renovation under the ZagEE scope. However, the audits have been performed within a time span of 4 years (from 2008 to 2012) and, consequently, part of the information contained was outdated and had to be updated and validated. This was especially true for energy prices (gas, electricity, heating oil) but also investment costs of energy efficiency and RES measures. Furthermore, part of the audits were performed before the Ministry of Construction and Physical Planning adopted the Methodology for performing energy audits (June 2009), thus these need a more in-depth update and harmonization with new methodology.</p> <p>After all energy audits had been validated and updated, all available information and data from these were entered into a common register and database. The first step was the organization of data and definition of functional features of the register. A minimum functionality included the ability to sort and query information and data separately for each energy efficiency and RES measure. Querying capabilities included sorting of all EE/RES measures for which a certain payback period is desired and for which the sum of total investment is below a desired threshold. After the functional features had been defined and enabled, the data available from energy audits (approximately 500 EE and RES measures) was entered into the common register and database.</p> <p>The final task was to perform the analysis of data available within the common register and database and present results to all relevant stakeholders included in the investment decision process. This included performing initial analysis, preparing and holding presentations for stakeholders and implementing feedback regarding investment decisions. Key output of this project segment was to produce concrete directions for development of main project designs.</p> <p>Lessons learned from this process were numerous:</p> <ul style="list-style-type: none"> • Development of buildings register should come before the application to PDA because the information about the size of the investment and expected energy savings are based on the buildings register • Constant updates of energy prices and equipment costs have to be done to reflect cost-effectiveness of potential EE/RES measures • Energy audits of public buildings should not be done purely because of legal requirements (which usually reflects their quality) but as a primary measure for better energy management of buildings and realization of its investment potentials • Revision of energy audits can only be made by an experienced and skilled team, preferably members of the project consortium 		
Performance indicators linked to the practice		
<ul style="list-style-type: none"> • Number of households with improved energy labeling: 87 • Number of households with improved energy consumption classification: 87 		

GOOD PRACTICE FICHE		Region: Croatia
<ul style="list-style-type: none"> • Number of households engaged in support programmes: 87 • (%) Reduction of annual primary energy consumption in public buildings: 49% • (kWh) Annual energy savings in households: 33.526 MWh/year • (%) Reduction of the use of fossil fuels in the building sector: 8.390 tCO₂/year • Other: Generation of renewable energy: 290 Mwh/year 		
<p><u>Indicators above are related to other practices as well, specific allocation to this GP is not possible.</u></p>		
<p>Indicators of success linked to the practice:</p> <p>In total, a database was made with portfolio of 87 buildings with total heated area of 226.654 m² and more than 500 energy efficiency or renewable energy measures.</p>		
<p>Evidence of success.</p> <p>PDA for development of buildings register is the foundation of the planning process considering that it provides information about the size of the investment, expected energy savings and cost-effectiveness of each EE/RES measure. The register enables public authorities to have a better overview of their building stock and to make decisions on energy renovation based on environmental (ton CO₂, kWh) or financial (€ savings) indicators.</p>		
<p>Factors that might hamper the transfer:</p> <p>The replication of the buildings register is very high and it has been made available to general public on the project's website. However, obtaining data from energy audits could present a problem to cities while determining investment costs for EE/RES measures requires an experienced team of experts.</p>		
Time required to complete the BP	1 year	
Contact details to obtain further information on the practice		
Contact name	Mrs Melita Boric	
e-mail	melita.boric@zagreb.hr	
Organization	City of Zagreb	
Type of Organisation	local government (with status of region)	
Website	http://zagee.hr/ http://www.zagreb.hr/	

GOOD PRACTICE FICHE		Region: Croatia
Title of the good practice:	C7. System for monitoring, measuring and verification of energy savings (SMIV)	
Partner region:	Croatia	
Location data	Country-wide	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> Innovation 		
Description of the practice: <p>In order to measure achieved savings in a unified and proper manner and in accordance with applicable Croatian law on energy efficiency, Center for Monitoring Business Activities in the Energy Sector and Investments - CEI has, in cooperation with the German Society for International Cooperation - GIZ, developed a System for measuring and verifying energy savings (SMiV) to which all plans and implemented energy efficiency measures are entered. Public administration, companies that have energy performance contracts, as well as the Fund for Environmental Protection and Energy Efficiency, are obliged to enter all implemented energy efficiency measures. This means that for every implemented measure there will be a method of reporting and verification of real savings and the predictions will be easily compared with actual achieved results.</p> <p>The main purpose of SMIV is to monitor the implementation of the National Action Plan for Energy Efficiency. Energy efficiency measures are monitored and verified in four sectors of final energy consumption: household, industry, service sector and transport. The register of implemented measures includes storing the following data: energy savings (kWh), reducing emissions (ton CO₂), the costs of the measures implemented (investment measures). The register of energy efficiency plans involves storage targets and planned energy efficiency measures for cities, counties, municipalities and other obliged sides. This kind of monitoring is a prerequisite for systematic and consistent measurement of savings achieved at the national level.</p> <p>The application uses bottom-up methodology as described in the Regulations on the methodology for monitoring, measurement and verification of energy savings. According to the Regulations the following measures can be implemented: integrated restoration of existing facilities and building services sector, restoration of the thermal insulation of certain parts of the building envelope, new installation or replacement of heating systems for hot water in residential buildings and buildings of the service sector, installation of equipment for individual heat metering, solar thermal systems for domestic hot water in residential buildings and buildings of the service sector, heat pumps, new installation or replacement of the air conditioning in residential buildings and buildings of the service sector, replacement of existing and installation of new appliances, replacement of existing or installation of new office equipment, replacement of existing and installation of new luminaries in homes, replacement, improvement or installation of new lighting system and its components in buildings of the service and industrial sectors, improvement or installing new public lighting system, replacement of existing and purchase of new efficient vehicles, promoting eco-driving, efficient electric motors in industry and energy audits.</p>		
Performance indicators linked to the practice <ul style="list-style-type: none"> Number of households with improved energy labelling Number of households with improved energy consumption classification Number of households engaged in support programmes: 8.000 (%) Reduction of annual primary energy consumption in public buildings (kWh) Annual energy savings in households: 136.000.000 Number of households with improved energy consumption classification Other: Annual energy savings in all sectors: households, public, transport, industry 		

GOOD PRACTICE FICHE
Region: Croatia
Indicators of success linked to the practice:

Total energy savings and reducing CO₂ emissions calculated through SMIV is:

- for 2015: 214.000.000 kWh and 52.058 ton CO₂ and
- for 2016: 58.000.000 kWh and 11.501 ton CO₂.

Evidence of success.

Through SMIV, Croatia is collecting data on energy savings for all sectors. SMIV uses **bottom up methodology** to calculate energy savings for every building, house, car, lightbulb etc.

Currently, there is almost **8.000 implemented measures in SMIV for 2015 and 2016**.

Facilitated implementation of energy analysis - **all data in one place**.

Facilitated **monitoring of energy savings and reduction of CO₂ emissions** at the level of the unit which has to make energy plan in accordance with the Energy Efficiency Act.

Factors that might hamper the transfer:

Main barrier for the implementation is the need for creating strong system with obligation through national acts. Croatia has obligated all public-sector entities, ESCOs and subsidy providers to insert data about implemented energy efficiency measures into SMIV. Other barriers could be promotion and education of users of application.

Time required to complete the BP
18 months
Contact details to obtain further information on the practice

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Type of Organisation	government agency
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GOOD PRACTICE FICHE		Region: Croatia
Title of the good practice:	C9. Croskills: Lifelong training plan for building workers	
Partner region:	Croatia	
Location data	Country-wide	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> Professionalization of the construction sector 		
Description of the practice: <p>This GP is focused on the first component of the Croskills project, itself being part of the larger Build Up Skills initiative. Co-funded by the Intelligent Energy Europe programme of the European Union, Croskills is aimed at life-long education of workers in the field of energy efficiency in building thus strengthening qualifications of craftsmen, employed and unemployed construction workers.</p> <p>The project consists of 6 components:</p> <ol style="list-style-type: none"> 1. TRAINING PLAN 2. TRAIN THE TRAINERS 3. TEST-TRAININGS 4. CERTIFICATION 5. SUSTAINABILITY PLAN 6. INFO-CAMPAIGNS <p>From 2012-2013 the project gathered relevant Croatian institutions and professional associations in the construction, energy and education sectors through the National Qualification Platform, resulting in the formulation of needs and priorities within the National Roadmap and action plan, formally endorsed by 23 sectoral stakeholders.</p> <p>Croatia, with some exceptions in the institutional vocational education, has no systematic training of students and construction workers in energy efficiency, even though the number of construction workers far exceeds the number of other experts in the field of construction (engineers, etc.). There is also no certification scheme for workers or companies related to EE in buildings. Therefore, this component was focused on developing the training plan that includes curricula and training modules with accompanying teaching materials, in order to close the educational gap in the construction sector.</p> <p>A total of 18 training modules – three modules for each of the 6 key building professions - bricklayer, plasterer, carpenter, housepainter, roofer, drywall installer - have been developed in accordance with the Croatian Qualifications Framework (levels 2 and 3).</p> <p>Training plans include:</p> <ul style="list-style-type: none"> - permanent on-the-job training of qualified on-site workforce, - qualification of unqualified workers for on-site construction jobs; - pre-qualification of (un)employed construction workforce for other/additional on-site construction profiles, - certification of non-formal and informal learning outcomes - certification exam without a course taken. 		

GOOD PRACTICE FICHE

Region: Croatia

FORMAT of the training curricula: Each of 18 training modules consists of 2-6 modules depending on the professions and EQF level, as a combination of theoretical lectures (at training centers) and practical work (full-scale models within the training centers and at locations of industrial partners). Special attention is given to the new construction products and technologies which are applied in the building of new and refurbishment of existing buildings, up to the NZEB standard.

DURATION: 10-40 hours, depending on EQF level and profession, on average 20 hours per each training course.

Currently ongoing is the development of demonstration tools:

- ✓ Full-scale models of building components/parts, available at training centers to ease the practical part of the training
- ✓ Short video-clips on key skills for each profession, illustrating in a simple way how to perform the most relevant tasks at the typical building sites
- ✓ Thermography cameras will be rented for real time demonstration of quality control of construction works and how it affects the energy efficiency of a building. The implementation of video content into lectures and e-learning (web tools for education, online educational resources, mobile learning, personal learning networks etc.) will simplifying the understanding of presented topics.

Participative and collaborative approach through the National Platform and for the development of National Roadmap and Action Plan was essential

The training plan is targeting **6 priority building professions**.

Within the framework of Croskills 1200 workers are to be educated on EE in construction, 10 training centres are to be accredited and 200 trainers certified to deliver the training programmes.

An important aspect of this GP is to **raise awareness and attractiveness** of the 6 building professions.

Indicators involved: training plans for building workers, collaboration platforms incorporated, action plans developed.

Performance indicators linked to the practice

Evidence of success.

The development process for the **National Roadmap and Action Plan** was open for all interested parties, through national consultations and meetings with focus groups held during 2013 throughout the country, in order to ensure presence of the highest possible number of interested stakeholders.

The **National Platform** was involved in the process of developing the lifelong education schemes for building workers as advisory body and will continue in this capacity throughout the Croskills project.

Factors that might hamper the transfer: The main important factor in developing the training plan was the participative approach and support of main national stakeholders. Lack of collaboration and agreement on priorities between those stakeholders would be a serious obstacle. A question of financing can arise later during the implementation of trainings as construction workers have limited

GOOD PRACTICE FICHE		Region: Croatia
amount of time and funds to spare for education – so a sustainable funding plan has to be in place.		
Time required to complete the BP	18 months	
Contact details to obtain further information on the practice		
Contact name	Mrs. Ivana Banjad Pečur	
e-mail	croskills@croskills.hr	
Organization	Faculty of Civil Engineering, University of Zagreb	
Type of Organisation	Public educational institution	
Website	http://www.croskills.hr/en/	

GOOD PRACTICE FICHE		Region: Croatia
Title of the good practice:	C11. Bračak Energy Centre	
Partner region:	Croatia	
Location data	Bračak, City of Zabok, Krapina-Zagorje County	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> Professionalization of the construction sector Innovation 		
Description of the practice: <p>The reconstruction and revitalization of Bračak Manor is a unique example of energy rehabilitation of a historic building under cultural heritage protection focusing on two aspects: application of advanced technical solutions and repurposing of a public building.</p> <p>During history the Manor has changed its purpose twice, starting off as an aristocratic summer house in late 1800s and turning into a hospital after WWII. When in 2007 the hospital relocated the old Manor was emptied and in need of a revitalization. A collaboration between the estate owner, Krapina-Zagorje County, and REGEA led to the conceptualization of Bračak Energy Centre, a regional hub of excellence and knowledge in energy efficiency and renewable energy sources hosting a business incubator for promising start-up companies in the field of energy, a multi-purpose education and demonstration centre and offices of the regional development agency ZARA and the regional energy agency REGEA. A strong visual identity has been developed by REGEA to accompany the promotion of this innovative idea.</p> <p>The idea for the project started in 2011 when the General Hospital Zabok and REGEA signed an agreement on the use of the building. In 2013 Krapina-Zagorje County authorized REGEA to implement the reconstruction and revitalization of Bračak Manor. In 2015 funding was ensured and construction works began which are to be completed until the end of 2016.</p> <p>Full funding in the amount of €3,2 million for this project has been ensured through a government decision declaring Bračak Energy Centre a project of national importance for the environment, nature, energy efficiency and renewable energy sources. The funding institution is the Croatian Environmental Protection and Energy Efficiency Fund.</p> <p>Main technical features include:</p> <ul style="list-style-type: none"> ✓ Highly efficient biomass boiler using wood pellets (ETA up to 94,9%), ✓ Micro CHP for hot water and power production during summer period ✓ Air to water heat pump system for cooling and heating in transitional periods ✓ External wall insulation on the inside and energy efficient windows and doors (U<1,4 W/m2K) ✓ Highly efficient internal and external lighting systems (LED and FLUO T5) ✓ HVAC system (heating, ventilation and air conditioning) ✓ Advanced central monitoring and control system (heating, cooling, energy consumption) ✓ Rainwater harvesting system for irrigation of green areas and as wastewater treatment ✓ Electric vehicle charging station and purchase of one electric vehicle ✓ Comprehensive interior conservation works (decoration and replication) ✓ <i>Energy efficient appliances for offices and in-house restaurant</i> 		
Performance indicators linked to the practice <ul style="list-style-type: none"> Number of households with improved energy labelling: 1 Number of households with improved energy consumption classification: 1 Number of households engaged in support programmes: 1 (%) Reduction of annual primary energy consumption in public buildings: 70% for heating (kWh) Annual energy savings in households: N/D (%) Reduction of the use of fossil fuels in the building sector: N/D 		

GOOD PRACTICE FICHE
Region: Croatia
Indicators of success linked to the practice:

The complete reconstruction of the building will result in an upgrade from EPC rating E to rating B with the share of 88% of renewable energy sources. Energy rehabilitation will reduce energy consumption for heating by up to 70%, or from the initial 213,0 kWh/m² to 64,0 kWh/m².

The reconstruction and maintenance of green areas around the building will contribute to **safeguarding the natural** surroundings.

It is expected that at least **40 new jobs** will be generated while the reconstruction process itself has boosted the domestic construction sector and improved the **skills of workers and professionals**.

Evidence of success.

Besides the obvious impact the project has on the **environment and energy efficiency**, the application of cutting-edge technical solutions was the key to success: **innovation** has been both an answer to a challenge of carrying out energy rehabilitation of a historic building and the means to raising the bar for energy efficiency.

The project will improve the **quality of lives of local citizens** by creating new services, such as the educational centre, business incubator and local restaurant, which in turn will contribute to **employment and regional development**.

Overall, the project will **raise public awareness** on the efficient use of natural resources and the importance of sustainable development on a continuous basis.

Factors that might hamper the transfer:

Energy rehabilitation of a building under cultural protection can be very challenging if **requirements set by conservation officers** are very strict.

Reconstruction of a historic building in addition to the application of innovative materials and advanced technologies can be very costly, so an adequate **financing model** has to be in place

The reconstruction process can be hampered by **unskilled workers and professionals**, so a careful selection of project design, construction and supervisory services is essential

Cooperation between key stakeholders, such as the building owner, future user as well as other involved institutions is the basis for such a project to kick-start.

Time required to complete the BP
5 years (soft activities are continuous)
Contact details to obtain further information on the practice

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Organization	North-West Croatia Regional Energy Agency
Type of Organisation	Sectoral agency
Website	http://www.regea.org/

GOOD PRACTICE FICHE		Region: Jämtland Härjedalen
Title of the good practice:	J3. Heating control with forecast	
Partner region:	Region Jämtland Härjedalen, Sweden	
Location data	Östersund, Region Jämtland Härjedalen	
Topic of the practice: Thematic coverage		
<ul style="list-style-type: none"> Innovation 		
Description of the practice:		
<p>Controlling buildings heating based on weather forecast that calculates how much energy to be supplied to a building, based on very local weather forecasts. In this case, the technology has been used for heating control, but it can also be relevant to comfort cooling.</p> <p>When the weather changes, easily arise difficulties in maintaining the desired indoor temperature. For example, a transition from a cold night to a clear day with high solar contribution through the windows often results in a too high temperature indoors.</p> <p>One of our stakeholders, <i>Östersundshem</i> (municipal housing company), has tested controlling heating of buildings based on forecasts. The technology calculates how much energy to be supplied to a building, based on very local weather forecasts. In this case, the technology has been used for heating control, but it can also be relevant to comfort cooling.</p> <p>Practical application of forecast control generally use remote-controlled forecast receivers that send and receive data over GPRS or GSM network. The forecast receiver in turn controls the controllers placed in the building and regulate the heat distribution. Östersundshem tested two methods in two identical buildings, manual control with weather forecasts and automatic control with weather forecasts.</p> <p><u>Objective/challenge addressed:</u> Reduce unnecessary energy use through improved control.</p> <p><u>Main stakeholders/target groups:</u> Real estate companies, housing companies, SMEs .</p> <p><u>Financial resources required:</u> Start-up costs; 2.000 Euro.</p> <p><u>Strenghts/weaknesses</u></p> <ul style="list-style-type: none"> Energy savings of 10-20 kWh / m². Up to 9% energy savings in buildings. More consistent indoor climate. Reduced environmental impact. <p><u>Lessons learned</u></p> <p>Manual control requires time and planning. It is difficult to make reliable analyses of the weather in advance. However, it can work on a small number of properties. It is most profitable to start with those buildings with the highest energy consumption. It may be a bit messy to install a reference sensor. It's best to do it in connection with another renovation.</p>		
Performance indicators linked to the practice		
<ul style="list-style-type: none"> Other: Up to 9% energy savings in buildings. 		
Indicators of success linked to the practice:		
More consistent indoor climate / reduced energy consumption.		

GOOD PRACTICE FICHE

Region: Jämtland Härjedalen

Evidence of success.

Results:

-9% Energy savings with automatic control. (4.000-5.000 euro savings per alley) compared to:
-5% Energy savings with manual control.

Factors that might hamper the transfer:

Jämtland Härjedalen has a cold climate, other regions may have lower savings potential, but it can possibly be used with cooling systems as well.

Time required to complete the BP

1-2 years

Contact details to obtain further information on the practice

Contact name	Karin Österberg
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Organization	Östersundshem
Type of Organisation	Municipal housing company
Website	www.ostersundshem.se

GOOD PRACTICE FICHE		Region Jämtland Härjedalen
Title of the good practice:	J7. Zerooil – with bio oil – a region without fossil heating oil	
Partner region:	Region Jämtland Härjedalen, Sweden	
Location data	Jämtland County, Sweden	
Topic of the practice: Thematic coverage <ul style="list-style-type: none"> ○ Activation of demand and combating energy poverty ○ Innovation 		
Description of the practice: <i>Switch from non-renewable to renewable energy</i> <u>Kind of the practice</u> The project “Zerooil – with bio oil” offered actors within the region consultancy support, arranged study visits that increased knowledge and interest, pairing suppliers with potential customers. And at the very least the project raised the question of this possibility of switching to renewable fuels. The aim of “Zerooil – with bio oil” was to create regional co-operation to deliver bio oil in such amounts that also small users can reach profitability. Secondly, the aim was to give advice to others concerning conversion from fossil heating oil to other alternatives and upgrade the inventory of the number of fossil heating oil boilers in the county. Fossil fuels are typically taxed quite heavily, which means that a lot of fossil oil has already been replaced. In some specific cases however (e.g. bio oil for heating), the price for fossil and renewable fuels is quite similar despite fossil taxation. In these cases, public authorities can support projects where cooperation and other driving forces are necessary to reach conversion to renewables. <u>Objective/challenge addressed</u> To reach necessary amount of bio oil delivered to the Jämtland County. <u>Main stakeholders/target groups</u> Main target group were district heating companies, industries and public property owners. Secondly others that use heating oil and fuel providers. <u>Financial resources required</u> The budget for the project was approximately 42,000€. The project was financed by the Region Jämtland Härjedalen during 2015-2016. <u>Legal framework</u> The development within this field is mostly driven by the taxes on fossil heating oil in Sweden. The taxes has increased during the last years, more for industries than for others, and that has in turn made it more interesting to find alternatives that also is more friendly for the climate. <u>Regional context</u> The vision of Jämtland County is to be a region with no fossil fuels by 2030. That means that use of fossil heating oil has to be at a minimum. Bio oil is one alternative that can make that possible. <u>Strengths</u> We have reached and based the project on regional cooperation. <u>Weaknesses/Lessons learned</u> We could have come further concerning smaller boilers		
Performance indicators linked to the practice Identified possible users of bio oil in Jämtland County.		

GOOD PRACTICE FICHE		Region Jämtland Härjedalen
<p>Given individual advices concerning bio oil at 10 companies, where the energy and climate advisors participated at on-site visits. Five of those have made plans for conversion.</p> <p>Had three meetings concerning regional cooperation. .</p> <p>Given individual advice to about 20 companies concerning other alternatives for fossil fuels.</p> <p>Updated the inventory concerning numbers of larger oil boilers. Larger than 50 kW.</p> <ul style="list-style-type: none"> o (%) Reduction of the use of fossil fuels in the building sector: 93% 		
<p>Indicators of success linked to the practice:</p> <p>Deliveries of fossil heating oil to Jämtland County was in the year of 1990 about 45.000 m³. That number has decreased to 3.200 m³, a decrease about 93%. That is a very good and fast development, although it still needs to speed up.</p> <p>During the project one site converted to bio oil, with the capacity of 10m³. At the time of writing more sites have converted, with capacities of several hundred m³.</p>		
<p>Evidence of success.</p> <p>Our inventory shows that the number of oil boilers compared with the year of 2014 has decreased from 310 to 265 and smaller boilers have decreased from 449 to 292. The oil boilers that have disappeared have been replaced by a variety of options, most have installed heat pumps, but many have also switched to biofuels (e.g. wood pellets) and district heating.</p> <p>In December 2016 bio oil was delivered to a site in Östersund. That was a good end point for the project.</p>		
<p>Factors that might hamper the transfer:</p> <p>- There is a discussion about how sustainable bio oil is. That can differ depending on which raw material that is used. Development within this will be extremely important to follow.</p>		
Time required to complete the BP	Approximately 6 years, 2014 - 2020	
Contact details to obtain further information on the practice		
Contact name	Jimmy Anjevall	
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Organization	Region Jämtland Härjedalen	
Type of Organisation	Regional government	
Website	www.regionjh.se	
Fiche completed on date:	2017-05-31	

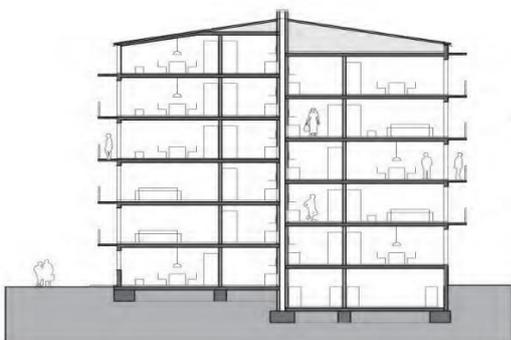
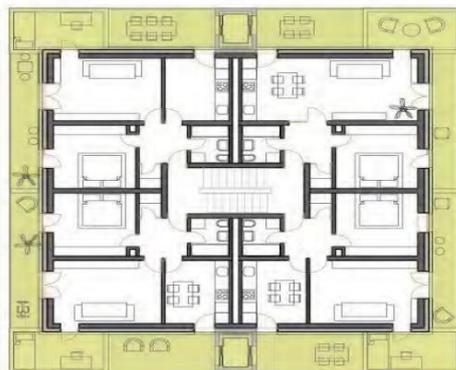
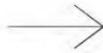
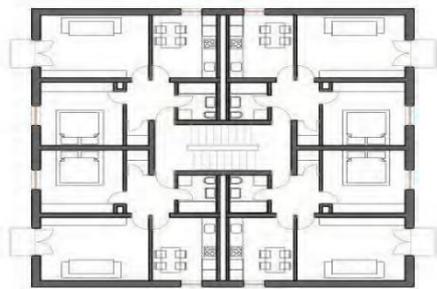
GOOD PRACTICE FICHE		Region Jämtland Härjedalen		
Title of the good practice:	J10. Sports Tech Research Centre			
Partner region:	Region Jämtland Härjedalen			
Location data	Jämtland Härjedalen			
Topic of the practice: Thematic coverage				
<ul style="list-style-type: none"> Innovation 				
Description of the practice:				
<p>The Sports Tech Research Centre is a multidisciplinary research centre that focuses on applied science of sports engineering and product development. The research is primarily within the fields of innovative development of and verification of products, material, technology and methods in the field of sports and outdoor activities. Some activities are also within the field of additive manufacturing (3D printing), in e.g. material/process development.</p> <p>Activities are within one of the university's focus areas "Forests and mountains as resources for business and quality of life". The research areas can be divided into three groups:</p> <ul style="list-style-type: none"> Biomechanics and Performance Optimization Human and Equipment Interaction Additive Manufacturing and Materials <p>The research covers a wide range of topics, from basic research on snow friction to active protective safety devices lowering injuries in sports. Multidisciplinary research teams are formed to address research questions in the best way. Research qualification ranges from mechanical engineering, materials engineering, electrical engineering, design, product development, manufacturing engineering, software and computer engineering, sports technology to the physiology, medicine and surgery.</p> <p>On site there are several technically advanced laboratories, some of which are world leading, e.g. a wind tunnel, materials testing lab, labs for additive manufacturing (3D-print) and applied mechanics as well as movable labs for studies in the field. The labs are excellent environments to conduct research, as well as being important resources for the university's engineering programs and outside partners. Through corporate collaboration companies and organizations can get help from researchers and students to develop and test products and materials.</p>				
Performance indicators linked to the practice				
Indicators of success linked to the practice:				
Assessment made in 2013 " ARC13 – Assessment of Research and Coproduction at Mid Sweden University":				
	Number	Scientific impact factor	Citations	Others
Articles	86 (8 in 2007 --> 28 in 2011; strong progression)	2>5 - 11>4 - 18>3 41>2-20>1 - 15<1 7 nolF ➔ Large panel, high mean	252 (55,5 in 2010)	3,84 authors /paper 1,59 countries /Pap ➔ Reflect international collaborations
Conferences	80			
Communication	Very good communication ranging from local to international medias (TV, journal...) --> strong visibility			
Tools development	7 Ergometers for upper and lower limbs, some specific for disabilities, 1 ski simulator, jumping machine			
Contribution to products	Suit for warm and humid environment, smartphone movement			

GOOD PRACTICE FICHE		Region Jämtland Härjedalen
innovations	application for skier, alpine helmet, cross country poles	
New process	Computerized biofeedback system, concept to reduce body mass/fat, waxing iron application	
Evidence of success.		
<p>The research centre has a clear, visible identity, and is well integrated both socially and economically with strong collaboration with industry and local development. It is one of the best in its field globally. The scientific production has increased exponentially from 2007, with outputs achieving good impact factors.</p>		
Factors that might hamper the transfer:		
Time required to complete the BP		
Contact details to obtain further information on the practice		
Contact name	Mikael Bäckström	
e-mail	Mikael.Backstrom@miun.se	
Organization	Mid Sweden University	
Type of Organisation	Public/private, regional/local government, etc	
Website	https://www.miun.se/en/sports-tech-research-centre/	
Fiche completed on date:	2017-09-25	

GOOD PRACTICE FICHE		Region: Slovenia
Title of the good practice:	S6. Education "European Energy Manager - EUREM"	
Partner region:	Slovenia	
Location data	Slovenia	
Topic of the practice: Thematic coverage		
<ul style="list-style-type: none"> • Professionalization of the construction sector • Innovation 		
Description of the practice:		
<p>Education "European Energy Manager - EUREM", which was developed in Germany in 1997, but so far it has in its framework for efficient energy management, trained for more than 4,000 European energy managers, is intended for all who want to get a comprehensive overview of areas of activity energy manager and relevant skills for efficient management of energy, in particular persons responsible for the management of energy companies in both the public and private sector, building managers, plant managers and production and process engineers.</p> <p>In Slovenia was the first education EUREM organized within the project EUREM.NET in 2008. Previously it was conducted 8 trainings EUREM, which was successfully completed by 176 European energy managers.</p> <p>Slovenian energy managers with their project tasks very successful at European level. Within the regular annual conference of the European energy managers, our energy managers received several awards.</p> <p>Training, which lasts for 6 months, is organised at the Centre for Energy Efficiency Institute "Jozef Stefan", it focuses on the acquisition of skills for the implementation of energy efficiency measures that provide medium to high reduction in energy use and energy costs at a reasonable investment cost. Participants in the context of education trained to prepare the analysis of the energy situation of the company, technical and organizational preparation and management of energy efficiency projects as well as their appropriate presentation of the company management, assessment and provision of targeted savings and ensuring continuous improvement in the company.</p> <p>The training is usually held extra-occupational and consists of the three following elements: face-to-face teaching (160 teaching units, 45 min each), self-learning and energy concept (80 teaching units in total). During the courses the participants acquire the theoretical knowledge which they may then apply in the course of their projects for the first time in practice.</p>		
Performance indicators linked to the practice		
<ul style="list-style-type: none"> ○ (%) Reduction of annual primary energy consumption in public buildings ○ Number of households with improved energy consumption classification, ○ (%) Reduction of the use of fossil fuels in the building sector. ○ (kWh) Annual energy savings in households: 16.9 million kWh. 		
Indicators of success linked to the practice:		
<ul style="list-style-type: none"> ○ Reducing energy consumption with implementation of measures from their project tasks is estimated at 224,5 GWh, 16.9 million kWh annually. ○ Reducing CO₂ emissions for 123.3 kton per year. 		
Evidence of success.		
<ul style="list-style-type: none"> ○ Average saving potentials per EUREM project work ○ Energy-saving potential 750 MWh / year <ul style="list-style-type: none"> ○ Cost-saving potential 30,000 € / year 		

GOOD PRACTICE FICHE		Region: Slovenia
<ul style="list-style-type: none"> ○ CO2 reduction potential 200 t / year ○ Investment costs for measure 100.000 € ○ Payback period 3 - 4 years 		
Factors that might hamper the transfer: <ul style="list-style-type: none"> ○ Willingness of individuals and companies to participate in the program ○ Finding a right lecturer 		
Time required to complete the BP	6 months	
Contact details to obtain further information on the practice		
Contact name	Boris Sučić	
e-mail	boris.sucic@ijs.si	
Organization	Jožef Stefan Institute - Energy Efficiency Centre (EEC)	
Type of Organisation	Public/private, national	
Website	http://si.eurem.net/display/euremsi/EUREM	

GOOD PRACTICE FICHE		Region: Slovenia
Title of the good practice:	S7. Complete renovation of apartment buildings - System Dominum	
Partner region:	Slovenia	
Location data	City Municipality Ljubljana	
Topic of the practice: Thematic coverage		
<ul style="list-style-type: none"> • Activation of demand and combating energy poverty • Innovation • New financial instruments 		
Description of the practice:		
<p>The idea is to solve problems with of apartment buildings from the 50s and 60s of last century:</p> <ol style="list-style-type: none"> 1. undersized housing, 2. nonperforming housing, 3. seismic (in)security, 4. energy (in)efficient. <p>250,000 people in Slovenia live in apartment blocks built before 1963, when there were no rules to ensure seismic safety of buildings.</p> <p>A little stronger ground tremors would cause social bomb (according to a study in 2009 only in Ljubljana would be damaged about 28,000 buildings), a serious earthquake could cause even a humanitarian disaster.</p> <p>Solution of these problems could be:</p> <ol style="list-style-type: none"> 1. extending the block: an increase in existing housing, 2. increasing the block: the addition of new dwellings. <p>Multi apartment building before renovation:</p> <ul style="list-style-type: none"> • small housing, • without elevator, • earthquake unsecured, • non-insulated façade. <p>Multi apartment building after complete renovation:</p> <ul style="list-style-type: none"> • housings are increased, • flexibility in housing, • elevator, • new installations, • earthquake rehabilitation, • energy rehabilitation. 		



GOOD PRACTICE FICHE		Region: Slovenia
Performance indicators linked to the practice		
<ul style="list-style-type: none"> ○ Number of households with improved energy labelling, ○ Number of households with improved energy consumption classification, ○ (kWh) Annual energy savings in households, ○ Number of households with improved energy consumption classification, ○ (%) Reduction of the use of fossil fuels in the building sector. 		
Indicators of success linked to the practice:		
<ul style="list-style-type: none"> ○ Residential area will increase, ○ Value of housing will increase, ○ Living conditions will improve, ○ Improved energy efficiency. 		
Evidence of success.		
The project is in the process of obtaining permits and approvals residents.		
Factors that might hamper the transfer:		
<ul style="list-style-type: none"> ○ Consent of neighbours, ○ Building permit, ○ Financing. 		
Time required to complete the BP	In progress (2 years by now)	
Contact details to obtain further information on the practice		
Contact name	Tomaž Krištof	
e-mail	office@studiokristof.com	
Organization	Studio Krištof arhitekti d.o.o. Rimska 20 1000 Ljubljana Slovenia	
Type of Organisation	Private	
Website	www.studiokristof.com	

GOOD PRACTICE FICHE	
Title of the good practice:	O2. Solar thermal installation- ESCO model
Region:	Catalonia (Spain)
Location data	Catalonia (Spain)
Topic of the practice: Thematic coverage	
<ul style="list-style-type: none"> • Innovation • New financial instruments 	
Description of the practice:	
<p>The project, which has been executed using the Energy Service Company ESCO model, consists of a Solar Thermal Installation in a building with 32 housing units.</p> <p>The ESCO company is in charge of the investment and maintenance of the solar installation, and in exchange, neighbours pay during the following six years the savings this installation will produce.</p> <p>Once the six years have passed, the installation and its savings will be returned to the neighbour community.</p> <p>With this action we can prove that this Community, paying in concept of energy the exact amount as the would pay if the solar thermal installation hadn't been made, will be able to amortise it in six years time with the economical savings generated by the reduction of the fuel consumption (natural gas).</p>	
Performance indicators linked to the practice	
<ul style="list-style-type: none"> • Number of households with improved energy labelling • Number of households with improved energy consumption classification: 32 • Number of households engaged in support programmes: 32 • (kWh) Annual energy savings in households • Number of households with improved energy consumption classification • (%) Reduction of the use of fossil fuels in the building sector: -40% gas 	
Indicators of success linked to the practice:	
<p>During the first year working with the Solar Thermal Installation, gas consumption has been reduced in 40%, comparing with the previous historical consumption, due to the energy production of the solar thermal installation.</p>	
Evidence of success.	
<p>A number of 32 houses are using solar energy to heat water, instead of natural gas. This leads to a CO₂ emissions reduction of 15.236 tons on a yearly basis.</p> <p>This best practice shows how the Energy Service Company (ESCO) models work. It is an evidence of success for commercial or non-profit businesses providing a broad range of energy solutions including designs and implementation of <u>energy savings projects</u>, <u>retrofitting</u>, <u>energy conservation</u>, energy infrastructure outsourcing, <u>power generation</u> and <u>energy supply</u>.</p>	
Factors that might hamper the transfer:	
<ul style="list-style-type: none"> • Poor energy awareness of homeowners • Lack of ESCOs companies 	

GOOD PRACTICE FICHE	
Time required to complete the BP	
Contact details to obtain further information on the practice	
Contact name	Xavier Boguña (Gerente)
e-mail	info@solsolar.cat
Organisation	Energía Renovable Solsolar s.l.
Type of Organisation	private
Website	www.solsolar.cat

6 Benchmarking fiches

Benchmarking Fiches are provided by BUILD2LC partners as a consequence of the learning and exchange of common experiences. Based on the effective exchange of Good Practices (GP), partners were asked to identify which practice they are willing to adopt in their region.

A Benchmarking Fiche has been designed in the frame of the project to show the interest of the partner in adopting a specific GP. Hence, partners are required to complete questions about main needs in their region (related to the topic) that the good practice will address, issues that could be improved in the region by adopting the good practice, problems that could arise when adopting or once adopted the good practice or policy instruments in place that could implement the good practice.

The good practices requested by the partners on this *Innovation* topic were:

- Podkarpackie Transfer Centre Low Energy Technology Passive House
- Complete renovation of apartment buildings - System Dominum
- System for monitoring, measuring and verification of energy savings (SMIV)
- Solar thermal installation- ESCO model
- Bračak Energy Centre

Hence we present the compilation of Benchmarking Fiches showing the interest of partners to embody the already identified Good Practices for the topic 'Activation of demand and combating energy poverty'.

The partners from Andalusia, Croatia, Jämtland Härjedalen and Slovenia did not requested any innovation GP so far. However, it is likely the adoption of some additional ones during the bi-lateral meeting phase the next semester.

BENCHMARKING FICHES FOR 'INNOVATION'					
	Podkarpackie Transfer Centre	System Dominum	SMIV	ESCO Model	Bračak Centre
	RRDA	LEAG	RGEA	OTHER	RGEA
LITHUANIA	X	X			
GLOUCESTERSHIRE			X	X	
PODKARPACKIE				X	X

BENCHMARKING FICHE	
TOPIC: INNOVATION	
Good practice to be adopted:	
Lithuania: Podkarpackie Transfer Centre Low Energy Technology Passive House	
Lithuania may use part of “Podkarpackie Transfer Centre Low Energy Technology Passive House” experience in quartal (city block) renovations program.	
Main needs to respond to:	
VIPA is appointed as financial coordinator in quartal renovation program and the quartals are planning to implement “lighthouse” projects with advanced technologies in some of the buildings. The experience in mentioned good practice may be helpful to make projects more efficient.	
Main objective to transfer the good practice to your region:	
The “lighthouse” projects will show other project promoters the technologies that could be implemented in other projects. It is planned that more efficient technologies would lead to more energy saving in other projects.	
Factors that might hamper the transfer:	
Too innovative (with ought track record) technologies, which may fail	
Policy instrument:	
No policy instruments identified. Framework policy instrument – quartal renovation program (which is not planned to be influenced)	
Existing financing funds:	Please detail any funds that could be used to finance the implementation of the practice in your region during the 2 nd phase in the project
There might be some financing for the extra (innovative measures) from international donors (e.g. KfW).	
Relevant stakeholders:	
<ul style="list-style-type: none"> • Municipalities participating in quartal renovation program. • Ministry of Environment – project promoter. • Final beneficiaries. 	
Main beneficiaries:	
The buildings with extra measures will save more energy and lower CO ₂ emissions. There might be some influence on the other projects which might look for the experience and seek some additional savings.	
Further information:	
There could be a need for the project promoters to meet Poland counterparties and share their experience. Bilateral meeting might be the best option of sharing such experience, although some detailed information might help in the beginning of good practice transfer.	

BENCHMARKING FICHE	
TOPIC: INNOVATION	
Contact details to obtain further information on the adoption of the good practice	
Contact name	Justinas Bucys
e-mail	justinas.bucys@vipa.lt
Organization	Public Investment Development Agency (VIPA)
Type of Organisation	Public
Website	www.vipa.lt
Fiche completed on date:	26 June 2017

BENCHMARKING FICHE	
TOPIC: INNOVATION	
Good practice to be adopted:	
<p>Lithuania: Complete renovation of apartment buildings - System Dominum</p> <p>Lithuania may use some part of experience of “Complete renovation of apartment buildings - System Dominum”.</p>	
Main needs to respond to:	
<p>In last programming period of 2007-2013 multi-apartment buildings were started to be renovated using financial instruments and this program was continued in 2014-2020 period. Despite the success of the program raised new challenges which requires to seek for alternative measures and solutions. The GP’s indicated above may lead to new solutions of financing building renovation program.</p>	
Main objective to transfer the good practice to your region:	
<p>As Lithuania is looking for new solutions and decisions, VIPA decided to explore Slovenian GP “Complete renovation of apartment buildings - System Dominum”, which may provide for the ideas on the renovations model, which will more rely on the private sector funding.</p>	
Factors that might hamper the transfer:	
<p>The reluctance of the politicians to change model. Reluctance of the multi apartment owners to apply major changes to the buildings. Challenges raised by the differences in legal systems of the countries. Requirements associated with the cities development plans</p>	
Policy instrument:	
<p>Currently there are no local policy instruments which might help to transfer such good practice to Lithuanian buildings sector. Although for the implementation of rehabilitation of multi-apartment buildings the Government of the Republic of Lithuania has approved multi-apartment buildings renovation (modernization) Programme.</p>	
Existing financing funds:	
<p>Currently approved multi-apartment building renovation system is relying on the funding from ESI funds and budget sources, as well as private participation, but the challenges associated with the programs raises questions about sustainability of the program. The applied model could increase the attractiveness of the renovation model as it could</p>	
Relevant stakeholders:	
<p>Ministry of environment – responsible for municipalities public buildings renovation. BETA – technical assistance facility targeting multi-apartment buildings, owned by ministry of environment. Technical and financial consultants - willing to provide technical advises and help to prepare technical and financial documentation</p>	
Main beneficiaries:	
<p>Multi-apartment owners</p>	

BENCHMARKING FICHE	
TOPIC: INNOVATION	
Government (minimized pressure on the budget, increase in result associated with energy savings and reduction of CO2 emissions)	
Further information:	
Lithuania needs more information about experience in adopting such good practice. Bilateral meeting might be the best option of sharing such experience.	
Contact details to obtain further information on the adoption of the good practice	
Contact name	Justinas Bucys
e-mail	justinas.bucys@vipa.lt
Organization	Public Investment Development Agency (VIPA)
Type of Organisation	Public
Website	www.vipa.lt
Fiche completed on date:	6th November 2017

BENCHMARKING FICHE	
TOPIC: NEW FINANCIAL INSTRUMENTS	
Good practice to be adopted:	
Gloucestershire: System for monitoring, measuring and verification of energy savings (SMIV)	
Main needs to respond to:	
Data is collected for each project within the region but this is not centrally collated. Using a SMIV model could help to collate this information to monitor activities and also provide evidence of effectiveness of installations for procurement purposes; an area which will be reviewed within the UK project.	
Main objective to transfer the good practice to your region:	
<p>We have identified 16 potential actions to pursue. This good practice could support a number of these actions, most notably:</p> <p>Action 4: Pilot for Growth – A partnership project will be developed to focus on Oakely, Cheltenham and Matson, Gloucester.</p> <p><i>How could the GP support this action?</i> This action focuses efforts on specific areas within the region. Once this pilot has taken place, it is anticipated that the project will role out to other areas. Using a system such as the SMIV will help to log improvements and can be used to collate the data across the county as the pilot is rolled out.</p> <p>Action 9: Implement a range of small measures packages for landlords including White Goods scrappage and LED lighting schemes</p> <p><i>How could the GP support this action?</i> It will be important to evaluate small measures packages. Therefore, using data from the Croatian SMIV may be able to support planning or the collection of information within the UK via an SMIV system can help to assess the impact of the action.</p> <p>Action 14: Review procurement processes with the aim of: a) improving standards through contracting; b) not excluding smaller, local businesses</p> <p><i>How could the GP support this action?</i> If procurement processes are to be successful it would be useful to see the impact of different measures installed by different companies, particularly SMEs who may not be able to provide such cheap labour costs but can show evidence of energy saving impacts. A system such as this could be incorporated into the system, particularly for Link to Energy companies.</p> <p>Action 16: Expand the Link to Energy network to have greater focus on businesses</p> <p><i>How could the GP support this action?</i> Again, incorporating a system such as the SMIV into Link to Energy will provide evidence for installers and customers. It can also be used as a reference tool and stimulate further work.</p>	
Factors that might hamper the transfer:	
<ul style="list-style-type: none"> - Finance to establish and sustain the system. - Ability to secure accurate and regular data. As we are working within a region it would not be possible to create legislative change (this could come if we can demonstrate success to the UK government). Therefore, we would need to work on a smaller scale where we can collect accurate data from regular sources or through projects developed through Build2LC where deliverables can be stipulated. - Applicability to the Gloucestershire context. 	
Policy instrument:	
The Target 2020 project uses EUSIF funding and could be an avenue for development (linked to	

BENCHMARKING FICHE	
TOPIC: NEW FINANCIAL INSTRUMENTS	
Action 16). Also, the existing Warm & Well and Link to Energy programmes could be used to implement to good practice.	
Existing financing funds:	
Funding has already been allocated within project budgets therefore some pooling of resources or applications for funding will need to be made to secure funding for the development and maintenance of a system.	
Relevant stakeholders:	
<p>Gloucestershire Clinical Commissioning Group – potential for financial support.</p> <p>Severn Wye – potential lead and facilitator for the development of a system.</p> <p>Registered Social Landlords – RSLs may wish to use the system to provide evidence of installations within their properties and for procurement purposes. Will also need to commit to providing data.</p> <p>National Landlords Association – landlords engaged within the Build2LC project may need to support data collection.</p> <p>Local Authorities and County Council – potential financial support and co-ordination of the system. Could use within procurement processes and to evidence impact.</p> <p>Link to Energy Installers – using the system to evidence impact. Need to contribute and commit to providing data.</p> <p>Energy suppliers/Ofgem –use the system to provide evidence and will also need to provide data. These stakeholders have a national impact and Ofgem can direct energy suppliers to collect data.</p> <p>Schools within the areas – engagement and education programme</p> <p>Community groups – engagement and education programme</p>	
Main beneficiaries:	
<p>Installers – Able to evidence the impact of their work.</p> <p>Decision-makers – Use the system to identify appropriate techniques. Show evidence of work carried out within organisations and across the region.</p>	
Further information:	
<p>We would like to see the system and then have a skype/call to discuss the system, how it was established, how it is used, how it is maintained, and costs/financing.</p> <p>At this stage we would not like a bi-lateral meeting visit.</p> <p>We are unsure if we will adopt this good practice but it may inform the actions identified.</p>	
Contact details to obtain further information on the adoption of the good practice	
Contact name	Victoria Boynton
e-mail	Victoriab2@severnwye.org.uk
Organisation	Severn Wye Energy Agency
Type of Organisation	Not for Profit energy agency
Website	http://www.severnwye.org.uk/
Fiche completed on date:	04/08/17

BENCHMARKING FICHE	
TOPIC: INNOVATION	
Good practice to be adopted:	
Gloucestershire: Solar thermal installation- ESCO model	
Main needs to respond to:	
Providing low cost, sustainable energy to areas of need within Gloucestershire in order to reduce energy poverty.	
Main objective to transfer the good practice to your region:	
<p>We have identified 16 potential actions to pursue. This good practice could support two of these actions:</p> <p>Action 4: Pilot for Growth – A partnership project will be developed to focus on Oakely, Cheltenham and Matson, Gloucester.</p> <p>Action 8: Provide/source grant funding to support landlords to install energy efficient measures within Matson, Gloucester and Oakely, Cheltenham</p> <p><i>How could the GP support these actions?</i> This action focuses efforts on specific high need areas within the region. This GP could help provide guidance about whether establishing ESCOs in these areas and installing solar installations or another energy source would be feasible in these areas. If it is feasible, the GP could provide advice about the establishment of the ESCO, financing and management within an area.</p>	
Factors that might hamper the transfer:	
<ul style="list-style-type: none"> - Community and stakeholder engagement. - Financing. 	
Policy instrument:	
None.	
Existing financing funds:	
Funding has already been allocated within project budgets therefore some pooling of resources or applications for funding will need to be made to secure funding for the development of this aspect of the action.	
Relevant stakeholders:	
<p>Gloucestershire Clinical Commissioning Group – potential for financial support.</p> <p>Severn Wye – potential lead and facilitator for the development of a system.</p> <p>Registered Social Landlords – RSLs may be targeted within the area to become part of the process.</p> <p>National Landlords Association – RSLs may be targeted within the area to become part of the process.</p> <p>Local Authorities and County Council – potential financial support and co-ordination of the practice.</p> <p>Energy suppliers/Ofgem –ESCO support.</p> <p>Residents – directly affected and involved in the process.</p> <p>Installers – Skilled installers will be required for the works.</p>	
Main beneficiaries:	
Residents – Reduced energy costs.	

BENCHMARKING FICHE	
TOPIC: INNOVATION	
Landlords – Tenants are more able to pay rent if energy costs are reduced.	
Further information:	
<p>We would like to see the system and then have a skype/call to discuss the ESCO, how it was established, financing, engagement with the community and stakeholders, long term benefits and challenges.</p> <p>At this stage we would not like a bi-lateral meeting visit.</p> <p>We are unsure if we will adopt this good practice but it may inform the actions identified.</p>	
Contact details to obtain further information on the adoption of the good practice	
Contact name	Victoria Boynton
e-mail	Victoriab2@severnwe.org.uk
Organisation	Severn Wye Energy Agency
Type of Organisation	Not for Profit energy agency
Website	http://www.severnwe.org.uk/
Fiche completed on date:	04/08/17

BENCHMARKING FICHE	
Best practice to be adopted:	
Podkarpackie: Bračak Energy Centre	
Main needs to respond to:	
<ul style="list-style-type: none"> • The need for minimizing of the negative buildings impact on the natural environment in the region • The need for taking actions against climate changing. • The need for reducing of the costs of the exploitation of buildings in region. • The need for respecting of international obligations that Poland has agreed to respect. 	
Main objective to transfer the best practice to your region:	
<ul style="list-style-type: none"> • The need for creating an educational energy center that would practically allow to raise awareness, knowledge and skills about energy efficiency and renewable energy sources for the public and private sectors, a multifunctional education and demonstration center in the region • The need for showing onsite how modern equipment, materials, and ways of using of energy might reduce the costs of energy and improve the environment. 	
Factors that might hamper the transfer:	
<ul style="list-style-type: none"> • Problems with financing of some solutions – the most often more advanced and more effective solutions cost much more than those less effective ones. • Other legislations preventing the implementation of certain elements of good practice 	
Policy instrument:	
<ul style="list-style-type: none"> • Regional Operational Program of the Podkarpackie Region for the years 2014-2020; • Own funds of various Associations, Chambers of Commerce or clusters 	
Existing financing funds:	
<ul style="list-style-type: none"> • Regional Operational Program of the Podkarpackie Region for the years 2014-2020; • Own funds of various Associations, Chambers of Commerce or clusters 	
Relevant stakeholders:	
<ul style="list-style-type: none"> • Marshall Office of Podkarpackie Region • Podkarpackie Energy Agency • Chamber of Civil Engineers • Podkarpackie Renewable Energy Cluster 	
Main beneficiaries:	
<ul style="list-style-type: none"> • society • public institutions • construction companies • housing co-operatives • schools and universities • entrepreneurs 	
Further information:	

BENCHMARKING FICHE	
Not enough information at this moment.	
Contact details to obtain further information on the adoption of the good practice	
Contact name	Marek Duda
e-mail	mduda@rarr.rzeszow.pl
Organization	Rzeszow Regional Development Agency
Type of Organisation	Public regional government
Website	www.rarr.rzeszow.pl
Fiche completed on date:	30.10.2017

BENCHMARKING FICHE	
Best practice to be adopted:	
Podkarpackie: Solar thermal installation- ESCO model	
Main needs to respond to:	
<ul style="list-style-type: none"> • Needs of a Solar Thermal Installation in a building and awareness activities for the promotion of energy efficiency measures and renewable energy sources for citizens in the local environment • Needs of the investment and maintenance of the solar installation • Giving advices to the citizens, final customers of energy in the residential sector and offering free and commercially independent advices connected with training services in the field of RES and RUE. • Needs of free helping in planning and implementation environmentally friendly investments in the region, helping in identification available sources of funding, organizing training and information and education activities to help prepare, verify and implement low carbon economy plans. • Needs of different forms of support tailored to specific needs of different groups: the form of informational meetings, consultations in the office and outside of the office, answers by email inquiries, phone counselling, training and information and promotion activities, individual counselling as well as conferences or webinars. 	
Main objective to transfer the best practice to your region:	
<ul style="list-style-type: none"> • Environmental benefits such as reducing pollutant emissions, improving air quality and reducing the use of non-renewable natural resources, • Increasing energy awareness of citizens, energy savings and reduction of greenhouse gas emissions and RES through providing local and regional information exchange and good practices on the implementation of Directive 2010/31 / EU, 2012/27 / EC and 2009/28 / EC and Directive 2008/50 / EC • Facilitating the implementation of certain measures and programs related to energy policy, • Systematically combating pollution of the environment, energy poverty and dependency on energy imports, • Preparation of well-qualified independent energy advisors, • Promotion of low carbon economy, • Generating of new jobs in the economy - increasing the number of municipal energy auditors, • Facilitating access to EU and national funds for increasing energy efficiency and using of RES, • Citizens - lower energy costs, energy efficient investments can become a potential source of revenue, • Business: lower energy consumption, positive image, increased competitiveness, • Support in the planning and implementation of environmentally friendly investments in the region, • Increasing the quality of life and green jobs. 	
Factors that might hamper the transfer:	
<ul style="list-style-type: none"> • Poor energy awareness of homeowners • Lack of ESCOs companies 	
Policy instrument:	
<ul style="list-style-type: none"> • Infrastructure and Environment Operational Program for the years 2014-2020 within the Priority Axis "Reduction of emissivity of the economy". 	

BENCHMARKING FICHE	
Existing financing funds:	
<ul style="list-style-type: none"> • Infrastructure and Environment Operational Program for the years 2014-2020 within the Priority Axis "Reduction of emissivity of the economy". 	
Relevant stakeholders:	
<ul style="list-style-type: none"> • National Fund for Environmental Protection and Water Management • Regional Fund for Environmental Protection and Water Management in Rzeszow • Marshall Office of Podkarpackie Region • Podkarpackie Energy Agency 	
Main beneficiaries:	
<ul style="list-style-type: none"> • Domestic, business and communities users • Installers • SMEs • public institutions • Insulation and heating product manufacturers • Podkarpackie Chamber of Civil Engineers • Universities. 	
Further information:	
We do not have enough information at this moment.	
Contact details to obtain further information on the adoption of the good practice	
Contact name	Marek Duda
e-mail	mduda@rarr.rzeszow.pl
Organization	Rzeszow Regional Development Agency
Type of Organisation	Public regional government
Website	www.rarr.rzeszow.pl
Fiche completed on date:	30.10.2017

7 Appendices

Appendix 8.1 Interregional Meeting in Östersund, Sweden Agenda

Appendix 8.2 Seminar presentations - *all the presentations are available at the BUILD2LC project website using the following link:*
<https://www.interregeurope.eu/build2lc/library>

Appendix 8.1: Interregional Meeting in Östersund, Sweden Agenda

BUILD2LC PROJECT

Interregional meeting on innovation

How to accelerate innovation uptake for energy rehabilitation

Östersund, Sweden, 12-13 September 2017

DAY 1 – TUESDAY 12 SEPTEMBER

I STUDY VISIT

09:30 ***Departure from Clarion Hotel Grand – 15 min walk***

10:00 ***Sports Tech Research Centre***

Introduction by project partner – Anneli Kamb or Marina Gregorsson

Innovation park in Östersund where companies can test their innovative products.

[Click for information of one of the research projects run by Sports Tech innovation Centre](#)

[Click for short video clip from the wind tunnel – one of the test devices in the laboratory](#)

12:00 ***Common lunch Cultum***

II STEERING COMMITTEE AND STAKEHOLDER NETWORKING

VENUE: REGION JÄMTLAND HÄRJEDALEN KÖPMANGATAN 21, ÖSTERSUND

13:30 ***Stakeholder networking session***

Pitching session 1 h – 3-5 min presentation per stakeholder

Discussions on prepared topics 1 h

Coffee and snacks will be available.

13:30 ***Meeting for BUILD2LC Partners: Steering Committee.***

- Discussion, agreements, financial issues, next meeting, etc.

- Bilateral meeting preparation

- Innovation map draft

17:00 ***End of day 1***

BUILD2LC PROJECT

Interregional meeting on innovation

How to accelerate innovation uptake for energy rehabilitation

Östersund, Sweden, 12-13 September 2017

DAY 2 – WEDNESDAY 13 SEPTEMBER

PLENARY SESSION

VENUE: CLARION HOTEL GRAND

Prästgatan 16 Östersund, Sweden. T: +46 63 55 60 00

I – REGISTRATION AND WELCOME

- 8:30** ***Registration***
- 9:00** ***Opening and Welcome by the Authorities***
Susanné Wallner, Regional Council
- 9.10** ***Lead partner Build2LC***
Joaquín Villar Rodríguez, Andalusian Energy Agency
- 9.15** ***Energy and housing - Swedish and regional conditions***
Torbjörn Skytt, Mid Sweden University

II – INNOVATION MANAGEMENT FROM GLOBAL TO LOCAL LEVEL

- 9:30** ***Region Jämtland Härjedalen Innovation Strategy and SMICE***
Erik Noaksson, Innovation strategist
- 9:50** ***Interregional collaboration to boost innovation uptake in energy rehabilitation in buildings***
Joaquín Villar, on behalf of JRC
- 10:10** ***Technological Corporation of Andalusia: an example of regional Public Private Partnership to fund RTDI projects***
Carlos García Delgado, Civil Engineering and Building Technical Officer.
Technological Corporation of Andalusia

Short Q&A and discussion

COFFEE BREAK

- 10:30** ***Coffee break.***

III WORKSHOPS

11:00 **Workshop**
Stakeholders' parallel round tables on innovation topics as:
How do we reach the nearly zero-energy buildings in existing buildings?
How can innovation play a role in reaching this goal?, How can
innovation be funded to boost these goals? Are ESIF well connected
with Smart Specialization Strategy priorities ? Interregional activities to
boost innovation uptake, etc.

12:45 **Group photo**

LUNCH

13:00 **Lunch at Clarion Hotel Grand**

14:00 **Transitions in the construction sector**
Lillian Strand, Norwegian University of Science and Technology

IV - GOOD PRACTICES OF INNOVATION

14:20 **Hospital of Östersund – large energy savings with innovative
ventilation solutions**
Stefan Östlund, Region Jämtland Härjedalen

14:40 **Innovative Practice at Stride Treglown, UK**
Richard Jessup, Stride Treglown

15:00 **Passive Houses in Mediterranean climate & Spanish Passive House
Platform**
Juan Manuel Castaño, European Passive House Platform

COFFEE BREAK

15:20 **Coffee break**

16:00 **Storsjö Strand – sustainable new city district in Östersund**
Karin Söderberg, municipality of Östersund

16:20 **Summary of GPs and discussion**

V – STUDY VISIT

17:00 **Study visit Storsjö Strand – sustainable new city district in
Östersund**
Multi-apartment buildings in wood – [Click here for webpage \(swedish\)](#)
(10 minute walk)

18:30 **End of meeting**

DINNER

19:30 **Common dinner Arctura**

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