Good Practice Guide

February 2018

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1. Introduction

This Good Practice Catalogue was developed within the INTERREG EUROPE Project ZEROCO2. It contains new and innovative Good Practice examples in terms of policy and methods of constructing and maintaining already existing near zero emission buildings. The catalogue is designed to provide new, specific ideas that can be transferred among the partners or to regions. The exchange of those examples, also beyond ZEROCO2, will help to improve local, regional or national policies in order to contribute to the competitiveness, sustainability and social cohesion of cities, regions, countries and the European Union as a whole.The first section of the Good Practice Catalogue introduces the ZEROCO2 project and its Conceptual Framework, which forms the basis for all deliverables. The next section gives a brief overview of the Good Practices exhibited in each partner region to give an idea of the characteristics and overall conditions for the improvement of the energy policy in the area.

2. The ZEROCO2 project

2.1 The Partnership

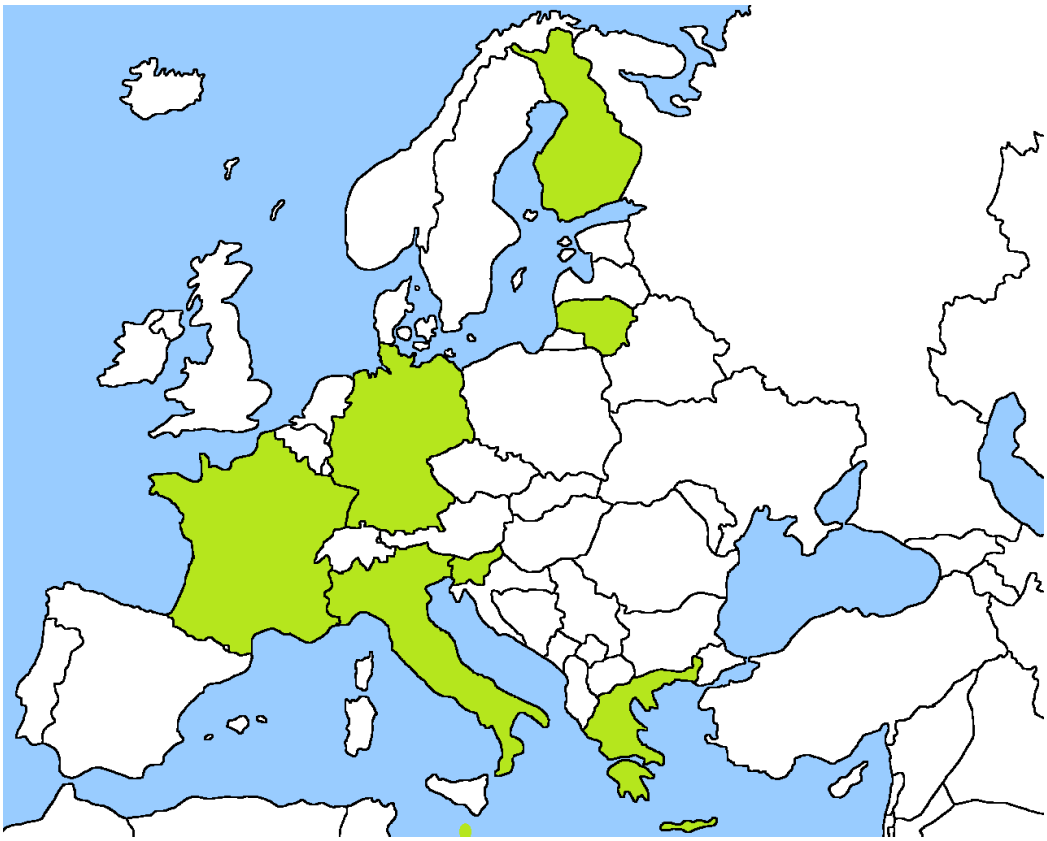

Figure 1: Map of the ZEROCO2 partnership.

The European project ZEROCO2 – PROMOTION OF NEAR ZERO CO2 EMISSION BUILDINGS DUE TO ENERGY USE is part of the INTERREG EUROPE programme that helps regional and local governments to develop and deliver better policy. Eight partners from eight different European countries—Slovenia, Greece, Italy, Lithuania, Malta, Germany, Finland and France—are participating in the programme[1].

The overall objective of the ZEROCO2 project is to improve regional and national environmental sustainability and energy policies and mitigate the risk of climate change; more specifically, by greening the building sector through enhancement of various eco-friendly energy sources and technologies, stressing its importance as an incubator for new markets related to energy, technology, services and business models. This project will represent and implement NEAR ZERO CO2 EMISSION BUILDINGS DUE TO ENERGY USE in policies to the extent of what has already been done for NEAR ZERO ENERGY BUILDINGS, effectively ridding of all CO2 emissions in the buildings

3. Methodology

The template for the Good Practice examples has been prepared by the Interreg Europe programme, and each Good Practice has been uploaded to the Interreg Europe Learning Platform. All ZEROCO2 partners, excluding the project's Communication Manager, the ElfI, has completed the form with at least two different practical examples from their region or country. The information about the partners and their regions/countries in section 4 has been pulled from the Regional Study prepared in the 1st semester.

[1] A more detailed description of each partner organization and their region/country can be found under point 4.

4. Participating Partners and their regions/countries – a short introduction with an emphasis on the energy use

Local Energy Agency Spodnje Podravje (Slovenia)

LEA Spodnje Podravje is the lead partner of the ZEROCO2 project. In the project, LEA Spodnje Podravje aims to improve existing energy policies on a national level by creating an action plan for the promotion of zero CO2 emission buildings in Slovenia.

Slovenia is located at the crossroads of main European cultural and trade routes. It is bordered by Italy to the west, Austria to the north, Hungary to the northeast, Croatia to the south and southeast, and the Adriatic Sea to the southwest. It covers 20,273 km^2 and has a population of 2.06 million people.

The production of energy from non-renewable sources such as oil, coal, natural gas and uranium still dominates in Slovenia, representing three-quarters of final energy consumption. Most of the energy is produced in nuclear power plants and thermal power plants. In 2015 renewable energy sources (RES) in Slovenia accounted for 23% of final energy consumption—only 2% away from the Slovenian goal for the year 2020.

The structure of the use of RES in Slovenia is currently dominated by the use of wood biomass and hydropower, which together accounted for nearly 90% of the total use of RES in Slovenia in 2010. Currently solar, wind and geothermal energy, which are still relatively untapped, contribute to a smaller share of RES

MAICH – Mediterranean Agronomic Institute of Chania (Crete, Grece)

MAICH is the Greek partner of the ZEROCO2 project. By implementing the project, MAICH will improve the energy policy of the Region of Crete.

Crete is the largest and most populous of the Greek islands and the fifth largest island of the Mediterranean. Located at the southern end of the Aegean Sea, Crete is one of the 13 regions of Greece. It is divided in 70 municipalities and 4 prefectures: Heraklion, Chania, Rethymnon and Lassithi, with Heraklion being the capital and the largest city on the island.

Various fuels are used in Crete for electricity generation, heat production and transport. The electric grid of Crete is not interconnected with the Greek continental grid, thus limiting the island's ability to utilize RES from Greece. The use of fossil fuels includes: a) fuel oil and diesel oil for electricity generation and heat production; b) liquefied petroleum gas (LPG) for heat production; and, c) gasoline and diesel oil use in transport. In 2013 total consumption of fuels—including fuels for heating and transport, but not for power generation—in Crete amounted to 333,999 tons [0.54 tons per capita]. Nuclear energy, coal and natural gas are not used currently in Crete. The installed power of conventional power stations in Crete is 850 MW and the electricity consumption 2,700 GWh/year. Apart from fossil fuels, various renewable energies are currently used in Crete, including solar energy, wind energy, biomass, hydropower and geothermal energy.

Molise Region (Italy)

The Italian partner of the project, the Molise Region, will improve their regional policy by implementing ZEROCO2. Molise represents a significant reduction in fuel consumption, with 34.7% of its gross energy consumption currently sourced from renewable energy. The Region exports electricity (126 ktep, equal to 102% of internal energy consumption) and among the renewable primary resources, bioenergy cover a share of 54.3%.

Molise is a region of southern Italy that is predominantly mountainous and contains little to no plains. Molise is the 19th (penultimate) Italian region by size, bordered by: the Abruzzo Region to the north, Lazio Region to the west, Campania Region to the south and Apulia Region to the southeast; the Molise Region also has a short stretch of coastline (35 km) on the Adriatic Sea in the northeast.

Municipality of Kaunas District (Lithuania)

The Lithuanian partner, the Kaunas District, addresses the Strategic Development Plan of the Municipality of Kaunas District for 2013 - 2020.

The Municipality of Kaunas District is situated in the southern part of the Lithuanian central lowlands. The Kaunas District surrounds the second largest city in Lithuania—Kaunas covers 1496 km^2, which amounts to 2.29% of the Republic of Lithuania. It is one of 60 municipalities in Lithuania. Further, the Kaunas District Municipality is subdivided into 25 elderships comprised of 371 villages, 9 small towns and 3 bigger towns.

In the Kaunas District, biofuel and natural gas are the most used sources of energy. Private houses are usually heated by their own biofuel boilers. Most of the natural gas in the district is consumed by industrial enterprises, utilities, household consumers and residents.

University of Malta (Malta)

Within the ZEROCO2 project, the University of Malta aims to improve policy on national level.

Malta is a small island with a very high density of population and tourists. This puts heavy demand on the use of energy and other resources. However, there is an untapped potential for energy saving and energy efficiency, especially in the area of renovation of existing buildings. Insulation, shading, and shifting to heat pump water heating or solar heating are among the most prominent measures that can be promoted further. The use of solar photovoltaics has increased substantially from 2010 onwards, and it is planned that the total capacity will reach 180 MWP by 2020, which will represent 4.7% renewable energy share. The 2016 communal solar photovoltaic farm scheme, which enabled households with no access to a rooftop to benefit from photovoltaics, was already a very effective policy initiative by the government.

Solar water heating, a mature and efficient RES solution for Malta that can allow for hot water storage and therefore can reduce peak loads from the power station, was very popular between 2006 and 2010, but its demand has declined in recent years given that the incentive for PVs is more financially attractive. The current solar water heating grant has remained the same throughout the years and therefore requires to be revised to make this technology financially feasible.

Wind energy in Malta has seen a setback because there are certain limitations, especially from the environmental point of view, both for the offshore and onshore wind farms. The potential for onshore wind is limited given Malta's size and high population density. Energy from waste is already contributing towards the generation of renewable energy through the extraction of biogas from landfills, which is fed into small combined heat and power plants for energy production.

Thermopolis Ltd. (Finland)

Thermopolis Ltd. is the ZEROCO2 partner from Finland. By addressing the Regional Strategy of South Ostrobothnia, Thermopolis will improve policy on regional level.

Finland is a northern country of forests (7.2% of total area), lakes (bodies of water make up 10% of total area), long stretches of open land and a low population density. Finland also has an energy-intensive industrial sector. Thus, it is not surprising that the three largest energy energy consumers in Finland are industry (45% of all primary energy consumed in Finland), heating of buildings (26%) and transport (17%).

South Ostrobothnia is located in western Finland, which is divided into 17 different municipalities. The area has a large number of small and medium sized enterprises. Agriculture is important. The landscape is made of open fields and rivers. The region represents about 4% of Finland's area, and about 3.5% of Finland's population lives in the region.

The region South Ostrobothnia consumes 40% of its energy by heating buildings. The three main sources of energy are oil (43%), wood fuels (22%) and nuclear energy (10%). Regional values of energy consumption do not include rail transport. There are no large forest industry plants, so there is no consumption of black liquor or other concentrated liquors that are by-products of the pulp and paper industry.

In South Ostrobothnia, oil is the most commonly used energy source. As there is no large-scale energy intensive industry (e.g. pulp or paper factories) in the region, so the energy share for transport, farming and heating by oil is exaggerated.

A.V.I.TE.M – Agency for Sustainable Mediterranean Cities and Territories (France)

The French Partner A.V.I.Te.M was created to design, experiment and assess best practices and innovative solutions in the field of sustainable urban and territorial development. Within the scope of the ZEROCO2 project, A.V.I.Te.M envisions the improvement of policy on regional level.

The Provence-Alpes-Côte d'Azur Region in France is composed of 6 areas: Bouches-du-Rhône, Vaucluse, Var, Alpes-Maritimes, Alpes de-Haute-Provence and Hautes-Alpes. These areas include both coastal and mountainous zones.

The Provence-Alpes-Côte d'Azur Region is among the most prolific energy consuming regions in France. The industry sector in this region is more abundant in large infrastructure than at national level, especially around the Berre Pond. The transportation sector also remains a large energy consumer due to the national and international logistic roles of the region, on top of residential transportation—since public transport is weak—and tourist flows. Finally, the residential-tertiary sector represents an energy use share that is lower than the national share, but still significant.

The energy mix is dominated by fossil energies, with oil products (transport, heat and industrial processes) ranking first, followed by gas and coal. Another regional characteristic is the strong penetration of electric heat.

The European Institute of Innovation (Germany)

The German partner, EIfI, is the Communication Manager of the project.

5. Good Practice Examples

In the following section, Good Practice examples collected by each partner (except ElfI) from their respective region or country are introduced. The Good Practice examples are demonstrated below.

5.1 Local Energy Agency Spodnje Podravje (Slovenia)

The first Good Practice example from Slovenia is demonstrated through their project on energy renovations of primary schools, kindergartens, health centres and libraries owned by local communities, for the period 2007 – 2013 (responsible body: Ministry of Infrastructure). LEA's projects were dedicated to the co-financing of operations for energy rehabilitation of buildings owned by local communities, which serves as an exemplary good practice example as well.

Energy renovation of 7 buildings of the Kindergarten Ptuj

Main institution involved	Kindergarten of Ptuj, Municipality Ptuj	
Location of the practice	Country	Slovenia
	NUTS 1	
	NUTS 2	
	NUTS 3	
Detailed description		
Detailed information on the practice	Kindergarten Ptuj is comprised of 10 buildings. In 2013, the Municipality of Ptuj, as the owner of the kindergartens, tackled energy renovation with the aim of reducing energy consumption for heating and ensuring favourable conditions for children in terms of the education and training process. Within the implemented action were renovated 7 buildings with the total heating surface of 4,408 m^2. To reach foreseen savings, measures on the buildings envelope were implemented: • Windows (935 m^2) • Façade (2323 m^2) • Attic (4408 m^2) This project serves as a Good Practice example in terms of ensuring environmentally friendly and energy-efficient spatial conditions for children in the context of educational process, in addition to improving working conditions for employees. The project was co-financed by the European Cohesion Fund (85% of eligible costs).	

	Subsidy granted by the Call: **Energy renovation of primary schools, kindergartens, health centres and libraries owned by local communities, for the period 2007 – 2013** (responsible body – Ministry of Infrastructure) These renovations can be easy transferred into other regions, especially if there is availability of European cohesion fund or other sources.
Resources needed	Total investment for energy renovation of 7 kindergarten buildings was 1,028,013 €. 85% of eligible costs were co-financed by the European cohesion fund and the rest by the Municipality of Ptuj.
Timescale (start/end date)	October 2013 – August 2014
Evidence of success (results achieved)	After implementing energy efficiency measures, there are energy savings of 544.5 MWh/year, which means the cost for energy has reduced by 26,000 €/year. Total energy consumption has reduced by 65%. Besides energy and money savings, the conditions for children have improved, as well as the working conditions for employees. The buildings are now environmentally friendly and energy efficient.
Difficulties encountered/ lessons learned	
Potential for learning or transfer	Energy efficiency measures can be applied to any other public, private or residential building that is willing to reduce energy consumption and to save money. This Good Practice is easily transferable to other regions, especially if there is availability of any kind of funds for these measures (European Cohesion Fund, national funds, etc.)
Further information	www.lea-ptuj.si

Contact details

Name	
Organisation	Local Energy Agency Spodnje Podravje
Email	info@lea-ptuj.si



Figure 2: Energy renovation of Kindergarten Ptuj buildings.

Energy renovation of Primary school Anica Černejeva Makole

Main institution involved	Primary school Anica Černejeva Makole, Municipality Makole.	
Location of the practice	Country	Slovenia
	NUTS 1	
	NUTS 2	
	NUTS 3	
Detailed description		
Detailed information on the practice	The Primary school Makole building was built in 1980. Due to high energy costs for heating, the owner of the building (Municipality Makole) decided to renovate the building. To reach the foreseen savings, the following measures were implemented: • Implementation of measures on the buildings envelope: - Windows - Façade - Attic • Implementation of measures on technical systems: - Optimization of the heating system - Installation of a wood pellet boiler This renovation is a Good Practice in terms of ensuring environmentally friendly and energy-efficient spatial conditions for children in the context of educational process and improving working conditions for employees. The project was co-financed by the European Cohesion Fund. Subsidy granted by the Call: Co-financing of operations for energy rehabilitation of buildings owned by local communities. These renovations can be easy transferred into other regions, especially if there is availability of European Cohesion Funds or other sources.	

Resources needed	Total investment for energy renovation of the Primary school Anica Černejeva Makole was 332,289.54 €. 234,394.74 € was covered by the Cohesion Fund and 97,894.80 € by the local community.
Timescale (start/end date)	June 2013 – October 2014
Evidence of success (results achieved)	After implementing energy efficiency measures there are energy savings of 115,432 MWh/year The energy production from renewable sources is 103,202 MWh/year. Besides energy and money savings, the conditions for children have improved, as well as the working conditions for employees. The building is now environmental friendly and energy efficient.
Difficulties encountered/ lessons learned	
Potential for learning or transfer	Energy efficiency measures can be applied to any other public, private or residential building that is willing to reduce energy consumption and to save money. This Good Practice is easily transferable to other regions, especially if there is availability of any kind of funds for the implementation of these measures (European Cohesion Fund, national funds, etc.)
Further information	www.lea-ptuj.si
Contact details	
Name	
Organisation	Local Energy Agency Spodnje Podravje
Email	info@lea-ptuj.si

Figure 3: Energy renovation of Primary school Anica Černejeva Makole.

5.2 Mediterranean Agronomic Institute of Chania (Crete, Greece)

Below are Good Practice examples for Greece, exhibited through their projects on renovating a zero CO2 emission commercial building that is not interconnected with the electric grid, a grid connected zero CO2 emission residential building, and the installation of solar-PV panels in the Orthodox Academy of Crete.

Creation of a zero CO2 emissions commercial building due to energy use which is not interconnected with the electric grid

Main institution involved	MAICH , CRETE, GREECE	
Location of the practice	Country	Greece
	NUTS 1	EL4
	NUTS 2	EL43
	NUTS 3	EL434
Detailed description		
Detailed information on the practice	1. The practice is addressed in the creation of zero CO2 emissions off-grid building due to energy. 2. The building covers its electricity needs with solar-PV and wind power and its heating needs with solid biomass burning. Electricity is stored in batteries. 3. The practice reaches the objectives for the creation of a zero CO2 emissions building. 4. The stakeholder and beneficiary of the practice is the company which owns the building.	
Resources needed	The total cost in order to create this zero CO2 emission building has been estimated at 21,700 € (covered area 35 m^2).	
Timescale (start/end date)	The Good Practice has been implemented 2007 onwards.	
Evidence of success (results achieved)	The building has operated smoothly for many years without fossil fuels consumption. Therefore, its CO2 emissions due to energy use are zero.	
Difficulties encountered/ lessons learned	Installation and operation of the abovementioned renewable energy systems went smoothly and without difficulties. The main lesson learned is that the creation of this type of building is rather simple.	
Potential for learning or transfer	We believe that the abovementioned installation is a Good Practice in our region could be transferred to other regions in Southern European countries, particularly in buildings which are not interconnected with the electric grid, because:	

	a) The renewable systems used are mature, reliable, well proven and cost effective; b) The installation cost of those systems is relative low compared with the cost of the building; c) The operating cost is also low compared with the cost of using fossil fuels instead of renewable energies (It is due only to solid biomass use); d) The same technologies could be used in other territories with high solar irradiance, satisfactory wind energy resources and availability of solid biomass resources.
Further information	
Contact details	
Name	Ioannis VOURDOUBAS
Organisation	MAICH
Email	vourdoubas@maich.gr

Figure 4: Creation of a zero CO2 emissions commercial building due to energy use.

GRID CONNECTED SMALL RESIDENTIAL BUILDING WITH ZERO CO2 EMISSIONS DUE TO ENERGY USE

Main institution involved	MAICH , CRETE, GREECE	
Location of the practice	Country	Greece
	NUTS 1	EL4

	NUTS 2	EL43
	NUTS 3	EL434

Detailed description

Detailed information on the practice	1. The practice is related to the creation of a small zero CO2 emissions residential building due to energy use. 2. It is directly connected with the objectives of the project. 3. The stakeholders and beneficiaries are the owners and the tenant in the apartment. 4. The building covers its electricity needs with a solar-PV system, its hot water needs with a solar-thermal system and its space heating needs with solid biomass burning.
Resources needed	The total cost of renewable energy technologies installed was 14,600 € or 112.3 €/m^2 of covered surface.
Timescale (start/end date)	The renewable energy systems were installed during June 2015 – October 2016
Evidence of success (results achieved)	The renewable energy systems operate smoothly. There is no consumption of fossil fuels and the solar PV electricity generated and injected into the grid offsets the grid electricity consumed annually.
Difficulties encountered/ lessons learned	There were not any difficulties in the implementation of the project. The main lesson learned is that the creation of residential buildings with zero CO2 emissions is neither difficult nor costly.
Potential for learning or transfer	We believe that the abovementioned installation is a Good Practice in our territory and could be transferred in other territories as well because: a) The renewable systems used are mature, reliable and cost effective; b) The installation cost of those systems is relative low compared with the construction cost of the building; c) The operating cost is also low compared with the cost of using fossil fuels instead of renewable energies; d) The same technologies could be used in other territories with high solar irradiance and availability of solid biomass resources.
Further information	

Contact details

Name	Ioannis VOURDOUBAS
Organisation	MAICH
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Figure 5: Small residential building with zero CO2 Emissions due to Energy use.

INSTALLATION OF SOLAR-PV PANELS IN THE PREMISES OF THE ORTHODOX ACADEMY OF CRETE

Main institution involved	MAICH , CRETE, GREECE	
Location of the practice	Country	Greece
	NUTS 1	EL4
	NUTS 2	EL43
	NUTS 3	EL434
Detailed description		
Detailed information on the practice	1. The practice is related to the installation of a solar-PV system in the premises of Orthodoxy Academy of Crete in Chania for offsetting its annual electricity consumption and reducing carbon emissions due to energy use. The main energy source used in the Academy is electricity and its carbon emissions are mainly due to electricity use. Current consumption of oil or gas is rather low. Solar-PV electricity could annually offset part or all of the grid electricity use according to net-metering initiative. It has been estimated that electricity generation from the solar-PV system installed corresponds with approximately 30% of its annual electricity needs. 2. It is directly connected with the objectives of the project since it results in the decrease of CO2 emissions due to energy use in the premises of the Academy. Annual electricity generation from the solar-PV system is approximately 75 MWh	

	resulting in annual emission savings of 56 tons CO2. 3. The stakeholders and beneficiaries are the owners of the energy system, which belongs to the Orthodox academy of Crete.
Resources needed	The total cost of renewable energy system installed with nominal power of 50 KWp was 70.000 €. The system was installed on the terrace of the buildings in Orthodox Academy.
Timescale (start/end date)	The solar-PV system was installed during 2017
Evidence of success (results achieved)	The solar-PV system operates smoothly. The solar-PV electricity generated and injected into the grid offsets part the grid electricity consumed annually. Since the system has been in operation only for few months, detailed results will be assessed later (after one or more years of operation).
Difficulties encountered/ lessons learned	There were not any difficulties in the implementation of the project. The main lesson learned is that the creation of buildings with zero CO2 emissions is neither difficult nor costly.
Potential for learning or transfer	We believe that the abovementioned installation is a Good Practice in our territory and could be transferred in other territories as well because: a) The technology of the solar-PV system used is mature, reliable and cost effective b) The capital and installation cost of those systems is relative low compared with the construction cost of the building c) The operating cost is also low compared with the cost of using fossil fuels instead of renewable energies. The pay-back period of the investment has been estimated at 8-10 years. d) The same technologies could be used in other territories with high solar irradiance, preferably in Mediterranean region.
Further information	
Contact details	
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Figure 6: Installation of Solar-PV panels in the premises of the Orthodox Academy of Crete.

5.3 Molise Region (Italy)

Below are Good Practice examples for the Molise Region of Italy, exhibited through their projects regarding low enthalpy geothermal heat pumps for heat generation, as well as the construction of an energy efficient building that serves as a nursery school, primary school, and secondary school.

Low Enthalpy Geothermal heat pumps for heat generation

Main institution involved	Istituto Comprensivo "Alighieri" del comune di Ripalimosani (CB) [building user] Regione Molise [moneylender]	
Location of the practice	Country	Italy
	NUTS 1	
	NUTS 2	
	NUTS 3	
Detailed description		
Detailed information on the practice	The practice described here is the reconstruction and optimization of the gym annexed to the municipal school of Ripalimosani (CB). The intent was to enhance the thermal energy efficiency of the plant and to reduce the total energy consumption of the building. The building is the gym used by the school both for normal teaching activities and for afternoon activities. The reduction of total energy consumption is reached using a low enthalpy geothermal plant. This kind of thermal plant is composed of vertical geothermal probes combined with high efficiency heat pumps that supply energy to the building with very low emission of CO2. The replacement of the old thermal plant with the new and more efficient one allows for the enhancement of the total energy efficiency of the building and the reduction of energy consumption by approximately 30%. The main beneficiaries of this practice are the Scholastic Institute (because of the improvement of the climatic condition inside the building) and the local government (because of the promotion of the use of high efficiency practices on the territories and the reduction of the energy costs).	
Resources needed	The total amount of the installation costs is about 50,000 €.	
Timescale (start/end date)	e.g. June 2012 – May 2014	
Evidence of success (results achieved)	The results of the application of this practice focus on the strong reduction of both the fossil	

	fuel energy consumption and the CO2 and pollutions emission in the atmosphere. The total enhancement of the energy consumption efficiency is approximately of 30%.
Difficulties encountered/ lessons learned	The lesson learned during the implementation of the practice is to focus on the importance of the calibration of the specific technology on the real energy needs of the building.
Potential for learning or transfer	This practice can be considered a Good Practice example for the other regions because it provides a solution for the reduction of energy consumption and the reduction of the emission of CO2 and other pollutants into the atmosphere. The use of high efficiency heat pumps is considered the best way to enhance the efficiency of the heat plants. The combination of the heat pumps with the geothermal probes is indicated in case the building is located where the outside temperature can reach negative values. In this case, the stabilized temperature of the ground allows the heat pumps to work in the high efficiency working region. In addition, combining the heat pumps system with a solar PV plant for the local electric energy production results in better efficiency of the total system and further reduction of the total emission of CO2.
Further information	http://colibrimagazine.it/sociale-e-servizi/palestra-nuova-zecca-ripalimosani-taglio-del-nastro/
Contact details	
Name	Mrs. Sandra Scarlatelli
Organisation	Molise Region
Email	zeroco2@mail.regione.molise.it

Figure 7: Remodelled school gym utilizing low enthalpy heat pumps

Construction of a building used as nursery school, primary school and secondary school

Main institution involved	Municipality of MAFALDA (Campobasso – Molise Region)	
Location of the practice	Country	Italy
	NUTS 1	ITF
	NUTS 2	ITF2
	NUTS 3	ITF22
Detailed description		
Detailed information on the practice	The building, used for school activities, is composed of three levels, in addition to an armed concrete structure and a laminated wood cover. The primary scope of the practice described here is to design a building with a low level of energy consumption and a high-level comfort for the kids. On top of this, the new plant must produce the energy needed by the primary needs of the building (heating, hot water, lighting, HVAC systems supply, etc.) on site. In order to achieve a high-level thermal comfort (especially important for the nursery school), a radiant underfloor heating system was installed. This kind of system requires fluid to reach quite a low temperature. The low temperature makes it possible to achieve high efficiency of the heat pump, which supplies thermal energy to the heating system. In case of emergency, a traditional boiler is installed. The energy needed by the heat pump and electric loads is supplied by the photovoltaic plant installed on the rooftop of the building. Its electrical power is 20 kW. The hot water production is enabled using solar panels installed nearby the PV-plant. The HVAC system, in order to maximize the system efficiency, uses high-efficiency heat-recovery systems, according to Erp2016 directive. By installing this kind of recovery system in each part of the building, the air is renewed without energy losses.	
Resources needed	The financial resources needed the practice are: a) 1,933,500 € by Commissioner Structure Post-earthquake activity—Commissioner Delegate Decree No. 114 of 20/04/2012; b) 1,200,000 € by Molise Region, Public Building Service, “Safe Schools” program (resolution of the Molise Regional Council. n. 687 of 23/08/2011).	

Timescale (start/end date)	Start date: 22/06/2015 End date: 30/11/2017
Evidence of success (results achieved)	The application of high energy efficiency practices in buildings allows for both a high level of indoor comfort and wellness as well as low energy consumption. Making a comparison with a building that has the same characteristics, other than traditional heating systems that do not utilize renewable forms of energy, it is possible to quantify the reduction of energy consumption by about 33%.
Difficulties encountered/ lessons learned	The lesson learned during the implementation of the practice is to focus on the importance of the calibration of the specific technology on the real energy needs of the building.
Potential for learning or transfer	The experience made can be easily transferred to other similar applications, in order to make this kind of practice the standard in the renovation of buildings.
Further information	http://www.ansa.it/molise/notizie/2017/09/30/sisma-nuova-scuola-a-mafalda_9f1d5537-c03a-4866-83f2-41b6bf73564a.html
Contact details	
Name	Mrs. Sandra Scarlatelli
Organisation	Molise Region
Email	zeroco2@mail.regione.molise.it

Figure 8: Renovated school in Malfalda Municipality that has adopted energy efficient practices

5.4 Municipality of Kaunas District (Lithuania)

Below are Good Practice examples for Lithuania, exhibited through their projects on the energy efficient renewal of urban areas, as well as renewable energy sources technology in Kaunas University of Technology (building number 9).

ENERGY EFFICIENT RENEWAL OF URBAN AREAS (QUARTER). Pilot project in Birštonas municipality

Main institution involved	Birštonas municipality	
Location of the practice	Country	Lithuania
	NUTS 1	Lithuania
	NUTS 2	Lithuania
	NUTS 3	Kaunas region
Detailed description		
Detailed information on the practice	From 2015 to 2017, a German-Lithuanian cooperation project has been dedicated to the topic “Energy-efficient redevelopment of urban areas”. The energetic refurbishment of the Lithuanian housing stock is a key aspect for sustainable urban development. Aware of this, the Ministry of Environment of Lithuania published recommendations for the preparation and implementation of energetic refurbishment programmes in urban areas in June 2016. Within the German-Lithuanian project, the municipalities of Šiauliai, Utena and Birštonas have prepared first integrated concepts for urban redevelopment. Urban area development is an integrated concepts of energy efficiency in 6 relevant sectors: 1. Buildings; 2. Land use; 3. Density (concentrating buildings); 4. Infrastructures; 5. Mobility; 6. Open spaces. Integrated concepts must be understood as processes rather than stand-alone solutions. Integrated concepts would improve energy efficiency and living environment quality of selected urban area. In addition, integrated concepts will increase energy efficiency, mobility and social living conditions in urban area. Relevant stakeholders – ministries, administrations, network operators, building owners, civil society.	

	Main benefits – increased energy efficiency and expenditures savings, higher living conditions and quality, more strategic wise urban area planning.
Resources needed	Total pilot project in Birštonas municipality costs 12,827,000 €. The project is funded by the Lithuania National and Birštonas municipality budgets, European Union structural funds, international institutions and private investors. The administrative body of project is Birštonas municipality.
Timescale (start/end date)	January 2016 – December 2022 (ongoing)
Evidence of success (results achieved)	Pilot project planned outputs: • Modernised 36 apartment buildings, 5 public buildings, roads and public places lightning, renewed infrastructure and open spaces; • Total yearly energy savings – 4,075,525 kWh (50%); • Higher living conditions and quality; • Strategic wise urban area planning.
Difficulties encountered/ lessons learned	
Potential for learning or transfer	This pilot project and 2 other pilot projects in different municipalities are initial program steps, after which the program will be implemented in other regions. Basically, this program is suitable to transfer not only to other regions but also to other countries. The main program advantages for successful transfer lies in the program planning process. This process is divided into concepts implemented by different level institutions (national agencies, municipalities). All national level processes have already been implemented and can be transferred to other regions in the same country. The municipality must choose urban areas to implement the project, as well as project activities guided by already prepared recommendations.
Further information	http://www.betalt.lt/wkd_projects/daugiabuciu-namu-modernizavimo-skatinimas/ (Lithuanian) https://www.e-tar.lt/portal/lt/legalAct/44a9aee0af0011e5b12fbb7dc920ee2c (Lithuanian) http://www.betalt.lt/wp-content/uploads/2016/09/insar_Layout_EN_online.pdf (English)
	Contact details
Name	/
Organisation	/
Email	/

Renewable energy sources technologies in Kaunas University of Technology building No.: 9

Main institution involved	Kaunas university of technology	
Location of the practice	Country	Lithuania
	NUTS 1	Lithuania
	NUTS 2	Lithuania
	NUTS 3	Kaunas region
Detailed description		
Detailed information on the practice	In 2017, scientists from the Kaunas University of Technologies Faculty of Electrical and Electronics Engineering and scientists from Kaunas University of Technologies Faculty of Civil Engineering and Architecture initiated renewable energy sources technologies project for one of the universities buildings (building No.: 9). The aim of project was to create innovative energy production and accumulation system in building No. 9. The designed system consists of: • 380 kW power solar power system (photovoltaic); • 150 kW power geothermal heat pump “soil-water”; • Heat energy accumulator in water or ice. The most innovative technology used in this project is the heat energy water accumulator, which allows the storage of renewable energy in water or ice. The same technology is installed in ECOLAB laboratory in Germany. This project was developed not only to use renewable energy sources for building energy consumption, but also to increase efficiency of energy use in building. The project improved energy efficiency and working conditions for employed people in building. Relevant stakeholders – administration of university, university employees, university students, other universities and building owners interested in similar technologies. Main beneficiaries – increased energy efficiency and expenditures savings in the university, teaching material for university students, practice experience for university students and researchers.	
Resources needed	The project is financed by the Lithuania Investment Fund for Environment Protection (LAAIF). The project uses not only financial but also human resources of Kaunas Technology University researchers. Total project value is 968,914.76 €.	
Timescale (start/end date)	July 2016 – July 2018 (ongoing)	
Evidence of success (results achieved)	Planned outputs: • 375 MWh annual electricity energy production (about 20% of total need for building)	

	• 835 MWh annual heat energy production (about 66% of total need for building) • 318 tones decrease in annual building emission of CO2.
Difficulties encountered/ lessons learned	
Potential for learning or transfer	This project is suitable for other various types of buildings with large heating area (14,000 square meters in the current project) and high energy consumption. In addition, this project is beneficial to research and education areas of energy and electricity sector because it serves as material for education and research.
Further information	https://eef.ktu.edu/news/5500-m2-moderni-atsinaujinanciu-energijos-saltiniu-laboratorija-ant-ktu-pastato-stogo-ir-po-zeme/ (Lithuanian) https://epubl.ktu.edu/object/elaba:16057383/index.html (Lithuanian/English)
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5.5 University of Malta (Malta)

Below are Good Practice examples for Malta, exhibited through the projects dedicated toward building a solar photovoltaic communal farm scheme, in addition to a scheme for the use of heat pump water heaters for efficient energy production.

Solar Photovoltaic Communal Farm Scheme

Main institution involved	The Energy and Water Agency (EWA), who formulated the scheme, and the Regulator for Energy and Water Services (REWS), how regulates the scheme, are the main stakeholders for the Interreg-Europe Project ZEROCO2.	
Location of the practice	Country	Malta
	NUTS 1	MALTA
	NUTS 2	Malta
	NUTS 3	
Detailed description		
Detailed information on the practice	Problem addressed: Communal solar photovoltaic farm scheme with an allocation of 999 kWp, exclusively targeting residential sector whose main residence has no right of use of own rooftop for installing PVs—this is common in certain high rise buildings and ground floor tenements. The scheme gives the opportunity for households without a rooftop to reach nearly zero CO2 emissions due to operational energy use. Location of solar panel farm scheme: Tal-Fiddien Water Reservoir Rooftop, Rabat Site size: ≈16,000 m^2 (4,000 PV panels) Output: 999 kWp Pricing: 1.500 EUR/kWp with each residence having an option to purchase 1, 2 or 3 kWp. Units Credited: 1.550 units per kWp purchased Maintenance fees: 0 Term: 20 years Feed-in tariff allocated: 15 c/unit for first six years, 10.5 c/unit for remaining years Transferability: Yes, when changing address and in case of death (to heir). Application Limit: Total aggregate of 999kWp, which was reached in June 2017. The scheme operates on a first-come-first-served basis. Main stakeholders: The Energy and Water Agency (E&WA) formulated the scheme and the	

	Regulator for Energy and Water Services (REWS) regulates the scheme. Beneficiaries: 1) Households without access to a rooftop, 2) Government of Malta- to reach its reach its PV targets, for which approximately 190 MW of PV capacity are required to be installed by 2020. This 190 MW in PV capacity would be enough to contribute 4.7% out of the 10% national renewable energy target.
Resources needed	- Planning Authority applications for permits to install PVs on the water reservoir - Application for Electrical grid studies (Enemalta). - Application for FIT to responsible authority (REWS). - Writing of tenders and evaluation of tenders (EWA public procurement). - Contract compilation to company awarded the tender to procure, install and maintain PVs. - Processing of applications received, and contract compilation to investors. Project investment cost: 1.46 million €
Timescale (start/end date)	October 2016 to June 2017
Evidence of success (results achieved)	Communal PV farms operated by private contractors ensure reliability and optimal operation of the PV systems. The scheme is a win-win proposal for the 3 parties involved: 1) Government to achieve the RE target; 2) Private contractor for job creation in green markets; 3) The general public for achieving lower carbon footprint and a financial benefit, equivalent to 5% investment. The scheme was fully implemented in less than 9 months (24 Oct 2016 - 22 June 2017).
Difficulties encountered/ lessons learned	Such a scheme can also be extended to cater to households that have a rooftop but cannot install PVs due to shading obstructions such as shading from nearby households. It can also be extended to commercial sectors (such as restaurants), most of which do not have access to a rooftop.
Potential for learning or transfer	Given that such communal farm scheme was a success in Malta, an island where land is scarce, the idea can be implemented in other region and cities in Europe. Communal PV farms can fulfil the requirement for new buildings in cities to achieve nearly zero energy status after 2020,

	especially for those that do not have sufficient space in their immediate vicinity to install sufficient capacity to achieve the NZEB status.
Further information	Further information can be found on the Energy and Water Agency website (https://energywateragency.gov.mt)
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Figure 9: Fiddien Water Reservoir before adding the solar photovoltaic system

Figure 10: Fiddien Water Reservoir after adding the solar photovoltaic system

Heat Pump Water Heaters

Main institution involved	The Energy and Water Agency (EWA) who formulated the scheme. The EWA is one of the main stakeholders of the Interreg-Europe project ZEROCO2.	
Location of the practice	Country	Malta
	NUTS 1	MALTA
	NUTS 2	Malta
	NUTS 3	
Detailed description		
Detailed information on the practice	Problem addressed: Buildings with no rooftop access do not have the possibility to install a solar renewable energy source (solar water heaters) for hot water production. The incentive scheme for heat pump water heaters gives the possibility for these buildings to produce hot water more efficiently, when compared to the prevailing electric resistance boiler, while generating renewable energy, in accordance with Annex VII of the EU RE Directive on heat pumps operating in the heating mode. Such energy efficient heat pumps contribute and count towards the 10% renewable energy target for Malta and helps buildings reach the near zero CO2 emissions targets. The scheme is open to the residential sector, both for those with and without access to a rooftop, thus solving a multitude of issues such as confined space or shaded rooftops that prohibit the use of solar heaters, possibility of installing heat pumps in other spaces such as internal yards or wall-mounted. Grant: 40% subsidy, up to a maximum of 400 € Beneficiaries: 1) Households - to reduce their energy bill, enhance energy efficient use and produce renewable energy 2) Government of Malta – Heat pumps contribute towards reduction of carbon dioxide emissions and support the achievement of 10% national renewable energy target for 2020.	
Resources needed	- Processing of applications received	
Timescale (start/end date)	October 2017 to ongoing	
Evidence of success (results achieved)	This scheme has just been launched. Given that almost 60% of dwellings are flats/apartments/maisonettes as per 2011 National Census data, this scheme is likely to be	

	successful since such apartments have limited space on the roof to install multitudes of solar heaters. Domestic hot water is also one of the major energy consuming sectors in households. Shifting to heat pumps would reduce energy consumption by about 600 kWh/year for each household.
Difficulties encountered/ lessons learned	The proper use of heat pumps needs to be emphasized. For example, cycling of heat pumps around the set point temperature in stand-by mode is very inefficient and should be avoided. This scheme can also be extended to commercial sectors (such as restaurants, hotels), where energy consumption due to hot water energy is a major carbon emitter.
Potential for learning or transfer	This scheme can be implemented in any other region in Europe, especially in areas where the main energy source is electricity and there are no feasible options for the use of other sources such as natural gas, wood chips or solar energy.
Further information	Further information can be found on the Regulator for Energy and Water Agency website (www.rews.org.mt)
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Main institution involved	**The project leader for the project was the Energy and Water Agency (EWA). The EWA is one of the main stakeholders of the Interreg-Europe project ZEROCO2.**	
Location of the practice	Country	Malta
	NUTS 1	MALTA
	NUTS 2	Malta
	NUTS 3	
Detailed description		
Detailed information on the practice	The St. Nicholas College Siggiewi Primary School in Malta, is a school building with a total floor area of approximately 4,500 square meters. It has undergone deep energy retrofitting to attain zero-carbon emissions and positive-energy performance. The project was co-financed under ERDF 2007-2013 and is considered as a pilot	

	project to identify how best such school buildings should be renovated. Comfort analysis using DesignBuilder-EnergyPlus software showed that for summer: the school can attain adaptive comfort if its glazing is externally shaded and night purging is introduced. In contrast, for the winter period, mechanical ventilation plus an active heat source is required to achieve thermal comfort.External shading and demand controlled mechanical ventilation were therefore introduced in the school. The portable electric resistance heaters were replaced with a more energy efficient active heating source (infra-red panel heaters). In addition, a number of measures were implemented to achieve the zero carbon status positive energy building, as follows: • Photovoltaic solar systems were installed both on the roof and on the façade, which also serves as a shading element for the windows. • Electrical storage water heaters were replaced with instant water heaters. • Inefficient lighting was replaced with energy efficient light sources (T5 and LEDs) and automatic controls were introduced. • Internal Insulation was applied in some classrooms to serve as a test bed for future implementation. A fully automated pool cover was installed to reduce evaporative heat losses from the outdoor pool. In addition, unglazed solar absorbers were designed to provide at least half the heating energy required by the pool. Air to water heat pumps were added to complement the solar thermal system in heating the pool to international standards. A Building Management System (BMS) was installed to fully monitor and optimise the comfort and energy performance of the school. Further research is being undertaken to compare the actual school performance with the DesignBuilder-EnergyPlus software simulated results and further optimise the retrofitting requirements for schools in Malta.
Resources needed	- Application for ERDF funding (including financial feasibility), Dynamic building energy

	software simulation for identification of energy retrofit measures, Public procurement (writing and evaluation of tenders, contracts), project management during implementation of measures including quality management and quantity surveying.
Timescale (start/end date)	July 2014 to December 2015
Evidence of success (results achieved)	Project completion and disbursements of funds on time, zero carbon emissions, positive energy school, improvement in visual, thermal comfort and indoor air quality, reduced CO2 emissions by 115 tonnes/annum, higher awareness among the students and the public in general of the benefits of combining energy efficiency with renewable energy sources.
Difficulties encountered/ lessons learned	Challenge of managing the project to reduce inconvenience to school staff during implementation. Challenge to explain new concepts to members of staff (for example, the teachers needed to be convinced that the automatic ventilation system is capable of controlling carbon dioxide levels and therefore teachers should not worry about opening windows in the cold winter days to ensure air circulation). Challenge for suppliers to install and successfully operate technologies which are relatively new to Malta (for example, automatic external movable shading elements, new BMS functionalities, pool solar heating), continuous resource requirements to monitor BMS data to monitor, maintain and optimise systems.
Potential for learning or transfer	The school was well studied using state of the art building energy software simulation and optimization tools so as to ensure the best measures are chosen in terms of energy reduction, thermal and visual comfort. Ongoing analysis of performamance of the different energy efficiency measures will help to devise a best practice guide for retrofitting of schools in Malta. This can be used for other schools, as most schools in Malta have similar characteristics. The guide should also provide ideas to renovate schools in the Mediterranean region having a similar climate.
Further information	Financial support (over 1 million € in investment) for the energy efficiency measures was provided from ERDF 2007-2013. Photovoltaics were financed from local funds.

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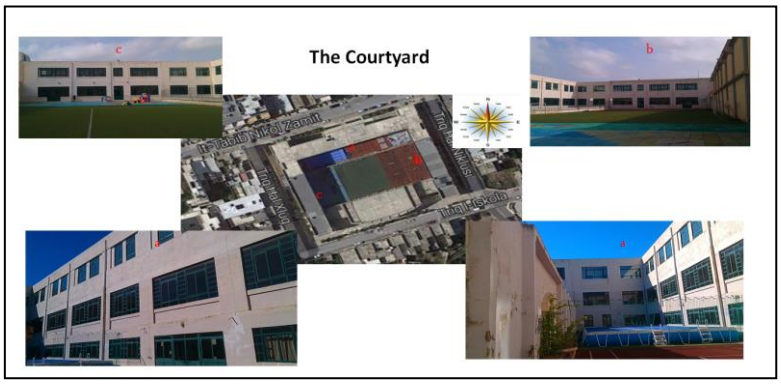


Figure 11: The Siggiewi primary school prior to the interventions

Figure 12: Unglazed pool solar thermal system and PV overhangs on the south courtyard facade (left image) and roof mounted Photovoltaics (right image)

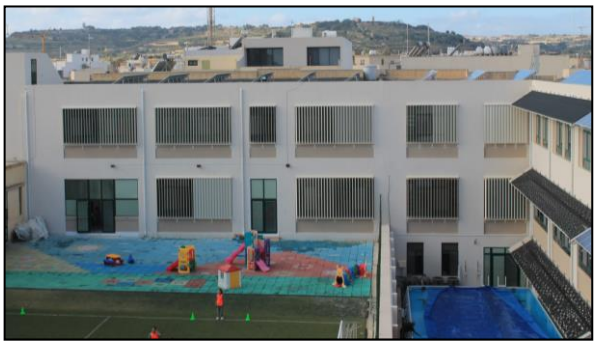
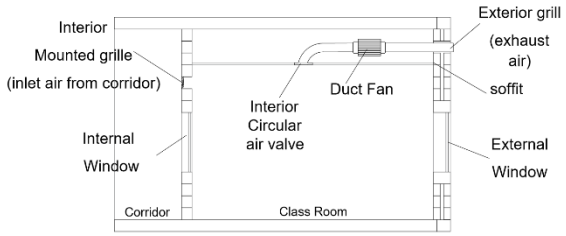


Figure 13: BMS controlled movable external vertical louvers on the East and west facades



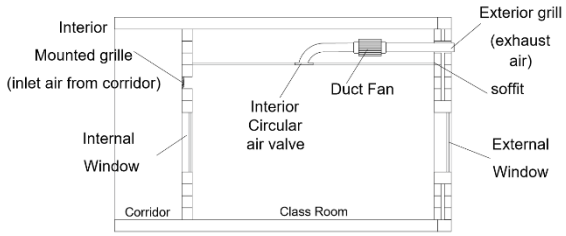


Figure 14: BMS and Demand controlled ventilation using CO2 sensors installed in the classrooms

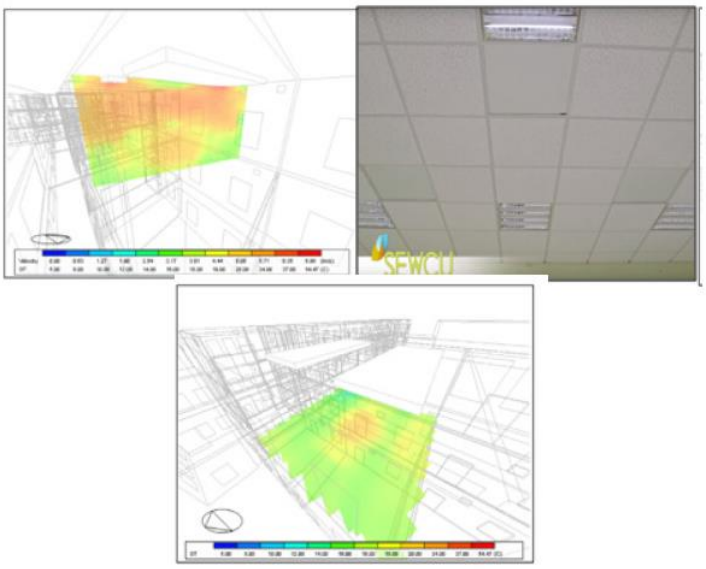


Figure 15 : BMS and black bulb sensor controlled infra-red panel heaters installed in the classrooms (middle image) - CFD analysis of a North facing classroom when simulated with mechanical ventilation and infra-red panel heaters (2 kW) during winter design conditions showing comfort is met (left and right images)

5.6 Thermopolis Ltd. (Finland)

Below are Good Practice examples for Finland, demonstrated by their development of a climate strategy for sustainable municipalities in Finland, in addition to their successful energy mapping in village clubhouses.

Sustainable municipalities – Kestävä

Title of the practice	Sustainable municipalities – Kestävä	
Does this practice come from an Interreg Europe Project	no [Technical: Good Practices outside the IR-E projects relevant to the topics and validated by the Policy Learning Platforms experts will also be included in the database]	
Main institution involved	Municipalities of Alavus, Ilmajoki, Kauhava,Kuortane, Kurikka and Lapua, Thermopolis Ltd.	
Location of the practice	Country	Finland
	NUTS 1	Manner-Suomi (Main land Finland)
	NUTS 2	Länsi-Suomi (West Finland)
	NUTS 3	Etelä-Pohjanmaa (South Ostrobothnia)
Detailed description		
Detailed information on the practice	The region has several small municipalities with limited resources to create and implement a Climate strategy. Eight municipalities joined their resources with Thermopolis the Energy Agency of South Ostrobothnia and through active teamwork wrote a joint climate strategy. The work started with a study on the region in a pre-strategy project. The writing of the climate strategy was funded by the ERDF in 2011-2012. The document was officially accepted in each municipality during the year 2012. Seven municipalities continued working together to implement the strategy in an ERDF funded project for the years 2013-2014. After these ERDF projects, the municipalities decided to continue working together in implementing the joint climate strategy. Each municipality formed energy efficiency teams with representatives from all the departments in the municipality. These teams meet regularly to plan and implement training for their co-workers, different kinds of events and give suggestions to the municipal boards on energy, climate and environment related issues. Also, each team has written an action plan for their municipality and these action plans are going through the process of becoming official documents that will guide the	

	governance of the municipalities. An important step in the process has been that the municipalities have joined the voluntary energy efficiency agreements that are made with the national government.
Resources needed	The writing of the climate strategy (EDRF) 187,585 € and ~5 person years. The first phase of implementing the strategy (EDRF) 90,000 € and ~2,5 person years. The continued implementation and development of the strategy around 60,000 €/year, ~0.8 to1-person year. These figures are only the people actually employed full time to coordinate and implement the project. Energy team members and other municipal workers participate during their work hours and thus the total amount is larger.
Timescale (start/end date)	Jan.2011-Feb.2013: The writing of the climate strategy (Seinäjoen seudun ilmastostrategia, EDRF) March.2013 - Dec.2014: The first phase of implementing the strategy (Kestävä Seinäjoen seutu, EDRF) Jan.2015 – ongoing: The continued implementation and development of the strategy
Evidence of success (results achieved)	Each municipality has continued implementing their strategy. Five of them are still collaborating together. The formed energy teams are very active and each municipality started energy and material efficiency training for their employees. The local waste management company is involved and the municipalities have gone over their waste management and modernized it including enough recycling bins etc. Schools have been provided with educational materials for grades 1-9.
Difficulties encountered/ lessons learned	The project required all sections of the municipality to work together to obtain long lasting results. This type of cross sectional co-operation is unusual in municipal organisations. Also, each department needed to realise their role in climate, energy, and environmental issues. The strategy needed to be simplified to very practical topics. To have lasting impact, the main decision makers need to be involved and kept informed. Also individual employees of the municipality need to be engaged. Including the right people in the energy teams is important.

	The work has to produce results that are documented and transferred to decision makers so that funding of the work continues. At least one person should be working fulltime on the project. The municipalities can share these costs.
Potential for learning or transfer	The example here shows how EDRF supported projects that continue the work of the previous can create a lasting movement within an organisation. Municipalities with small resources can join together to impact the climate change, without losing their "local touch" needed to bring the efforts into everyday operations. During the writing of the strategy, each municipality had members in thematic teams. Thus, each municipality ended up with the same strategy. The implementation phase has been guided by municipal specific energy teams, and each team has dealt with similar topics with a local twist.
Further information	http://kestavaseinajoenseutu.fi/default.aspx, website in Finnish, address to be updated in near future.

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Energy mapping of village clubhouses

Main institution involved	Registered association of Kuudestaan is a Leader Action Group (LAG), which operates in within the land area of the municipalities of Alavus, Kuortane, Soini and Ähtäri is the funder, Thermopolis Ltd carries out the energy mapping and communities that own clubhouses participate in the mapping of their clubhouse.	
Location of the practice	Country	Finland
	NUTS 1	West-Finland
	NUTS 2	South Ostrobothnia
	NUTS 3	

Detailed description

Detailed information on the practice	The clubhouses are village centres that are run mainly by voluntary workers. Because most of the buildings were built in the early 1900s, they are usually heated by oil or electricity and are not very

	energy efficient. Heating needs vary greatly depending on the level of use of the buildings. Rising energy prices are creating a challenge for communities to keep the clubhouses operational. An energy expert from Thermopolis visited these houses and helped the communities come up with a plan to improve their energy efficiency and switch to renewables. Individual reports were made for each building and user behaviour instructions were included. In addition, communities were advised on possible investments and improvements. Such as replacing an old oil boiler with a ground sourced heat pump. Many of the recommendations have been realized. The main stakeholders involved in this project are the village communities from the operational area of LAG Kuudestaan and Thermopolis Ltd. The main beneficiaries are the communities. This project is a step towards sustainable communities.
Resources needed	This practice is funded by the Rural Development Programme for Mainland Finland in the through LAG Kuudestaan. Total cost estimation is 83,826.00 €, (EAFRD 34%, the Finnish government 30%, LAG Kuudestaan 16% and private funding 20%).
Timescale (start/end date)	2015 – 2017 – ongoing
Evidence of success (results achieved)	The project has produced individual energy mapping reports for several community clubhouse buildings with suggestions on improving energy efficiency, reducing CO2 emissions and behavioural changes for building users. Many of these suggestions have been or will be realised. This has led to the decreasing of operational costs and thus increased the vitality of these community clubhouses.
Difficulties encountered/ lessons learned	The execution of this project has required co-operation between professionals of different fields, and the activation of the communities. Resources were limited.
Potential for learning or transfer	Similar projects have already been completed in other leader group regions in South Ostrobothnia by Thermopolis. This idea could easily be adopted to other regions for the benefit of countryside communities. Key success factors have been the individual reports for each building and the activity of local communities. With a focused direction, the communities can direct their small renovation funds to the most efficient changes. By mapping the conditions of the buildings and their energy usage, it was possible to improve user

	behaviour in relation to heating, for example. By energy mapping it is possible to identify where energy is consumed and why. Making reductions in energy consumption possible. This project is one step towards climate change mitigation and reaching expectations of the European climate strategy.
Further information	website in Finnish: http://www.thermopolis.fi/hankkeet/meneillaan-olevat-hankkeet/kokoontumistilojen-energiakatselmus-hanke/

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5.7 A.V.I.TE.M – Agency for Sustainable Mediterranean Cities and Territories (France)

Below are Good Practice examples for France, exhibited through their projects on the rehabilitation of social housing towards energy efficiency, as well as their building of sustainable buildings in the Mediterranean region.

Housing Rehabilitation Energy Improvement Program II : Rehabilitation of social housing to reach the BBC - low energy building objective.

Main institution involved		
Location of the practice	Country	
	NUTS 1	
	NUTS 2	
	NUTS 3	
Detailed description		
Detailed information on the practice	*What is the problem addressed and the context which triggered the introduction of the practice?* The problem addressed is the need to achieve the national objectives of "energy transition". This is because there is an increasing energy insecurity as energy costs rise and the poorest populations are the first affected. Indeed, it is a public service obligation to support the rehabilitation of social housing to reach the BBC—low energy building standard. The Housing Rehabilitation Energy Improvement Program stems from a regional policy aiming at pushing forward housing energy performances and social requirements vis-a-vis poorest housings. *How does the practice reach its objectives and how it is implemented?* The practice is implemented and reaches its objectives by: • The support rehabilitation works responding to BBC standard: minimum 38% energy saving and C+ standard to receive Region co-financing. Minimum 50% energy saving and B standard to combine co-financing from Region and ERFD funds. • There is a contribution to costs reduction through tenants' support and performance follow-up of heating installations. The Purchase/Rehabilitation operations: funds can go from 3,000 € to 9,000 € per	

	housing depending on energy performance and saving. As well, there is a housing rehabilitation and energy performance improvement: 8 to 16% of eligible costs depending on energy performance and saving. • It promotes approaches that assist tenants in using rehabilitated housing. • Eventually the objective is to delete oil and propane as heating energy sources. *Who are the main stakeholders and beneficiaries of the practice?* The main stakeholders are social landlords and social housing organizations as well as local public enterprises. The final beneficiaries of this policy are the tenants of these buildings, especially low-income housing.
Resources needed	This project has a length of 5 years and the budget is voted on each year. In 2017, 4 million € (+ 9 million € ERDF) was provided. The financial forecasts are unknown for the upcoming years.
Timescale (start/end date)	2011-2015
Evidence of success (results achieved)	The Region contributed with over 60 million €over 4 years for the rehabilitation of 30,000 housings. This corresponds to about 10% of the regional social real estate. It has been seen that energy standards have increased passing from C+ to B. The tenants were considered active participants throughout the rehabilitation project duration to impact on behaviour change regarding energy use. Based on this successful practice, the program has been renewed for a third phase starting in 2017.
Difficulties encountered/ lessons learned	The low-carbon approach is not considered, even though renewable energy and bio-sourced materials are encouraged. There are no complementary components linked to renewable energy production challenges. The financial visibility of the program is uncertain, as budget is unknown for the upcoming years.
Potential for learning or transfer	Works carried out under this program, particularly focused on the thermal aspect, involved the residents in managing their renovated housing energy consumptions. Inhabitants' involvement is a strong added value insofar as program results are linked to use criteria and to a sociological approach which is often insufficiently taken into account. This practice within the implementation

	of this policy can inspire other regions. Capitalization on achievements was made in 2016 through a guidebook for residents' comprehensive support during the energy rehabilitations based on field experiences. This also provides social landlords with a set of methodological elements. It was carried out by the ARHLM (regional association gathering social landlords) and BDM (Mediterranean Sustainable Buildings association). The guidebook could be translated into English and disseminated to other European regions in view of transferring it.
Further information	http://www.enviroboite.net/programme-rhea-2-habitat-logement
Contact details	
Name	Service Habitat
Organisation	Région Provence-Alpes-Côte d'Azur
Email	

Mediterranean Sustainable Buildings approach – Bâtiments Durables Méditerranéens (BDM)

Main institution involved	EnvirobatBDM Provence-Alpes-Cotes d'Azur Region, France ADEME, national energy agency, France	
Location of the practice	Country	
	NUTS 1	
	NUTS 2	
	NUTS 3	
Detailed description		
Detailed information on the practice	*What is the problem addressed and the context which triggered the introduction of the practice?* The BDM approach (Bâtiments Durables Méditerranéens in French, or Sustainable Mediterranean Buildings in English) is a sustainable building project management approach designed to support decision makers. It has been developed by EnvirobatBDM, an association of building and planning professionals created in 2003 in the PACA region and based in Marseilles. It gathers more than 350 professionals and stakeholders. In 2008, these professionals decided to create an approach supporting sustainable buildings design adapted to the Mediterranean context and its specificities such as summer comfort and heat island effect, water management or local	

	materials. The approach was also designed to support capacity building of the local industry through feedback on Good Practices as well as failures. *How does the practice reach its objectives and how it is implemented?* BDM is a participative certification using a Participatory Guarantee System (PGS). It is therefore a locally focused quality assurance system. It represents an alternative to third party certification, particularly adapted to local markets and short supply chains. The reference framework, topics, criteria and indicators have been set up on a co-constructive and participative basis through numerous stakeholders' workshops to end up with a comprehensive frame tackling issues organised in 7 categories: implementation site, energy, water, materials, comfort and health, social and economy, and project management. Regularly, this framework is revised and updated to meet new requirements on sustainable approach, becoming more demanding and therefore upgrading the quality level of certified buildings. The assessment is carried out by a professional of sustainable building that is part of the project team, and who is trained to the BDM approach and tool. The professional is also in contact with the EVBDM team justifying the answers given to the assessment process in order to get the different label (bronze, silver or gold). The assessment is made at the three main steps of the project: design phase, building phase and operation phase. This allows following the project, promoting improvement and getting feedback on its implementation. The three certification steps take place during a "Commission". It is a public presentation of the project where a panel of experts provides feedback and advices on the assessment carried out and give the final label. It is therefore transparent and participative. *Who are the main stakeholders and beneficiaries of the practice?* The main beneficiaries of the practice are: project owners (public and private); project managers

	(architects, consultants, etc.); production companies; and manufacturers and material traders and PACA citizens living in these buildings.
Resources needed	There are 2 types of human resources mobilised to have the BDM system working: professional volunteer's members of the association and the association employees. The association employs 4 persons dedicated to the follow-up of the approach and tool. They organise the workshops, the commissions (one per month), are in contact with the project teams, organise the trainings, and so on. The members of the association participate on a voluntary basis to the workshop to upgrade the approach and are mobilised to be member of the commission jury that attributes the label.
Timescale (start/end date)	Started in 2008
Evidence of success (results achieved)	In 2017, EnvirobatBDM represents: • Over 300 members (for 13,500 jobs) project owners (public and private), project managers, consultants, production companies, manufacturers and material providers. • Over 250 trained professionals to the approach and tool • Over 370 projects recognized Mediterranean Sustainable Buildings representing more than 1 million square meters. • An online directory of over 5,000 sustainable construction professionals. • Demand for development of a similar approach on urban scale that was set up in 2016. • Demand by other French regions for support to develop similar tools on their territory (see ''Potential for learning or transfer'' section below)
Difficulties encountered/ lessons learned	The main weakness is that this label (BDM) is not recognized as a standard by the national authorities.
Potential for learning or transfer	The BDM approach offers a methodology for a contextualized supportive system to local development of sustainable buildings. This methodology can be applied in different territories willing to address sustainability issues locally. This is what is being experimented in the neighbouring Occitanie Region, as well as in the

	Ile-de-France Paris Region which are setting up the same approach inspired by BDM. Discussions are taking place with some other French regions. In Europe, thanks to its participation in Interreg projects, contacts have been made with other European regions that shown great interest in the approach.
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6. Conclusion

This collection of Good Practice examples demonstrates that various actions towards near zero emission buildings due to energy use and beyond are being implemented in regions and countries participating in the ZEROCO2 project. Many of these actions are indeed innovative and have a great potential to inspire other ZEROCO2 partners and beyond. As there is a variety of partners from different European countries, this guide can be useful to many types of cities and regions.

Reducing emissions has become and will continue to become a major global issue. Since it is estimated that buildings contribute as much as one-third of total greenhouse emissions in the EU, greening the building sector will play an important role in addressing this issue.

Good Practices presented in this guide are examples of successfully implemented projects resulting from different energy policies (renovation strategies, operational programmes, etc.). These projects are all excellent examples of strategies and programmes that are leading cities or regions in the direction of reducing emissions in buildings.

We hope that the exchange of Good Practices through this guide will further enhance policies towards near zero emission buildings due to energy use in partner regions and countries. We also hope that this guide can be used as basis for recognising the benefits of interregional cooperation in policy and planning.

7. Project Partners

	Local Energy Agency Spodnje Podravje (Lead partner)	SLOVENIA
	Mediterranean agronomic institute of Chania	GREECE
	Molise Region	ITALY
	Municipality of Kaunas District	LITHUANIA
	European Institute for Innovation	GERMANY
	Thermopolis LTD.	FINLAND
	Agency for sustainable Mediterranean cities and territories	FRANCE
	University of Malta	MALTA