ECO-Life - Sustainable Zero Carbon ECO-Town Developments Improving Quality of Life across EU

Final publishable executive summary report

Reporting Period:	From Dec. 2009 to June 2016
Project start date: 29 December 2009	Duration: 78 months
Deliverable:	-
Contract No:	TREN/FP7EN/239497/"ECO-Life"
Project Coordinator Name:	Reto M. Hummelshøj
Project Coordinator Organisation:	COWI A/S
Revision	Version 1

Project supported by the European Community:
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ECO-Life

ECO-LIFE - SUSTAINABLE ZERO CARBON ECO-TOWN DEVELOPMENTS IMPROVING QUALITY OF LIFE ACROSS EU

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October 2016

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PROJECT NO.	DOCUMENT NO.
A009179	-

VERSION	DATE OF ISSUE	DESCRIPTION	PREPARED	CHECKED	APPROVED
1	28-10-2016	Final publishable executive summary	MGCH	LOBU/RMH	RMH

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1 Executive summary

1.1 Project objectives

The ECO-Life project (ECO-Life - Sustainable Zero Carbon ECO-Town Developments Improving Quality of Life across EU) comprises demonstration of ECO-Buildings and large-scale integration of renewable energy sources into energy supplies. These activities are demonstrated in two communities, Høje-Taastrup in Denmark and Kortrijk in Belgium while planning activities has been performed in Birštonas and Palanga in Lithuania.

1.2 Main results of the total project period

The projected start was in December 2009 and ended in June 2016. In more than six years the partnership across borders carried out sustainable urban development and knowledge sharing in Høje-Taastrup and Kortrijk successfully. The project includes refurbishment of almost 30,000 m² and construction of more than 27.000 m² of new houses of higher energy efficient standards than normal building regulations required. In order to fulfil the objective of developing CO_2 neutral communities as lighthouses for replicable purposes, the project also included installation of renewable energy systems. In total, more than 3,600 kW of photovoltaic systems and 380 kW of heat pumps was installed and complemented by solar thermal systems, energy efficient street lighting, battery chargers for electrical vehicles etc.

Due to economic reasons the partners in Birštonas, Lithuania was terminated in 2013 before any of the demonstrations were even started and the activities was transferred to the remaining communities.

The project has achieved substantially energy savings from demonstration buildings and a remarkable production of from renewable energy systems. In total yearly savings of 1,131 tons CO_2 have been achieved from buildings and more than 2,100 tons CO_2 are displaced yearly by the renewable energy systems.

The average payback time for all the demonstrations in Denmark and Belgium are approximately 17 and 24 years respectively on the total investment of more than 40,000,000 million EUR before the EU support and 12-14 year after.

Figure 1: Maps representing the three ECO-Life communities

2 Project content and objectives

2.1 General project objectives

The central theme of the project is the combination of energy efficiency in dwellings combined with maximum use of renewable energy sources and not least the introduction of innovative approaches for the involvement and engagement of the citizens to ensure long-term sustainable development. Project participants regard this as the way to contribute to Europe's goals for a sustainable future. The scientific and technological objectives and ambitious of empowerment of the project are hence to establish the technological and socio-economic basis for and to demonstrate innovative integrated energy concepts on the supply and demand sides of zero-carbon communities in Lithuania, Belgium and Denmark.

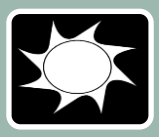
In short, the ECO-Life project objectives were:

- A real and visible impact in the countries, transforming urban areas of a significant size into CO_2 neutral communities. In Lithuania and Belgium, the effort is the first of its kind, and in Denmark, it has become the most integrated community of its kind. All three communities are pioneers in their field, setting very ambitious goals and will be national showcases for sustainable city development.

- Improvement of quality of life in the three communities in all aspects such as health, exercise, close distance to nature and recreation facilities, sustainable local transport, short distance to public transport, nursing and educational facilities, emphasis on local work places. Also, the use of improved communication technologies, the integration of advanced RES, RUE and polygeneration and communication technologies are important elements.

2.2 Community specific objectives

2.2.1 Høje Taastrup, Denmark



Renewable energy supply (RES)

- 2.634 kWp Photo Voltaic plants (PV)
- 86 m^2 Combined Solar Thermal and PV
- 3046 m^2 Solar Thermal
- 233 kW Decentral Heat Pumps
- Wind turbine monitoring

Energy efficiency in buildings (RUE)

- 11.029 m^2 (10.873 m^2)* Class A Refurbishment of Dwellings
- 6.203 m^2 A+ Institutions
- 3.962 m^2 A++ Deep refurbishment of munti family dwellings
- 3.665 m^2 (1.000 m^2)* A+ Office building (administration/ service offices)
- 2.276 m^2 A+, Class 1, New Low Energy Dwellings
- 1.428 m^2 A++ New Passive Houses
- 1.385 m^2 Refurbished Institutions

Polygeneration and ground source seasonal storage

- 122.6 kW Polygeneration Cooling
- 15 wells in 120 m depth

Integration of RES and RUE

- Extra RES covers need of the included ECO buildings after improving their energy efficiency by various RUE actions and generates surplus energy for the grids supplying the community
- Improvement of efficiency of DH generation and supply
- Integrated use of a segmented underground seasonal energy storage
- Battery charging of electric cars
- Intelligent 2-way energy metering, information and control equipment
- Use of low-energy street lighting

Specific innovations

- "Whole Town Approach" - involvement of citizens' right from the start to influence the design of the city, including implementation and use of different RUE and RES solutions
- New types of user installations will be tested (first in the flex houses and later on a larger scale) e.g. a new type of DH units, enabling houses to be supplied with very small pipe dimensions with a constant tiny flow, leading to very low energy pipe losses avoiding daily fluctuations
- A new type of smart metering, control and information systems (further development of APTUS and/or Housekeeper units). Improved control and management of heating, ventilation, air conditioning, lighting, and other devices, as well as the use of new / intelligent lighting techniques
- Use of prefab TABS (Thermo Active Building Systems) in office buildings for base load climatisation and load shedding, night cooling and off-peak charging / supply

2.2.2 Kortrijk, Belgium

Renewable energy supply (RES)

- 950 kW Bio Fuel Boiler (central + network + heat storage)
- 245 kWp Photo Voltaic Plants (PV)
- 126 kW Gasdriven Absorption Heat Pump
- 78 m^2 Solar Thermal
- 21 kW Decentral Heat Pumps

Energy efficiency in buildings (RUE)

- 7.034 m^2 Experimental area with Existing dwellings and New buildings/ apartments
- 17.774 m^2 Low-energy Renovation of Existing Building stock
- 3.942 m^2 Zero-energy Housing for newly planned houses in city centre and on industrial brown field

Polygeneration

- 9 kW El and 14 kW heat mini-CHP units on bio-fuel (70% RES considering – production energy). These units provide electricity for pumps and heat for the neighbourhood through a small district heating network.

Integration of RES and RUE

- RUE measures will make complete coverage energy demand by RES possible.
- New master plan / infrastructure for a higher density and sustainable use of existing area.
- Expansion of results to the whole building stock of HOUSE-BE (approx. 1.500 houses).

Specific innovations

- Use of district heating with a local RES-based energy central is an innovative technology used, especially in Belgium where by tradition energy sources are electric power and natural gas.
- Integrated approach of social (multicultural and deprived), complete neighbourhoods, considering all the aspects in a consistent sustainable way, concerning the implementation of RES and RUE, but also with an active involvement of the (social) tenants in the way of occupation of the dwellings and an intensive sensibilisation in the way of sustainable and conscious living, e.g.:
- Continuous follow-up and monitoring of energy use by tenants.
- Financial help and guidance of (social-housing) tenants by the social housing association on buying energy efficient household appliances and the integration of collective services by socio-economic projects.

Transport

- Internal transport in the experimental area will be closed for through motorized traffic, excepting public transport and services.
- A mobility study that evaluate and present solutions.

3 Project details

3.1 Contact persons for the project partners

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3.2 Project participants

24 project partners have participated in the project. Besides the coordinators, the partners have included municipalities, housing companies, energy suppliers, universities and other research institutions. In Table 1 below a full list of the project participants is shown. During the project period, a few of the partners have resigned.

Table 1: List of project participants

No.	Participant organisation name	Country	Short name
1 (Coordinator)	COWI A/S	DK	COWI-DK
2	Høje-Taastrup Kommune	DK	MUN-DK
3	Høje-Taastrup Fjernvarme a.m.b.a.	DK	UTIL-DK
4	VEKS I/S	DK	TRANS-DK
5	Teknologisk Institut	DK	RTD-DK
6	Det Grønne Hus - Energitjenesten (SME+NGO)	DK	INFO-DK
7	11CityDesign (SME)	DK	SOC-DK
8	Rockwool A/S	DK	IND-DK
9	AB APTUS Electronik	SE	ITC-SCAN
10	UAB COWI Lituva	LT	BALTIC-LT
11	Birstonas Municipality	LT	MUN-LT
12	Birštonas Šiluma (District Heating Company)	LT	UTIL-LT
13	UAB AVSC group	LT	DEV-LT
14	Lith. Builders Assoc. (SME)	LT	ASSOC-LT
15	Vilnius Gediminas Technical University	LT	UNI-LT
16	Housing and urban development agency	LT	URBAN-LT
17	Kortrijk Municipality	BE	MUN-BE
18	Goedkope Woning (SME)	BE	HOUSE-BE
19	BURO II + VAS (SME)	BE	BURO-BE
20	evr-Architecten (SME)	BE	CONS-BE
21	Ecopower (SME)	BE	UTIL-BE
22	University of Ghent	BE	UNI-BE
23	Palanga Municipality (Observer community)	LT	OBSERV-LT
24	UAB Būsto Idėja (SME)	LT	IDEA-LT

**CO = Coordinator*