



Ostend, region for clean energy Power-Link, Belgium

Summary

EOS (*Energy saving Ostend*) has been formed by the city of Ostend in order to lower energy costs for its inhabitants by decreasing the usage of energy. This kind of entity formed by a city council is **unique** in Belgium and, therefore, represents a **pilot project**. On the **resident level**, Ostend is also moving further towards a centre of clean energy on a **business level**. Not only private companies invest in renewable energy projects, but research is also available with the presence of the **Greenbridge Science Park** and the energy knowledge platform of Ghent University, **Power-Link**. All these initiatives led to an improvement in energy efficiency and effectiveness, as well as new developments in the clean-tech sector. Organisation and coordination form an important part, although this was achieved with the presence of local central contacts such as EOS and Power-Link. The 'triple helix' of academic-industry-government cooperation was a key component.

End-user area	Target Audience	Technical
<u>New Buildings</u>	<u>Citizens</u>	<u>Energy Efficiency</u>
<u>Transport and Mobility</u>	<u>Households</u>	<u>Heating</u>
<u>Industry</u>	<u>Schools and Universities</u>	<u>Cooling</u>
<u>Sustainable Communities</u>	<u>Decision Makers</u>	<u>Appliances</u>
<u>User Behaviour</u>	<u>Local and Regional Authorities</u>	<u>Lighting</u>
<u>Education</u>	<u>ESCOs</u>	<u>CHP</u>
	<u>Architects and Engineers</u>	<u>District Heating</u>
	Other	<u>Solar Energy</u>
	<u>Triple Helix</u>	<u>Biomass</u>
		<u>Wind</u>
		<u>Geothermal</u>
		<u>Hydro Power</u>
		Other
		<u>Clean Tech</u>

Context

Global warming is an international topic in the media, policy and public opinion. Action has to be taken in order to mitigate the effects of global warming and reduce the emissions of greenhouse gases, which only propagate the warming effect, not only on an industrial scale, but households are also an important target. In this way, the whole city and other actors are integrated and focussed on the same goal.

The rising energy costs together with the financial crisis form a big threat for households and industry. However, it also opens up new possibilities. Opportunities lay in investment and research towards new technologies like clean tech and renewable energy.

Although the actions are fully interconnected, they could be divided into the following groups:

- The citizens of Ostend
- The entrepreneurs of Ostend
- The heritage of the city of Ostend



Objectives

The region of Ostend has a lot going to become the **clean tech cluster** of Flanders, yet research, industry and government (**triple helix**) had to join forces. Starting points are the existing potential of the region, and the application of it for the various parties. Cooperation leads to cluster formation and specialisation and forms the basis for an international cross-top clean tech region.

In the light of its participation in the **Convenant of Mayors**, in 2007 the city of Ostend established a separate entity called "EOS" (*Energy saving Ostend*). EOS aims at **reducing the energy cost** and greenhouse gas **emissions** in private households. Furthermore, the city of Ostend systematically limits the consumption of energy in their own buildings. The port of Ostend hopes to be the pioneer of a **knowledge region for renewable energy** with the support of the energy knowledge platform of Ghent University, Power-Link, and the Greenbridge Science Park. It also hopes to serve the development of a **dynamic industrial clean tech region**. Research and innovation initiatives, performed in close cooperation with interregional and international triple helix actors, belong to the key objectives of **Power-Link**.

Process

The energy experts of EOS visit 700 **households** per year and produce a report on how they can reduce their energy consumption in the most efficient way. Every household receives a free "energy package" with small energy reducing goods e.g. aerated shower heads (cf. add. A1). The good example is being set through the energy handling of the local government buildings with the help of Federal Energy Services Company (**Fedesco**). The city of Ostend contracted the Fedesco to implement Energy Performance Contracts to retrofit the 6 buildings with the highest energy consumption. After this cooperation Ostend can use the experiences autonomously. This cooperation is unique in Belgium with Ostend acting as a **pilot project**, an example for the rest of Belgium.

Some of the advice the energy experts give is costly for the households. EOS solves this by funding green investment via interest free loans of up to €10 000 per household. As of 2010 EOS will provide 500 loans on a yearly basis for an amount of up to €3.75 million per year.

The port of Ostend has for several years invested in clean energy and these efforts are beginning to show results. A cluster of **energy companies** have been quietly founded around the port, including: **C-Power-** the initiator of the first offshore wind farm in Belgium. **Electrawinds-** the biggest private player in the Belgian renewable energy market (wind, solar and biomass) produces green energy in Ostend through one biofuel plant and one biosteaplant and developing international operations, **Building Group Verhelst-** in an area of 7 ha., **Enfinity** who has installed a solar system with a capacity of more than 2 MW and **REpower AG-** one of the leading international manufacturers of wind turbines for onshore and offshore applications opened a facility in the port of Ostend.

Research finds its ways through the **Greenbridge Science Park** of Ghent University. It provides incubator facilities designed to help high tech start-ups build up their company, with a particular focus on clean tech and/or smart tech. So, Greenbridge provides real leverage to the entrepreneurship. The **energy knowledge platform** of Ghent University, **Power-Link**, is the R&D motor of the Greenbridge Science Park. As a knowledge centre and network partner, Power-Link provides a central information service on sustainable and renewable energy sources and low carbon issues, it contributes to projects in new tech energy research as a coordination and dissemination partner enabling the collection of energy from wind, water, solar power, hydrogen, biomass and biofuel, white biotechnology, etc. and it encourages rational and/or reductive energy consumption by providing guidance and service to economic and social end users.

Ostend is a striking example of a Flemish region where government, industry and university (**triple helix**), all act in close consultation with each other.



Financial resources and partners

Table 1 represents the costs and funding sources of the EOS projects. For the energy loans EOS uses federal resources that have to be returned with interest. This interest is covered by EOS so free loans can be offered.

Table 1: costs and funding of EOS

costs (k€)	
Energy loans (interest, personnel...)	300
Energy experts	200
funding (k€)	
City of Ostend	250
Federal (loans)	170
Regional (experts)	80

Power-Link is funded by the European Regional Development Fund (ERDF), an instrument that offers financial support with the aim of improving convergence, strengthening competitiveness, creating employment and increasing sustainable internal cohesion. Besides private contribution, many - especially research - projects, are funded through the funding programs of the European, Flemish and West Flanders government. Greenbridge was also achieved with support of the European Regional Development Fund (ERDF) and the Flemish government.

Results

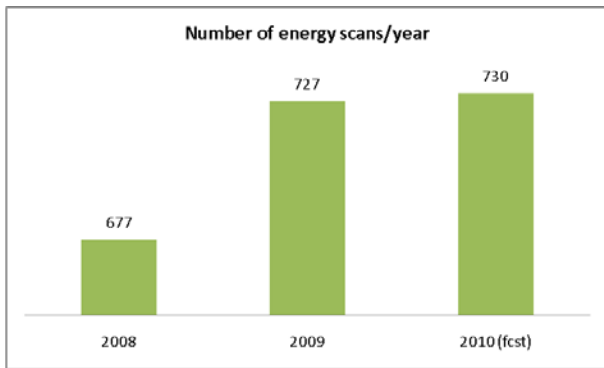
From 2007 till the end of 2009 more than **1465 energy scans** have been completed. Calculations have proven that the total savings from the scans equals **6 751 040 kWh/year**, which means the reduction of **2 351 325 kg CO₂ emission/year**. This results in an overall saving of **€ 597 000 /year**.

Table2: Results energy scans EOS

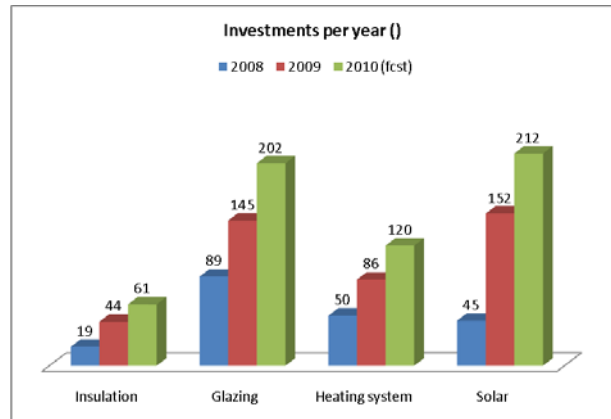
# Scans	Energy saving (kWh/year)	Cost saving (€/year)	CO₂-emission saving (kg/year)
1	6656	407	1605
1465	6 751 040	597 000	2 351 325



Case Study 28: Power-Link, Belgium



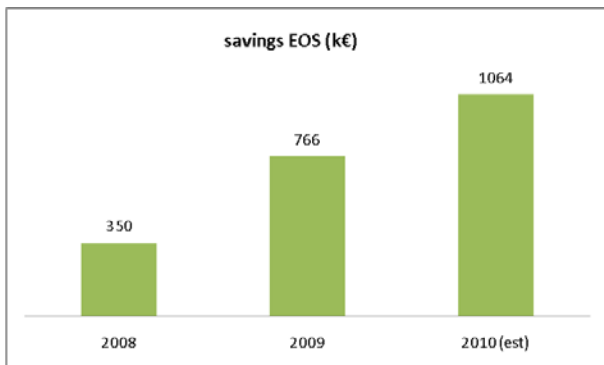
Graph 2: Number of energy scans/year



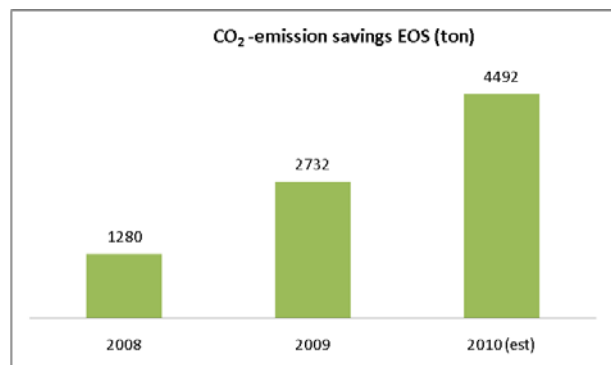
Graph 1: Energy friendly investments/year

In the last two years about **591** free **energy loans** have been given for a total amount of €3 380 612, resulting in a energy saving of 3 105 357 kWh, 470 352 kg CO₂ -emissions and €179 072 every year. In the mean time, the demand for energy loans keeps increasing every year.

Indirect these actions contribute to employment in the area. Every million euro invested in the renovation sector means 24 new jobs are created. In Ostend 4 million will be invested, which means about 100 new jobs.



Graph 4: Savings due to the energy scans



Graph 3: CO₂-emission savings due to the energy scans

On a **business level** there are many energy production and research projects being executed in the Ostend region; table 3 gives a not exhaustive overview.



Table 3: Data energy projects in Ostend

company	project	status	since	investment (k€)	power	energy production	avoided emission (ton/year)	new jobs
C-Power	Offshore wind farm	In progress	2009		so far: 30 MW (of 300 MW)	95 GWh (of 1000 GWh)	42 750 CO ₂ (of 450 000 CO ₂) 42,75 NO _x 19 SO ₂	***
Electrawinds	Biofuelplant	in operation		22 000	16.6 MWe	eq.38000 families	86258 CO ₂	***
Electrawinds	Bio-steamplant	Ready	2008	90 000	18 MWe	eq. 42850 families	87048 CO ₂	***
Greenbridge	TEB (O&O)	approved	2010	4500	-	**	**	4 fteq
Greenbridge	Hercules SWT (research)	approved	2010	581	50-100 kW	**	**	-
Greenbridge	Double tracker (research)	Ready	2009	-	3.6 kW	3600 kWh/jaar*	0,817 CO ₂ *	-
Power-Link	energy knowledge platform	In operation	2008	430	-	-	-	5 fteq

* Numbers based on theoretical values

** Values vary due to inclusion in research project

*** Numbers unknown

Fteq: full time equivalent

On the CO₂-neutral Greenbridge Science Park many different research projects have been started by the energy knowledge platform Power-Link.

- Implementation of innovative sustainable energy sources and their interaction with the distribution net, IWT TETRA, 01/10/07 - 30/09/09;
- Recycling of residual heat via an organic Rankine Cycle in applications of renewable energy, IWT TETRA, 01/10/07 - 30/09/09;
- Mie Energy, EWI, 01/03/08 - 31/12/10;
- Feasibility study of a low cost photo bioreactor for the culture of microalgae, IWT O&O, 01/01/08 - 31/12/09;
- Lipid-based, high value products and renewable energy from microalgae, IWT SBO, 01/02/09 - 31/01/13;
- Hydrogen Region Flanders - South-Netherlands, EFRO Interreg IV, 01/06/09 - 31/05/12; Power-Link functions as the single point of contact for hydrogen matters in the province of WestFlanders.



The Greenbridge Science Park also houses a number of **innovative demonstration projects** to test and to monitor new energy technologies:

- **Small Wind Turbines (SWT)** are demonstrated and research is conducted on them in a number of projects. In particular, the electricity production and economic efficiency of various SWT designs are measured. Technical, mechanical and electrical aspects of the design are optimised in an onsite SWT field laboratory.
- The **PV dual tracking project** is a test set-up designed to measure the electrical and economic efficiency of new types of photovoltaic (PV) panels under varying weather conditions.
- A pilot **alternative fuel station** on the Greenbridge site is planned to provide natural gas (CNG) and biogas as well as electricity generated by using PV panels.
- The University of Ghent **Solar House** project is a research initiative for the development of affordable energy self-sufficient housing options: a prototype do-it-yourself building-kit is under development to compete in the 2011 Solar Decathlon, a competition organized by the US Department of Energy for the design and demonstration of innovative solar powered houses.

Measurable data are being acquired and will be quantified by the end of the year. In addition, the realisation of these kinds of demonstrations represents the self sufficiency in energy for the Greenbridge incubator and its **CO₂-profile**.

Lessons learned and repeatability

When it comes to investments in new technologies, cases tend to stay theoretical because the practical action is a bigger threshold to cross, especially for households. In addition to the advice EOS provides; it also brings theory into practice by installing small energy reducing products in every house visited by an expert and by providing funds in order to persuade the citizens to renovate their house if necessary.

The problem EOS encounters is that demand is greater than supply. We overcame this by not promoting our services over the last year. In the mean time we're looking for extra funds.

Ostend - via EOS - is one of the few cities in Flanders who use the Flemish funds for energy efficiency investments. Due to its own input there can be free loans offered. This successful system acts as an example for other cities in Flanders.

The cooperation with Fedesco in order to deal with the energy efficiency of government buildings is a pilot project in Belgium and acts as a test case in which the experiences can be used in the application of the same project in other cities and municipalities. The way the city of Ostend works ensures the efficiency of their investments. Even small investments in the buildings can reduce the energy consumption and also sensitisation can be ignored in local policy. But if there is a way to reduce energy consumption on a large scale, large investment should be made. The budgets of cities are under pressure and therefore other solutions should be used.

Setting up new clean tech, new energy technologies, etc. projects involves certain difficulties or ambiguities concerning legislation, funding, and gathering partners. Furthermore, due to the many actors, coordination and administration requires much effort and time, and slows down the progress of the project. Scattered initiatives make it difficult to keep an overview of the experiences made and available knowledge from the past and present. This obstacle was intervened the raising of the energy platform Power-Link, acting as a coordinator, networker, guide of all kinds of renewable energy research and demonstration projects. Through its Triple Helix approach, Power-Link is able to facilitate project initiation and quantify the results and the experience gained.

In synergy with Power-Link, the Greenbridge Science Park seeks high-tech investors in clean technology, in particular energy related, and aims to implement and demonstrate high potential techniques. Proof of this last



aspect is the recent approval of the project “The Energy Box” (TEB): a demonstrator of new clean technologies. TEB demonstrates, interacts and commercialises emergent energy technologies.

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