Report on Best Practices

POWER
Low Carbon Economies

European Union
European Regional Development Fund

INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

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TIMBER Project

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Preface

TIMBER Project

The project TIMBER (Tools for Integrated Management of Biomass Energy Resources) is a European initiative developed within the framework of the "POWER Progamme: Low Carbon Economies (INTERREG IVC)" whose main objective is to design a standard model for the regional development of sustainable and renewable energy based on biomass resources. The POWER Programme is co-financed by the European Regional Development Fund (ERDF). (http://www.powerprogramme.eu)

Five European public entities work closely to develop this tool detecting barriers and constraints, performing feasibility studies and identifying best practices in each of the participating regions. Finally, the results and experience accumulated during the project will lead to the implementation of this model for the development of Biomass Action Plans at a regional level.

This report is the result of one of the activities that will be carried out in the TIMBER project; identifying Best Practices.
The identication of various best practices in the different regions has several objectives:

- To exchange knowledge and experiences to inspire the other TIMBER partners;
- The information that is exchanged can also be applicable for the TIMBER partners;
- The information and lessons learnt from the Best Practices will be used as input for the development of the model;
- The information will be sent to others as well by e-mail and will be posted on the POWER policy forum (powerprogramme.ning.com) so they can benefit from this knowledge and experience as well.

The best practices discussed cover several topics on how to contribute to a low carbon economy and will hopefully inspire other regions on how to set up similar projects in their region as well.

Best regards,

The Timber project team

POWER Low Carbon Economies
European Union
European Regional Development Fund
INTERREG IVC
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Biomass plant using prunings of hedgerows and windbreaks in Beetsterzwaag

Renewable Energies

Region
Friesland
The Netherlands

THEME

Renewable energy from windbreaks

OBJECTIVES

- To use prunings of hedgerows and windbreaks as biomass for renewable energy;
- Encourage the production and use of renewable energy, the quality of rural areas and employment;
- Provide heat to Rehabilitation Friesland and Lynden Steyn School.

LOCATION

Beetsterzwaag, Friesland, The Netherlands.

Province Friesland

Location Lynden Steyn School

DETAILED DESCRIPTION

Timescale
In 2004 a feasibility study and location study has been carried out. 28 locations were researched, On 16 january 2008 the plant was officially opened.

Bodies Involved / Implementation
The exploitation of the biomass plant is in the hands of the agricultural association "The Alde Delte from Opsterland". The agricultural association has developed a company incorporated under the name Delta T. Bio Energy BV. Also the foundation established the natural association BOOM which ensures a continuous supply of wood chips from the area around. They received several grants from different governmental organisations, such as the Province of Friesland, the municipality of Opsterland and also an Interreg IIIB North Sea Bio Energy subsidy. The overall projectmanagement has been executed by Rural Service Area North (Dienst Landelijk Gebied).

Process and detailed content of the practice
Far transports lead to higher transportation costs and increasingly extra energy. In this case, the fuel comes from the vicinity of Beetsterzwaag and does not has to be transported over long distances. The total CO_2 reduction compared to the use of natural gas is on an annual basis over 640 tonnes. In addition there is saved fossil energy per annum over 320.000 m^3 natural gas.

The rehabilitation center and school are located within the urban area of Beetsterzwaag and the installation is about 500 meters away built on a plot to Beetsterweg. To provide the

rehabilitation center and the school to heat a heat pipe has been built. By an exchanger the energy is transferred to the existing heating systems. The existing boilers in the rehabilitation center and the school will stay intact as a back-up and will run during cold winter days to help out.

The system basically works like a central heating. By the furnace, water in the heat exchanger is heated to 95 ° C and through a pipe system pumped over a distance of 500 meters to the heating of the rehabilitation center and the school. Then the water is cooled to 70 ° C and flows back through the return lines to the furnace.
The plant is locally controlled by the computer and using modern communications technology from the central in Austria continuously monitored of interference. When these occur, a warning immediately follows by cell phone.

Legal framework
The Law on Spatial Planning obliges to hold hedgerows and windbreaks for conservation, but for this particular area grants are no longer available. To keep the maintenance of the landscape affordable there has been searched for an alternative income. With the installation of a plant for bio-energy a perspective for Beetsterzwaag is found.
According to the Dutch Emission Guidelines, emissions of dust from the burning of clean wood is bounded. For a plant with a capacity of one megawatt, like the one in Beetsterzwaag, a requirement for emission of particulate matter of 50 mg/m^3 flue gas is set.

Financial Framework
The total investment for the 1 MW wood-fired incinerator with heat pipe structure and the property is approximately 800.000 euros.
Besides the contribution of farmers, financing comes from grants from the Interreg IIIB North Sea Bio Energy project, the province of Friesland, the A7-Zone Landstad Friesland Fund, the municipality Opsterland and LTO-project fund. The funding is hosted by the Triodos Bank.

Opportunities
- To maintain the hedgerows and windbreaks in the area ;
- The annual consumption of natural gas from the Rehabilitation Friesland School "Lynden Steyn" was about 400.000 m^3. If the wood-burning incinerator runs best, it comprises approximately 80% of the total energy demand. Therefore more than 320.000 m^3 of natural gas per year is saved.

Threats
- Decreasing demand of heat in the future, caused by more energy efficient buildings;
- Increased competition on bio fuels may results in rising prices;
- Risk with possible disruption to transport or fuel the plant.

CO_2 reduction (expected)
CO_2 saving approximately 640 tonnes / year

Energy production
1 MWth heat.

EVALUATION

Possible demonstrated results (eg through indicators)

- More than 320.000 m^3 of natural gas per year is being saved.
- CO_2 savings are approximately 640 tonnes / year
- Preservation of scenic landscape in the area (hedgerows and windbreaks)

Possible success factors

- Communication with policy makers and the public about the plant has been from the very beginning of the project an important focus for Beetsterzwaag;
- Prunings of hedgerows and windbreaks use as biomass to generate renewable energy.

LESSONS LEARNT

A small biomass plant can be realized. The pilot of Beetsterzwaag gives an impulse to the production and use of renewable energy, the quality of rural areas and to employment.

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New sustainable location for regional waste service

Renewable Energies/Energy Efficiency

Region
Noord-Brabant
The Netherlands

THEME

Sustainable building project that also includes use of renewable energies

OBJECTIVES

- To move 5 seperate locations of the regional waste collection service to 1 centralized location;
- To make this location as sustainable as possible.

LOCATION

's-Hertogenbosch, Noord-Brabant, The Netherlands

DETAILED DESCRIPTION

Time-scale

- September 2007 - decision municipality of 's-Hertogenbosch to move the five locations to one location;
- September 2007 - March 2009 Preparation phase;
- March 2009 - September 2011 (expected) construction phase.

Bodies involved/implementation

- Province of Noord-Brabant;
- Regional Waste Service, owned by the Municipality of 's-Hertogenbosch.

Process and detailed content of the practice

In September 2007 the municipality of 's-Hertogenbosch made the decision to move the 5 locations of the regional waste service to one location. At this location several activities will be carried out. such as:

- Collecting waste from households;
- Collecting waste from bussinesses;
- Collecting hazardous waste;
- Transfer station for waste.

The goal was to make this location as sustainable as possible. The preparation of the whole project took approximately 1,5 years. The preparation phase contained a raw design of the location, a first, preliminary design and the formulation of the final terms and specifications. Also a research has been carried out on how to reach the goal to make the location as sustainable as possible. This research covered a wide range of aspects, not only on sustainable constructing but also what kind of possibilities there were to use windenergy, solar energy, warmth storage and biomass based energy. The research showed that there were in fact opportunities to use these initiatives for the production of heat and energy for this location.

The research also showed that the initial budget wouldn't be sufficient for these kind of ambitions. However, when in June 2008 the municipal council of 's-Hertogenbosch determined the new climate policy, new opportunities occured to carry out these activities with an additional budget. Also the Province of Noord-Brabant invested in this project. Slowly the original goal to make the location as sustainable as possible, shifted to a new goal: to make the new location carbon neutral.

Since the regional waste service collects prunings, the research showed that there would be no trouble in producing warmth. The only problem was, to make it profitable other purchasers for the produced warmth needed to be found. Next to the location where the regional waste service will be established, is also a new bussiness area going to be set up. The bussinesses that were interested in moving to this new bussiness area were approached by the regional waste service to see if they had an interest in purchasing the warmth from them.

This resulted in 12 bussinesses that will be connected to the heating system by a 1,5 km long tube, transferring the heat from the incinerators to their offices.

After the preparation phase the construction of the location itself started. This will take approximately another 1,5 years and is expected to be ready in the second quarter of 2011.

Design of the location

Construction in progress

There are several ways in which the regional waste service establishes this carbon neutral location; sustainable constructing, renewable energies, exchange of energy/heating and warmth storage.

Sustainable constructing

By the use of:

- Maximum isolation;
- Green (overgrown) roofs, facades;
- Solartubes;
- LED-lights in the outside area;
- Daylight switched fixtures;

Renewable energies

- Between 4.000 to 5.000m^2 of solarcells on the roofs of the buildings for electricity. Since the energy production during the day is more than that used by the regional waste service and too little for what they need during the night, they contacted the Waterboard, which has several buildings situated next to the location of the waste service. The Water board itself produces electricity by processing sewage. Their need for energy is exactly the opposite: they need more during daytime and less during the night. The Waterboard and Regional Waste Service have decided to establish an electricity connection that allows them to transfer their surplus of electricity;
- Two wood-fired incinerators, producing 1,6 MW heating in total. The heat goes first into a reservoir where it's stored. In that way whenever an office needs the heat, you can avoid that the incinerators need to start up for individual offices. From the resevoir, the warmth gets transferred through heat exchange units, that is a seperate system. Each office has it's own connections to this system, with in their own building their own seperate system to distribute the heat. The incinerator will be producing energy for 8 months per year. Research showed that keeping the incinerators working during summer wouldn't be efficient. Therefore, they 're only turned on for 8 months a year.

Legal framework

There were several legislations that needed to be taken into account:

- Heat production legislation;
- Distortion of competition - The regional waste service received governmental fundings for constructing this new location and the incinerators. But they are going 'on the market' with the heat that is produced;
- Electricity legislation.

Financial framework

The heating system has a total cost of 1,5 million euros. The Regional Waste Service received 40% of fundings from the Province of Noord-Brabant for this investment.

EVALUATION

Energy production

1,6 MW_t.

Main Barriers and Threats

- Throughout the process it became very clear that a large sum of investments is needed for the development of these kind of installations. Without fundings, this concept wouldn't be able to exist.;
- With a small amount of purchasers, there is a large risk that if one of the purchasers for some reason fails to continue his contract (even though the contracts are for 10 years), a large part of the income needed to make the heating system profitable will fall out.

Possible demonstrated results

- This project developed itself along the way because of the commitment of different parties, such as politicians, governmental agencies as well as bussinesses and other energy producing companies in the area;
- A smallscale project can be profitable as long as the whole process is overthought really well and there are different parties willing to invest in an initiative like this.

LESSONS LEARNT

Success factors

- This project started out a bit smaller, but along the way it attracted more parties to participate in it. It was striking to see that the involvement of other parties attracted even more parties to join. This made it possible to let the project evolve;
- The establishment of a climate policy at the beginning of this project, created opportunities to set the goals for this location to a higher level.;
- The investments made by the Province of Noord-Brabant were crucial for the profitability of the heating system;
- The strength of this project is also in the short distance between the available resources (the biomass that gets collected on the location), the processing of the resources into wood-chips, and the purchasers located in the vicinity of the incinerators. This reduced the distribution costs significantly.

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Pilot project bio energy, "De Lier"

Renewable Energies

Region
Zuid-Holland
The Netherlands

THEME

Biobased energy from wood for the production of heat and electricity

OBJECTIVES

Deliver heat and electricity to three greenhouses.

LOCATION

De Lier, Zuid-Holland, The Netherlands

DETAILED DESCRIPTION

Time-scale
A greenhouse in the city Schipluiden, started experimenting in 1984 with heating of the greenhouse by the use of woodburning. They started experimenting with this sort of heating because they wanted to decrease their energy costs. However, this experiment didn't succeed.

In the 90's "Agro Adviesburo BV" carried out a brief feasibility study that looked at further possibilities of the use of wood burning for the production of heat and electricity. From the outcomes of this research the involved parties decided to establish a new installation.

In 1997 the installation provided heating. In 1999 the First Electricity was delivered from the installation.
With the results of the installation that was built in the 90's, the greenhouse wanted to start another project to build a new, modern installation, that could provide more heating and Electricity to other greenhouses as well.
This installation was set to use in 2006.

Agro AdviesBuro

Bodies involved/implementation
- Wood fiber and sawdust trading "De Lange BV" in Ursem (production);
- Local greenhouses and Agro Adviesburo BV.

Process and detailed content of the practice
Woodfiber and sawdust trading "De Lange BV" (WSL) is a supplier of wood and sawdust. The development of a biomass insincerator was a lucrative way to get rid of their sawdust and woodfiber residues.
This interest has resulted in WSL delivering heat to three greenhouses. The greenhouses save approximately 20% on their heating costs. To ensure that WSL will be delivering for a longer period to the greenhouses, the greenhouses and WSL agreed to a contract in which the greenhouses have a purchase obligation.
The greenhouses also have a conventional boiler in case for some reason WSL isn't able to deliver a sufficient amount of heating.

The biomass installation is managed by WSL. The biomass furnace gives the greenhouses a more sustainable identity. Because of this they are able to apply for 'green mortgages'. Green mortgages are loans with a low rates.

The future of the installation of WSL looks bright. Not only has one of the three greenhouses expanded, also one other greenhouse decided to partcipate in the project. Because of this the

heatingdemand had increased. To also increase the economical efficiency, WSL is looking into building a larger installation.

Legal framework
The biomass installation had to measure up to all environmental standards that concerned the project.

Financial framework
Overall investment is 2,3 million euros. The parties involved created a construction in which payment is attached to the performance of the installations and to what extent the commitments agreed on are monitored.

Opportunities
- It is possible to produce biomass energy on a small scale base;
- The succes of the smallscale biomass installation makes it possible to extend the installation.

Threats
- A long term commitment of the greenhouses is needed to ensure the use of the heat;
- Technical failure leads to extra costs. Because of the small scale of the project the rendability of the installation decreases quickly.

Co_2 reduction
Per year the amount of natural gas that is saved is 4.250.000m^3. This comes down to 7.565 tonnes of gas.

EVALUATION

Energy production
Electric power: 200 KW and thermal power: 4.000 KW_t per year.
This is enough to deliver Electricity for 500 households.

Possible demonstrated results (eg through indicators
- The project is increasing because of its own success. It serves as an example for the development of other, larger biomass furnaces;
- A small-scale project can be efficient enough when it comes to energy savings for businesses with a large demand of energy.

Possible success factors:
- Communication with policy makers and the public about the plant has been from the very beginning of the project an important focus for De Lier.
- Large commitment of all parties. Even though there has been some technical delay, the project was carried out with involvement of all parties.

LESSONS LEARNT

- A smallscale project can be efficient when it comes to the production of renewable energy. However, the payback period can increase very rapidly due to extra expenses that weren't calculated up front. In the case of "De Lier" the payback period was increased from 6 to 10 years;
- A pilot project like this project can spread out and grow from the success and the experience gained.

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System to support the construction of heating systems using biomass as a fuel

Renewable Energies

Region
Malopolska
Poland

THEME

Practice regarding funding the upgrading of existing heating systems (carbon) in public and private buildings with use of biomass combustion technologies. The activities were designed to increase use of renewable energy in energy production and protection of the air by reducing CO_2 emissions. Subsidies were also intended to entice potential buyers to the implementation of modern installations using biomass instead of coal, natural gas, fuel oil that were not subsidized in any way.

OBJECTIVES

The main objective was protection of the air by reducing CO_2 emissions and increased use of biomass for heating purposes.

LOCATION

Poland - Malopolska Region

DETAILED DESCRIPTION

Time scale
4 years

Bodies involved/implementation
Regional Fund for Environmental Protection and Water Management in Cracow.

Process and detailed content of the practice
Over four years 11 heating systems have been funded and upgraded, which have been adapted to burn various types of biomass such as pellets, wood chips, grain. The subsidies aimed at promoting the use of renewable energy sources and upgrading of old coal-fired boiler to new biomass boilers. Institutions that have opted for the acquisition financing from the funds committed to using only biomass for heating purposes.

Primary school building in Jordanów

The co-financed installations for the incineration of biomass (wood pellets) with a total capacity of 240 kW used for heating purpose in Primary school in Jordanów

EVALUATION

Results

The grant reached a level of 40, 50 and 60 percent of the total cost of installation. Within five years, the total amount of grants allocated to the modernization of boiler and implementation of the biomass installation reached over € 500.000.

The introduction of such funds undoubtedly contributed to the increased interest in using biomass, building a multitude of installations using this renewable energy source, and thus to improve air quality in the region by a high degree of reduction of CO_2. These funds contributed to the modernization of old installation which use was associated with major accident hazards to modern eco and safe biomass installations. Such activities may be disseminated in many regions, because they require only a financial contribution from local authorities. The introduction of grants of this type leads to a situation where a potential beneficiary, who wants to modernization of the boiler, instead of choosing an solution using traditional fossil fuels will select eco solution.

Main Barriers and Threats

The only danger in the use of such funds to build a biomass installation in Poland is the lack of fuel suppliers in the market.

CO_2 Reduction

Expected CO_2 reduction is about 6.000 ton per year

Energy Production

Expected Energy production is about 15.000 MWh
Expected Heat production is about 15.000 MWh

LESSONS LEARNT

The biggest barrier that makes this kind projects in Poland has small interest is the lack suppliers of biomass on the market. Difficulties in obtaining this kind of fuel in the market makes it even despite subsidize biomass technology only few potential buyers decided on this type of installation. Another problem is the price of biomass, in conjunction with a small number of suppliers in the market and the lack of competition, the price of biomass is high compared to its calorific value which also causes less interest of potential buyers.

CONTACT

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Cooperation between potential buyers of biomass with local authorities

Renewable Energies

Region
Malopolska
Poland

THEME

The practice concerns the cooperation between the Schools of Economics and Food Economy in Wojnicz and local authorities of Tarnow District, where the facility is located. Practice has shown the possibility of solving one of the major problems associated with the use of biomass in Poland, namely the lack of potential suppliers this kind of fuel.

OBJECTIVES

Cooperation to promote the use of biomass.

LOCATION

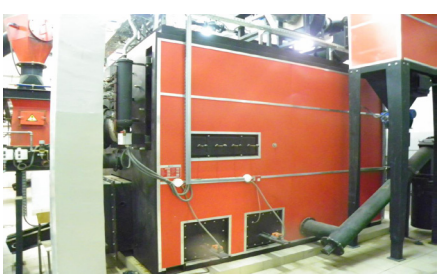
Poland - Tarnów District

DETAILED DESCRIPTION

Bodies involved/implementation
Tarnow District authorities and Schools of Economics.

Process and detailed content of the practice
The main objective of the practice was to start cooperation local authorities parties with potential interested parties in the use of biomass.
In this connection that the Institution of School of Economic require upgrading the old coal boiler and considered buying gas boiler the local authority took the initiative, which aimed was promote the use of biomass and lure potential buyers to implement this type of installation. The barrier that they had to overcome was the lack of suppliers of biomass in the fuel market. In view of the fact that biomass is not a popular fuel used for heating purposes, potential buyers still face the problem of sourcing this type of fuel on the market. Units using biomass installations such as CHP plants, public buildings are forced to import fuel from long distances or from abroad (Slovakia, Ukraine), which usually is profitable only for large buyers (CHP).

Realizing this problem, Tarnow District authorities came with an initiative to provide fuel (free of charge) for the future installation of the biomass, if only the Schools of Economics agrees to modernize its old coal boiler to the boiler using biomass. Both sides reached an agreement in this case, the installation was built (the total power of 1 MW) and the local authority provide the fuel. Another good example is that the origin of the fuel. As mentioned before fuel is supplied free of charge, and comes with slices of aesthetic trees in parks, roads and green areas in the Tarnow District, and then is chipping.



Installations for the incineration of biomass (wood chips) with a total capacity of 1MW.

Gymnastics Hall building

Technical workshops building

Main building (with classrooms)

Legal and financial framework
Installation construction costs amounted to 420.000 euro, in 60% of the costs were covered by the county and environmental funds, which made a financial contribution to the project (Regional Fund for Environmental Protection and Water Management and Eco-Fund), fuel costs are linked only to tree cutting (paid by district) and chipping (paid by entity that uses fuel).

EVALUATION

Results
The use of such incentives from local authorities in areas in which municipalities have a large stock of fuel from aesthetic felling of trees can contribute to the growth of interest in using biomass for heating in public buildings.

Main Barriers and Threats
The risks are obviously related with a limited amount of fuel.

CO_2 Reduction
In this case (one installation) the reduction of CO_2 is about 1.200 tonnes / year.

Energy Production
In this case (one installation) heat production is about 1.312 MWh.

LESSONS LEARNT

One of the indicators demonstrating the results of this practice is the reduction of CO_2 resulting in improved air quality in the region. A fact which contributed to the success of this practice is resignation of local authorities of the income from selling wood for promoting the use of biomass, improving air quality in the region and to attract potential buyers to use this type of installation in public buildings.

A limitation of this practice primarily is fuel. A limited amount of fuel makes the use of such practices is limited. The second factor is the availability of fuel. Such practices can be implemented only in regions with has a large areas of open access green. But this practice does show how an integrated approach of local authorities of the region can contribute to growth in the use of renewable sources in the region. Apart from the fact that they are suppliers of the fuel (free of charge) they also funded part cost of new installations. Only this type of approach with innovative ideas can lead to increased use of renewable energy sources in the regions.

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Municipal Indoor Pool Heating with Biomass in Medina Sidonia

Renewable Energies

Region
Andalusia
Spain

THEME

Heat production based on biomass pellet boilers in an indoor pool.

OBJECTIVES

To provide the municipal indoor pool with a heating system based on renewable energy (biomass), sustainable and environmentally friendly.

LOCATION

Municipal Indoor Pool (Av. de Azocarrem, s/n. 11170 Medina Sidonia, Spain).

DETAILED DESCRIPTION

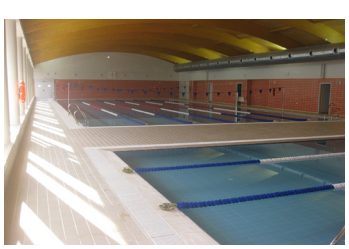
Time-scale
The biomass heating system was installed in approximately 2 months. It becomes operational in September 2009.

Bodies involved/implementation
- Municipality of Medina Sidonia, promoter and owner of the indoor pool;
- PRODEGEMSA - Promoción, Desarrollo y Gestión Municipal SA., a public company currently responsible for managing the municipal facility.

Process and detailed content of the practice
Two 300kW biomass boilers OSBY P500 have been installed in the municipal indoor pool of Medina Sidonia. They can provide 114.500kWh per month to met the following consumptions:

- Heating the indoor pool water;
- Heating locker rooms, offices and common areas;
- Sanitary hot water production.

The boilers are fed with wood pellets, with a monthly consumption of 23.368kg. The fuel is stored in an 88 m^3 ground silo near the boiler, with two worm gears for fuel feeding.



Indoor pool

Triangular fuel silo

Legal framework
Mainly, the laws and regulations concerning energy efficiency on buildings and indoor heating systems (e.g. the Thermal Installations in Buildings Regulations "RITE").

Financial framework

The total budget for planning and installing the biomass heating system was € 345.272,39. The project had financial support from the Order of Incentives for Sustainable Energy Development of Andalusia.

EVALUATION

Results

With this indoor pool (and its heating biomass system) the municipality of Medina Sidonia has a new sustainable facility, and its citizen can enjoy the benefits of this public service throughout the year. The energy consumed by the indoor pool is supplied by a clean and renewable source (114.500kWh/month from pellets) and without GHG emissions (saving 69tonnes of CO_2 emissions per month compared to a similar system fed with diesel). This contributes to achieve the emissions reduction targets establish in the Covenant of Majors. It's also a profitable activity because the fuel prices are relatively small.

CO_2 Reduction

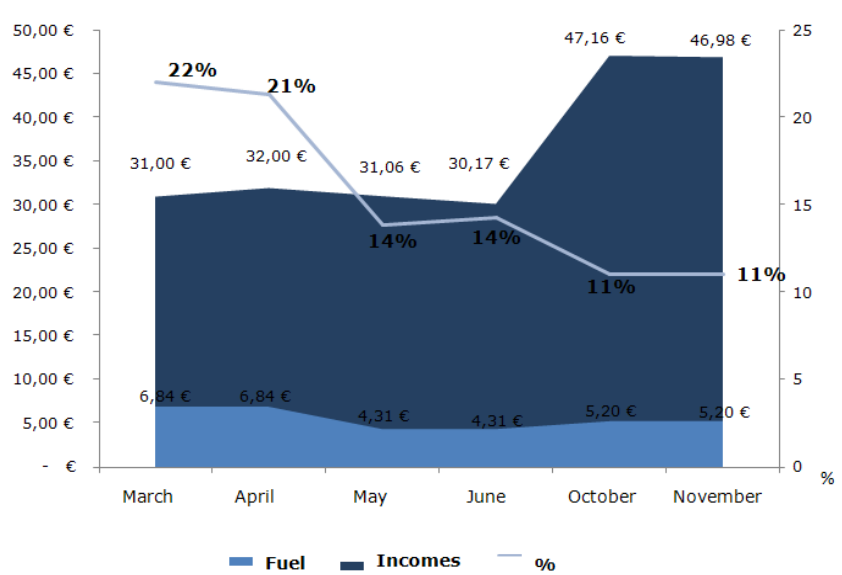
As biomass is considered a "carbon-neutral" energy, the heating system installed in the indoor pool has 0 CO_2 emissions. Anyway, if the thermal demand of the facility would be met with a diesel heating system the CO_2 emissions would be around 69tonnes/month.

Energy Production

The biomass boilers will produce 114.500kWh per month with a pellets consumption of 23.368 kg/month.

Main Barriers and Threats

After the installation, during the first months of operation, the pellet consumption was higher than expected (40kg/hour). The staff responsible for the heating system management decided to study it and propose several optimization measures (adjusting operation times, managing boilers starts and stops frequency, etc.). After this optimization the fuel consumption (and also operating cost) was significantly reduced (31 kg/hour).



LESSONS LEARNT

- To install biomass heating systems in indoor pools is profitable, even for public local entities;
- Once implemented it's necessary to optimize the operation of these facilities: adjusting operation times, managing boilers starts and stops frequency, etc. This optimization is important to achieve higher energy and economical savings;
- It's important to invest on good equipments and material, but also in well-trained professionals to manage the installations.

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Biomass thermal energy supply in the Hotel Barceló Punta Umbría

Renewable Energies

Region
Andalusia
Spain

THEME

Heat production and sale based on biomass boilers in a hotel. ESCO's operation model in biomass facilities.

OBJECTIVES

- To provide the hotel with a heating system based on renewable energy (biomass), sustainable and environmentally friendly;
- To develop a profitable facility operated under ESCO's business model.

LOCATION

Spain - Province of Huelva - Hotel Barceló Punta Umbría (Av. del Decano s/n, 21100 Punta Umbría).

DETAILED DESCRIPTION

Time-scale
The implementation of the project takes 5 months. The facility will be operated by the ESCO for a period of 10 years. After that, the hotel will take the ownership of the equipment.

Bodies involved/implementation
- Hotel Barceló Punta Umbría, promoter;
- Moneleg SL., an ESCO that implement and operate the installation.

Process and detailed content of the practice
The project includes the installation of a heating system based on two 500kW biomass boilers Herz Biomatic-BioControl 500. Both boilers are able to met the 80% of the heating and sanitary hot water demand of the hotel (that means an amount of 11.513.501,6 kWh_t).

The facility also includes two silos to store the fuel (pellets and olive pits) with a maximum capacity of 24tonnes. Four 5.000l accumulator buffer tanks are used in this installation as energy store.

Barceló Punta Umbría Hotel

Legal framework
Mainly, the laws and regulations concerning energy efficiency on buildings and indoor heating systems (e.g. the Thermal Installations in Buildings Regulations "RITE") and also those relating energy services (e.g. Directive 2006/32/CE on energy end-use efficiency and energy services).

Financial framework
The total budget for planning and installing the biomass heating system was € 295.824. In this case, the project is financed entirely by BIOMCASA Programme.
This is a public initiative boosted by Spanish Ministry of Industry, Tourism and Trade thought the Institute for Diversification and Saving of Energy (IDAE). The programme is trying to promote the ESCOs (Energy Service Companies) through low-interest credits for installers and engineering enterprises, working with biomass boilers for heating.
Thus, the biomass heating system is operated by an Energy Service Company. This company carries out energy improvement projects in customer's enterprises using its own capital or resources (in this case, the installation of the biomass heating system in the hotel). The sale of the thermal energy produced by the installation will cover the repayment cost to the ESCO over the contract period (10 years). The expected invoicing for the produced heat will be € 80.500 per year. At the end of the period the customer (in this case the hotel) takes ownership of the equipment at no charge and thereafter receives the full benefit from the equipment.

The project had also financial support from the Order of Incentives for Sustainable Energy Development of Andalusia. The incentive received in this case was the 30% of project cost.

EVALUATION

Results (expected)
- 15 % energy savings in heating and sanitary hot water production;
- 50% cost savings after the contract period: pellets costs for this installation are € 47.300 per year. A similar propane heating system would have a fuel cost of € 94.700 per year;
- 0 tonnes of GHG emissions (saving 350 tonnes of CO_2 emissions per month compared to a similar system fed with propane).

CO_2 Reduction (expected)
As biomass is considered a "carbon-neutral" energy, the heating system installed in the hotel has 0 CO_2 emissions. Anyway, if the thermal demand of the facility would be met with a propane heating system the CO_2 emissions would be around 348tonnes/year).

Energy Production (expected)
The biomass boilers will produce 1.210.800 kWh_t per year.

Main Barriers and Threats
The main difficulty founded in the development of this project has been its novelty. The introduction of ESCOs in the Spanish energy scene is very recent so there aren't previous experiences or results in implementing ESCO's business model for biomass heating systems.

LESSONS LEARNT

- The ESCO model let the customer to overcome the financial barriers for the implementation of renewable energy measures because it's the ESCO the responsible of the investment. It also allows the final user to be ignorant of any practical technical details of the heating system, including its operation and maintenance;
- The ESCO operating model is also profitable for large-scale biomass installations.

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BIOPTIMA International Fair of Biomass and Energy Services

Renewable Energies

Region
Andalusia
Spain

THEME

BIOPTIMA is an international fair about biomass and energy services.

OBJECTIVES

- To promote the development of a consolidated biomass market, specially the agricultural biomass;
- To become the benchmark for biomass and solar energy in southern Europe, being the meeting place for producers and suppliers of equipment, technicians, installers, engineers, consultants, universities, research centers, utilities and consumers of energy.

LOCATION

Spain - Province of Jaén - Fair and Congress Enclosure Province of Jaen (Carretera de Granada s/n. 23003 Jaén).

DETAILED DESCRIPTION

Time-scale

The fair is held on a biennial basis. A discussion forum is held on alternate years to establish the design and the development for the next fair edition. The 3rd BIOPTIMA Edition was held from 22nd to 24th of April 2010.

Bodies involved/implementation

Organizers:

- IFEJA - Institución Ferial de Jaén, S.A. (develops exhibitions and fairs services);
- AGENER - Agencia de Gestión Energética de la Provincia de Jaén (energy management agency responsible of the technical direction of BIOPTIMA);
- Inverjaen, S.C.R, S.A. (venture capital company that holds the strategic direction of the fair).

Sponsors:

- Andalusian Energy Agency;
- Caja Rural de Jaén;
- Diputación Provincial de Jaén;
- Municipality of Jaén;
- Private companies (Valoriza Energía, S.A.).

Collaborators:

- IDAE – Institute for Diversification and Saving gf Energy;
- APREAN Renewable - Andalusian Association of Promoters and Producers of Renewable Energy;
- AMI – Association of Integral Maintenance and Energy Services Companies;
- a3e – Association of Energy Efficiency Companies.

Process and detailed content of the practice

BIOPTIMA is an international fair about biomass and energy services organized by different private and public entities in the province of Jaén (Andalusia, Spain). It takes places every two years with a discussion forum on alternate years to establish the design and the development for the next fair edition. The 3rd BIOPTIMA Edition was held from 22nd to 24th of April 2010.

Since its first edition in 2007, BIOPTIMA has become a reference on the European sector of renewable energies, especially in the biomass and energy efficiency.

Its latest edition attracted 17.000 attendances, most of them from business and institutional sector. They were able to visit the 250 stands in the 15.000 m^2 exhibition. Biomass was the main theme of the exhibition (47% of the stands), follow by solar energy (30%) and energy efficiency (11%).

The fair has also a parallel programme that includes presentations by expert speakers, conferences, discussion forums, professional meetings, etc.

Financial framework

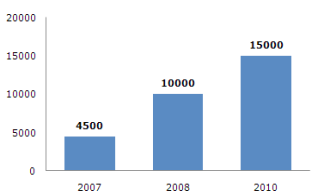
The fair has an investment plan of € 500.000. Funding comes from a variety of resources, both private and public. The private contribution has been increasing since the first edition of the fair.

EVALUATION

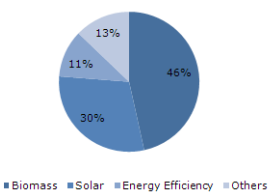
Results

The 3rd BIOPTIMA 2010 Edition had the following results:

- 17.000 visitors (41% professionals);
- 250 stands: 12% from international entities, 31% from national and 57% from Andalusian companies. The distribution in terms of thematic was: 47% biomass, 30% solar and 11% energy efficiency. The rest was about water and other renewable energies;
- 15.000 m^2 of exposition.



m^2 of exposition



Thematic distribution

LESSONS LEARNT

Main Barriers and Threats

Financing the event was the main difficulty founded in the development of this project. The fair is a very expensive initiative that needed financial support from different entities, both public and private. Moreover, renewable energy (including biomass) is a developing market not yet consolidated in the region.

The success of a project like this depends heavily on public-private collaboration. These kinds of initiatives have to be promoted by public sector at its beginning. In any case, the private sector must become the "motor" of the fair, being finally a project promoted by companies.

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Eco-labelled district heating and district cooling at Norrenergi

Renewable Energies

Region
Stockholm County
Sweden

THEME — Eco-labelled heat and cooling production

OBJECTIVES — Presentation of experiences from the first eco-labelled district heating and district cooling in Sweden.

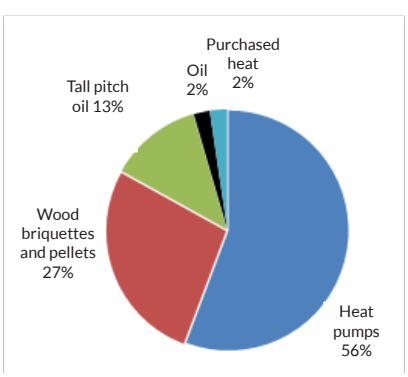
LOCATION — Cities of Sundbyberg and Solna, Stockholm County, Sweden

DETAILED DESCRIPTION

Timescale
Norrenergi was awarded with The Swedish Society of Nature Conservation's "Good Environmental Choice" eco-label in 2008. The whole process of eco-labelling took 9 months.

Bodies involved / implementation
Norrenergi, which is an energy company owned by the cities of Solna and Sundbyberg, and The Swedish Society of Nature Conservation (SSNC).

Process and detailed content of the practice
Norrenergi was the first energy company in Sweden offering its customers district heating and district cooling awarded with SSNC's "Good Environmental Choice" eco-label. Norrenergi produces about 1 TWh district heating every year. More than 50 % of the heat production comes from large heat pumps, which use residual waste water as heat source. Heat is also produced in hot water boilers, which are fuelled with wood briquettes, pellets and tall oil pitch. Bio fuels accounts for 27 %, tall pitch oil for 13 % and fossil oil for 2 %.



Norrenergi also produces about 70 GWh district cooling every year. District cooling is generated by heat pumps, cooling machines and cold sea water.

There are strict environmental requirements on district heating and district cooling certified in accordance with "Good Environmental Choice", e.g.:

- No more than 10 % of the supplied heat or cooling may origin from non-renewable energy sources;
- The plant's efficiency must be at least 70 % and the plant must have a control system to trace the origin of the biofuels;
- The suppliers of wood fuel must fulfil the demands for certification according to the Forest Stewardship Council or practicing equivalent principals aiming at a sustainable forestry. Wood fuel may not come from illegal loggings or forests with high conservation values. Palm oil may not be used as biofuel;

- Heat or cooling from heat pumps must come from geothermal sources, lakes, solar energy, or process water from food industry. Electricity used for heat pumps must come from renewable sources.

Legal framework
SSNC's criterias for "good environmental choice" heat and cooling. No legal framework exists for that.

Financial framework
The costs of the process have been calculated to 1 euro per year and apartment heated with district heating from Norrenergi.

Opportunities
By eco-labelling its products Norrenergi increases its credibility towards the customers and simplifies the communication about offering environmentally sound district heating and district cooling.

The process of eco-labelling has resulted in improved routines when it comes to environmental and sustainable requirements on contractors. All in all, eco-labelling has potential to strengthen Norrenergi's brand and to improve its competitiveness.

CO_2 reduction
There hasn't been any noticeable change in the fuel mix since 2008, when the eco-labelling was completed. At the moment Norrenergi is applying for an environmental permit of burning bio-oil (instead of fossil oil) in one of the heat plants used on extremely cold winter days, which will result in CO_2 reductions if permit is granted.

Energy production
1 TWh district heating and 70 GWh district cooling.

EVALUATION

Possible demonstrated results (e.g. through indicators)
The eco-labelling process has resulted in higher motivation within Norrenergi to decrease the remaining use of fossil fuels. The process has also led to cooperation between Norrenergi and the fuel contractors about studies of effects of recycling of wood ash. Further, eco-labelling has resulted in more comprehensive environmental and sustainability requirements on contractors and an improved control system of the origin of purchased biofuels and electricity. According to Norrenergi, eco-labelling has resulted in improved competitiveness and a strengthened brand.

LESSONS LEARNT

This best practice shows that eco-labelling of heat production can result in improved routines in energy companies of requirements on contractors and higher motivation within the company to work with reducing the negative impacts of its activities. It also shows that eco-labelling is a possibility for energy companies to improve their credibility towards their customers. This shows that eco-labelling has potential to strengthen a brand and improve competitiveness.

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Forest Stewardship Council: http://www.fsc.org

Igelsta CHP-plant, the largest biofuelled co-generation plant in Sweden

Renewable Energies

Region
Stockholm County
Sweden

THEME

Heat and electricity production based on biofuels and recovered waste fuels.

OBJECTIVES

Presentation of resource-efficient use of biomass and profitable heat and electricity production based on renewable energy.

LOCATION

City of Södertälje, Stockholm County, Sweden

DETAILED DESCRIPTION

Timescale
The planning process for the new plant has been going on for several years. Important steps were the appointing of a project leader and a formal environmental permit granted in 2006. The construction started in 2007 and Igelsta CHP was inaugurated in march 2010.

Bodies involved / implementation
Söderenergi is owned by Telge AB (42%) which is part of the City of Södertälje and by Södertörns Energi AB (58%), which is a holding company owned by the municipalities of Huddinge and Botkyrka. The two controlling companies, exert the same degree of influence.

Process and detailed content
Igelsta CHP plant is the largest biofuelled co-generation plant in Sweden. The plant has a capacity of 200 MW heat and 85 MW electricity, enough to heat 50.000 private houses and power 100.000 homes. The boiler is a circulating fluidized boiler and it can handle different types of biofuels. The plant has a flue gas condenser, which means that the heat from the flue gases is recovered and used, and results in a higher thermal output for the plant. All in all about 70 % of the produced heat in Igelsta CHP is recovered and used, which result in very efficient production. The main fuel is forest waste, i.e. wood chips from branches and tops. A smaller share is waste fuel, comprising quality-controlled scrap-paper, wood and plastics that is not suitable for recycling and origins from offices, shops and industries. Other waste fuels may be used in Igelsta CHP plant in the future, for example nut shells and agricultural fuels.The fuel is transported primarily by boat and rail. A lesser amount is brought in by road transports Söderenergi has built a fuel terminal alongside the Svealand railway line. Over 200.000 tonnes of forest fuel arrive at Igelsta by rail every year. Good logistic is essential for a large biofuelled plant like Igelsta that burns up between 600.000 and 700.000 tonnes of fuels per year depending on the fuel mix. The emissions from Igelsta CHP plant are low. The flue gas is treated with selective non catalytic reduction and the flue gas condensate is treated by ultra-filter, reverse osmosis and metal separation. All process waste water from the plant is treated. Igelsta Plant will be certified under the ISO 14001 Environmental standard during 2010.

Legal framework
The most essential legal framework concerning the energy production in Igelsta is the Environmental Code and the legislations on work environment. The plant has an environmental permit from 2006, regulating its operation and emissions. The permit regulates the emissions to air and water, fuel logistics, waste management and noise and contains requirements

on controlling the activity in the plant and report the result of the control program to the Swedish Environmental Agency. Further, legislation on work environment regulates how employers should act to prevent ill-health and accidents at work and to achieve a good working environment.

Financial framework
The total budget for planning and construction of Igelsta CHP plant was 250 million Euro.

Opportunities
- By choosing a co-generation plant, Söderenergi can increase the heat and electricity production and in the same time reduce the total emissions of CO_2;
- According to economic calculations the investment in Igelsta Plant is profitable for the owners. The pay-back period is 10-12 years;
- By investing in a circulating fluidized boiler Söderenergi has ensured fuel flexibility, which is very important in times when demand on biofuels is increasing;
- With expanded production in place, security of supply is strengthened further.

Threats
- Decreasing demand of heat in future, caused by more energy efficient buildings;
- Increased competition on biofuels, resulting in rising prices;
- Risk of possible disruptions of fuel transports to the plant.

CO_2 reduction (expected)
75.000 tonnes

EVALUATION

(Expected) Energy production
1,3 TWh heat and 0,55 TWh electricity

Possible demonstrated results (e.g. through indicators)
By investing in Igelsta CHP plant Söderenergi has:
- Increased the share of renewable fuels from 85 % to 90 % of the fuel mix in the total district heating system, by replacing peat and oil with biofuels;
- Reduced the CO_2 emissions with 75.000 tonnes per year and also reduced the emissions of sulphur dioxides, despite an increased heat and electricity production;
- Increased the fuel flexibility and strengthened the security of supply.

LESSONS LEARNT

Possible success factors
- Location of the new plant on an existing site where logistics is already well developed;
- Communicating with policy makers and public about the new plant has been a crucial effort from the very beginning of the project.

A large bio-fuelled co-generation plant, producing district heating and electricity simultaneously, is an example of a resource-efficient way of using biomass, resulting in many positive effects in the concerned region. An important lesson from Igelsta is that fuel flexibility is a vital question for heat and electricity producers, due to an increasing competition on biofuels. Further, good logistics i.e. own harbours facilities are essential for large bio-fuelled plants, due to large volumes of fuels.

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OTHER INFORMATION

Various documents:'The Igelsta CHP plant', 'Our fuels'
Söderenergi's webpage: http://www.soderenergi.se

Biomass in Schools Programme

Behaviour Change

Region
Buckinghamshire
United Kingdom

THEME

BCC is responsible for overseeing a portfolio of over 200 schools. Circa 55% of the CO_2 missions in the authority (over 24.000 tonnes) can be attributed to schools. In response to this issue, BCC has set about trying to reduce these figures, by delivering a Biomass in Schools Programme, which aims to;

- Sustainable Schools Programme – promote the Eco-Schools Award in schools (teacher training to encourage teachers to adopt a whole school approach);
- Increase the installation of Biomass Boilers – through a programme of renewal to install biomass boilers in schools where the boiler was previously oil fired;
- Annual Schools Conference – held in February each year, encouraging schools to be more proactive in terms of energy management/carbon reduction etc;
- Online Carbon/Cost Calculator – to help determine whether the site is suitable for different technologies;
- Carbon Detective Training for teachers - enabling schools to play a part in entering the details of their energy consumption into the online calculator.

OBJECTIVES

To reduce carbon emissions across the property portfolio and raise awareness of across the community

LOCATION

United Kingdom - Buckinghamshire

DETAILED DESCRIPTION

Origin
Local

Timescale
It's a rolling programme, which takes place every year.

Bodies involved / implementation

- Buckinghamshire County Council;
- Eco-Schools;
- Schools themselves.

Legal framework
n/a, however its important to note that UK Local Authorities have ring-fenced school budgets, which enable them to exercise less control over the 'local' priorities.

Financial framework
the BCC Sustainability Team is supported by Green Financial Tools, like Salex. CRC, RHI – pending Opportunities – BCC would be please to transfer this expertise trans-nationally Threats – lack of capital funding for boiler installations and devolved budgets in schools makes it harder to implement the programme

CO_2 reduction (expected)
4% reduction in carbon (2.000 tonnes) by 2011 and 8% (2.000) by 2013 across the portfolio.

EVALUATION — Increased installed capacity in the public sector.

LESSONS LEARNT — Separate governance model of schools makes implementation challenging.
Devolved budgets and level of administration require multi pronged approach.

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Online energy assesment tool

Renewable Energies

Region
Buckinghamshire
United Kingdom

THEME

Online energy assesment tool

OBJECTIVES

Online benchmarking tool, which enables energy managers/key staff to input their energy consumption patters, building characteristics etc, to enable an assessment to be made of their potential to swith from fossil fuels to renewables

To enable complex organisations to collect the data they need to enable them to make an assessment of the potential for Biomass, from across a range of functions and departments.

LOCATION

United Kingdom, Buckinghamshire

DETAILED DESCRIPTION

Origin
A online data collection tool, which enables a complex organisation to collect the data it needs to identify the current energy costs, the potential for renewable energy installations and the likely cost and CO_2 savings likely to flow from such installations.

Timescale
Accelerates the benchmarking process to a matter of hours and minimises the need for face to face collection.

Bodies involved / implementation
Buckinghamshire County Council and (its partner) Ringway Jacobs.

Process and detailed content of the practice
- BCC operates 237 schools in the County and also works with a range of other local governmental partners to try and reduce their carbon emissions;
- Collecting the data needed can be time consuming and difficult;
- In response to this issue, BCC has developed an online calculator to enable a distributed group of managers to input the data needed to undertake an assessment of the potential for renewable energy.

Financial framework
Financial modelling of the returns likely to be achieved from installing renewable energy (which takes account of Feed-in-Tariffs and renewable Heat Incentives).

Opportunities
Can provide a a useful tool for modelling complex and changing cost models.

Threats
It will need some commitment from the data inputter.

EVALUATION

- Provides user friendly way of collecting data;
- Demonstrates savings;
- Provides impetus for person entering data.

LESSONS LEARNT

As part of its commitment to reduce carbon emissions in the local area, Buckinghamshire County Council's Sustainability Team have developed a free renewable energy guide to enable their partner organisations assess the potential of their sites for renewable energy. Entering the required information into the guide will provide information sheets for the renewable technologies most suited to the particular building. The outputs cover information on:

- Solar Photovoltaics (PV);
- Solar Thermal;
- Wind Turbines;
- Ground Source and Air Source Heat Pumps;
- Biomass.

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RE:FIT

Energy Efficiency

Region
London/South East of England
United Kingdom

THEME

An innovative procurement process for assessing potential energy savings and carbon reduction measures in the public sector which guarantees cost savings.

OBJECTIVES

To facilitate the use of energy performance contracting across 40% of public buildings in London. This will affect 11 million m^2 or 2.000 buildings, bringing a reduction in carbon emissions of over 2,5 million tonnes by 2025.

LOCATION

United Kingdom - London/South East of England

DETAILED DESCRIPTION

Origin
A procurement process developed by the London Development Agency which has already been delivered on 42 buildings across London, including Transport for London, the Metropolitan Police, the London Fire Brigade and Emergency Planning Authority.

Timescale
Accelerates the assessment process for potential implementation of efficiency measures from 18 months to 6 -12 months.

Bodies involved / implementation
London Development Agency (and its partners) and SEEDA.

Process and detailed content of the practice
Framework agreements have been established with 10 companies that have signed up to undertaking energy efficiency saving assessments in public sector organisations. Setting up these framework agreements (which provide public sector organisations with guaranteed cost saving) has been a lengthy task which has involved some detailed specialist legal and procurement input.
However, this procurement process is now available for public sector organisations to use; Buyers are responsible for preparing a project brief that identifies the buildings they would like the 'commercial' company to assess; A mini competition is run with the 12 companies who undertake an Investment Grade Proposal (IGP) of the potential savings, and submit their proposal to the buyer; The buyers assesses their preferred supplier and selects an ESCo from the framework panel to work with; Following negotiation and agreement of the planned energy saving measures and the level of (guaranteed) savings, the contract is signed. Installation of energy saving measures Performance is monitored on an annual basis, for the lifetime of the payback period, with potential for renegotiation of aspects of the framework.

Legal Framework
A procurement process based on established framework agreements, supported by mini-competitions, which negate the requirement to go through the full OJEU process.

Financial framework
This process does not yet come with funding (although there are plans to try and lever in EIB/ERDF funding). Organisations that implement it need to fund the upfront investment from the balance sheet. It does however offer guaranteed financial savings.

Opportunities
Can provide a potential model for accelerating the uptake of energy efficiency and renewable measures in the public sector.

Threats
Does not provide funding to shorten the payback period for renewable energy measures.

Carbon Savings
The target is to achieve 2,5 million tonnes by 2025. The 42 projects implemented to date have installed energy saving measures of approximately 146.000m^2 of occupied building space, delivering a 6.000 tonnes reduction in carbon emissions and an average 28% reduction in energy consumption. With a £7m capital spend generating a £1m saving per annum off fuel bills, the pay back period is seven years.

EVALUATION

Possible demonstrated results (e.g. through indicators);

- RE:FIT provides a ready to use, proven and innovative procurement model – reduces timescales, hassle and expense associated with OJEU procurement process;
- It makes sustainable retrofit of existing public buildings financially feasible.ESCo's provide guaranteed energy savings and take contractual responsibility and risk for performance of ECM's.

LESSONS LEARNT

- It reduces energy consumption and carbon emissions from buildings – reducing risk of penalties under Carbon Reduction Commitment;
- It offers alternative funding solutions (such as the London Green Fund) where access to capital is limited;
- It delivers support and advice together with standardised contracts and toolkits;
- It provides access to the latest and most efficient energy saving products and processes from specialist suppliers.

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