

Biomass Partnerships

Booklet of Good Examples



Europe needs to break its dependence on fossil fuels. Biomass is one of the main alternatives.

Cost effective measures in favour of biomass need to be developed at European level to:

- draw maximum advantage from national and local innovation;
- provide a clear way forward for major industries organised on a European scale;
- share burdens fairly.

The Biomass Action Plan sets out a coordinated programme for Community action, including measures to improve demand for biomass; improve supply; overcome technical barriers; and develop research.

Technology for biomass use in residential and industrial heating is simple and cheap. There are strong traditions of biomass use and this is the sector where most biomass is used. New techniques are available to turn wood and clean residues into standardised pellets that are environmentally safe and easy to handle.

Nevertheless, biomass is growing slowest in heating.

KanEnergi Sweden AB, 2007.

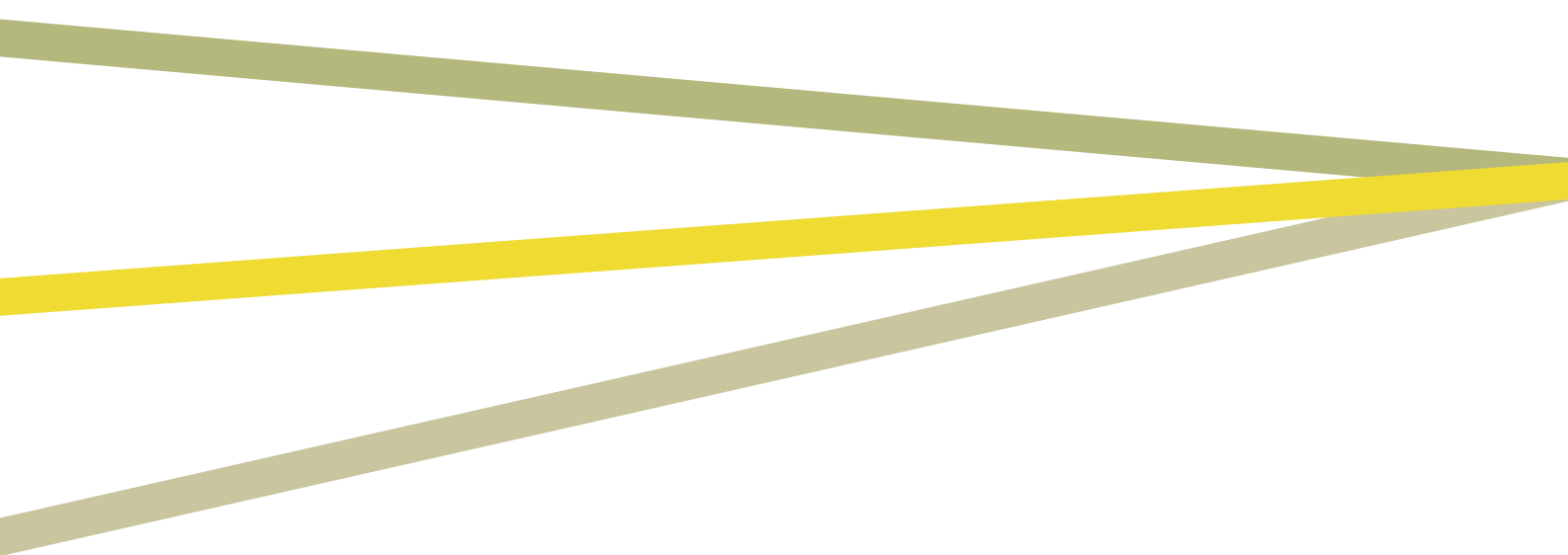
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Biomass Partnerships

Biomass Partnerships is an ALTENER project coordinated by the Swedish Energy Agency (STEM), with partners in Finland, Austria, Scotland (UK), Germany, France, Belgium, Bulgaria and England (UK).

In order to expand the market for RES heating it is necessary to increase the supply and to stimulate the demand. This project strived to support these issues by creating several partnerships; the aim was at least one in every partner's home country for delivery of heat from biomass and interacts with national agencies to deliver policy objectives with respect to reductions in greenhouse gas emissions through the commercial use of biomass fuel sources.

In order to succeed in the project it was of vital importance to work with a bottom-up approach, i.e. have the practical market actors involved at the local/regional level at the same time as it was important to work with a top-down approach, i.e. policy makers, municipalities and regional decision makers. The establishment of the regional partnerships worked with these two approaches.



Sweden

Farmer Energy Plant using wood chips in Lundsbrunn

The company **Lundsbrunns Bioenergi AB** was started by five farmers in 1996. They won a public procurement to support a group of public buildings with heat in the village of Lundsbrunn, Sweden. Before the buildings were heated with electric boilers and required 1000 MWh of electricity.

It was decided that the new boilers were to use wood chips as fuel. The partners are forest land owners so they can chop and store wood chips at their farms. They also have the possibility to buy wood chips from other local suppliers.

The chipping is carried out by entrepreneurs, and the entire annual need is chipped at once and covered with tarpaulin. The delivery is a load of 30-35 m³, 1.5 times per week.

RESULTS

- The plant yearly produces about 1000 MWh and thereby replaces about 1 000 MWh of electricity per year.
- The yearly consumption of wood chips is about 1 200 m³ in the solid-fuel boiler and about 15 m³ of heating oil in the oil burner
- Mainly own wood feedstock is used for the chipping
- The plant has been profitable



Loading and delivery of wood chips.

Heating a school with biomass – a Farmer Energy project in Alingsås

Svensk Spannmålsodling AB is a company formed by two farmers in Alingsås, Sweden. The business concept is to own heat centrals (heating plants) and sell ready made heat. The farmers have found a new market for 190 ton grain, or 20% of the farm cropland, in producing heat. Today one of the schools in the municipality is heated by locally grown grain.

The company's first project was the conversion of Lena school from fossil oil heat to biomass heat. The project is a good example of finding new alternatives to traditional agriculture.

RESULTS

- Lower heating costs
- Diminished oil use
- Reduction in discharge of CO₂
- Increased job opportunities



Heating plant for biomass.

Austria

Biomass for Fronius

Fronius is a technology and market leader in the fields of welding, battery charging systems and solar electronics. In Sattledt, a new production and logistic centre for more than 600 employees in Sattledt/Upper Austria was built in 2006. For this new production facility and office building with a total heated area of 37.000 m², space and process heat is provided by a wood chips heating system.

As the company management of Fronius preferred not to have the responsibility for the construction and operation of a biomass heating plant, they chose the possibility of a third party financing scheme, where the financial and technical risks are taken over by an ESCO.

The “Ing. Aigner Wasser-Wärme-Umwelt GmbH” was selected as the ESCO in a tendering process and is in charge of the whole planning, constructing, financing and operation of the project. A heating plant with a total capacity of 2,850 kW was constructed. It consists of two biomass boilers with 1,200 kW for the heat supply in winter and 350 kW in summer, as well as a peak load gas boiler with 1,300 kW as a back-up system. The heating system as well as the boiler room and the wood chips storage room are built under the ground. The annual heat demand is around 5,000 MWh. A contract between Fronius and the ESCO fixes the heat delivery as well as the heat price for the period of 15 years. The total investment costs for the heating plant were 556,000€.

The biomass heating plant saves around 1,000 tons of CO₂ per year in comparison to a heating system with natural gas. 95 % of the annual heat demand can be covered by biomass. As the wood chips are bought directly from regional farmers, also a creation of regional added value is achieved.

RESULTS

- Heating plant with a total capacity of 2,850 kW
- Optimised efficiency of the plant during the whole year, using two separate biomass boilers (1,200 kW + 350 kW) and a 1,300 kW gas boiler as a back up system
- Provision of 95% of the annual heat demand by biomass
- Annual reduction of 1,000 t CO₂ compared to the use of natural gas



Pipes from a biomass heating plant.

Third Party Financing - the wood chips heating system at Weber Hydraulics

Weber Hydraulics GmbH is a leading producer of hydraulic products with currently 170 employees in Losenstein/Upper Austria. The company has been expanding over the past few years and therefore, a new production building with 3,400 m² was constructed. Instead of just enlarging the existing oil heating system, a new biomass heating system was installed for the whole plant. The management decided to use the Third Party Financing scheme and to **source out** the planning and the operation of the new heating system to an ESCO.

Based on a tendering process, “Ing. Aigner Wasser-Wärme-Umwelt GmbH” was chosen - this ESCO is not only in charge of the construction and financing, but also the operation, servicing and maintenance is undertaken by the ESCO.

The total investment costs of the project were around 129,000€. Two Fröling biomass boilers (500 kW + 85 kW) were installed for the provision of space and process heat. With two separate boilers, the heating system can be operated with an optimised efficiency during the whole year, for heating around 8,800 m² of space. The annual heat demand of 720 MWh is provided to 100% with biomass. Wood chips were chosen as fuel because they are available regionally and are bought from an association of local farmers.

By substituting heating oil with wood chips, around 12,000€ can be saved annually. Additionally there is a significant positive effect for the environment because of the reduction of CO₂ emissions of around 187 t/year, compared to a heat supply based on fossil fuel. O.Ö. Energie-sparverband supported Weber Hydraulics in this project.

RESULTS

- Two biomass boilers with a total capacity of 585 kW
- Annual heat demand of 720 MWh is provided to 100% by biomass
- Annual saving of 12,000€ compared to a supply with heating oil
- Reduction of CO₂ emissions of around 187 t/year

Building for biomass heating production.



Finland

Tuusulan Energia Oy - Parma Oy - process heat with wood chips

Parma Oy is a Finnish concrete element manufacturer. One of their factories, located in Tuusula in Southern Finland, gets all their process heat from a biomass plant operated and owned by a heating contractor, Tuusulan Energia Oy. **Also** other factories of Parma Oy have switched from oil to biomass after learning about the positive experiences in Tuusula. The heating contractor has gotten more customers and is increasing his capacity. 32% of Parma Oy's fuel is domestic biomass. This figure was only 2.1% in 2001.

The collaboration between the contractor and the factory has been working very well. The plant is owned by the contractor who takes care of everything concerning the maintenance and fuel supply of the plant. The customer pays for the delivered heat.

The heating plant is a 2.5 MW pilot plants and the heating contractor is committed to test different fuels in the plant. Besides wood chips; grain, turnip rape and linseed has been used. Sod peat will also be tested in the near future.

RESULTS

- Replaces 650 tons of heavy fuel oil
- Installed capacity, 2,5 MW
- CO₂ reduction 2000 tonnes/year
- Fuel, mainly wood chips, for testing: grain, turnip rape and linseed
- Investment cost 950,000€



Parma Oy is Finland's largest manufacturer of prefabricated concrete element.

Ryttylä Training Center - from oil to wood chips

The **Hausjärvi training centre** in Ryttylä, in southern Finland, switched from oil heating to wood chips. The main reason for the switch was that the chimney and the boiler were old and needed to be renewed. Because of high oil prices, it was decided to invest in a wood chip heating plant. The owner first considered planning, building and operating the plant themselves but after learning more about heating with wood chips, they decided to outsource the operation of the plant. The heating contractor is Brofta Oy. The company is a heating contractor of several facilities. The planning, building and operation of the plant are handled by the contractor, including the fuel supply. The objective of the contractor is that the plant is working properly and the client is satisfied.

The capacity of the plant is 500 kW and the annual heat demand is 1200 MWh. There is a reserve-boiler, a 320 kW oil boiler for peak use periods and for cases when there is disturbance with the wood chip boiler. The wood chips storage is rather large, 250 m³. That allows savings in transport costs. Also the maintenance and supply security are improved.

The total investment was 300,000€. 15% of the investment was received as an investment subsidy from the Ministry of Trade and Industry. Because of considerably lower fuel costs the calculations show that the investment will pay itself back in only a few years.

RESULTS

- CO₂-reduction 400 tones/year
- The cooperation between the customer and the contractor has worked well, and technically there haven't been any major problems
- Capacity of 500 kW
- Lower fuel costs



Picture of the Ryttylä Training center.

Germany

Profitable cooperation between sawmill owners and farmers in Germany

Small sawmill owners can sustainably survive only if they can offer products of higher quality, e.g. dried wooden building construction material. The high investment for a drying chamber leads to a necessary co-operation of 2-3 sawmill owners. In addition, a biogas plant can only be operated under positive economical conditions if the co-generated waste heat can be used instead of spoiled in the air. Through co-operation between farmers and sawmill owners, the site of a new biogas plant with heat delivery to the new drying chamber can be situated close to the sawmill plants, reducing transport costs. The partnership and realisation process needs advising support of third and neutral party like the one IZES gGmbH could provide through the performing of an economical comparison study and support in the process.

Around 940,000 kWh waste heat will be produced each year from the biogas plant, giving no CO₂-emissions. The investment for the drying chamber on the basis of waste biogas heat was 70,000€ (without VAT). One new job at the drying plant will be created and around 10 jobs in both the sawmill factories are secured due to the new product “dried wood”. Around 4,800€ are saved in total annual costs compared to i.e. a vacuum dryer.

This project is a promising example to demonstrate how different partners can profitably co-operate for their own commercial and regional benefit and a sustainable future for us all.

RESULTS

- Savings of around 60,000 kWh of electrical power each year compared to what a vacuum dryer would have needed.
- CO₂-emission from heat producing will be close to zero due to the use of waste heat from the biogas plant.
- Economically viable to all partners involved.



*Fermentation storage
under construction*

School heating triggers public private biomass co-operation

In 1999 the necessary refurbishment of the heating supply for the primary school of Britten, with 300 kW thermal power and 45.000 litres of oil consumption, was the starting point for the municipality of Losheim am See (Saarland) to change the municipal strategy from oil to biomass. The municipality parliament was ready to realise a pilot project with a wood-chip fired biomass boiler. To secure the wood supply, a co-operation between the municipal forest and an association of bigger private forest owners was found. They started with wood-chip production for the new biomass heating plant. Also, an unusual agreement with a chimney sweeper was found for operating of the boiler.

Then, with slowly increasing oil prices, the new co-operation founded a new company to build a wood supply centre with a platform for wood chips, wood logs and later also selling pellets. With the support of IZES gGmbH a profitable concept and a two step procedure was developed. In 2005 the "Holzhof (=wood farm) Losheim" was founded.

The biomass heating system comprised an investment of nearly 120,000€, in comparison to 60,000€ for a conventional oil boiler. Around 30,000€ were subsidies from the regional ministry. The simple heat supply with biomass this way triggered the co-operation of a municipality with private forest owners and a chimney sweeper, to find an optimal solution with minimal risks. In autumn 2006 a private investment decision was taken to install another 320 kW biomass boiler in the same location Britten as a follow-up to the positive results of this boiler.

RESULTS

- Around 30,000 litres of oil are substituted by local forest wood each year.
- Job-opportunities created in the forest, when installing and operating the boiler, and in the new company selling wood chips, logs and pellets.
- Energy cost gains of about 2.0 cts/kWh compared to oil.



Buildings in the municipality of Losheim using biomass for heating.

France

Wood and straw energy plant in France

In 2002, two French farmers, Jacques and Charles Schneider, contacted the nuclear research institute CEA to offer to sell them heat energy produced from burning straw. These two farmers set up a Limited Liability Company SARL in French called AGROénergie. Its business consists in producing and selling energy from farming by-products. They have designed and created the whole project. The wood and straw energy plant has a 5 MW capacity and the company has signed a 12 year contract with the CEA (a public research institute), which committed itself to buy at least 20,400 MWh per year at a defined and revisable price, all included (fuel purchase, repairs, maintenance, installations depreciation).

Mixing straw and sawmill wasted double advantages: the diversification of resources and the reduction of problems due to straw ashes fusion. Sawmill wastes add up to the energy efficiency of shredded straw and are securing the production, if any delay occurs in deliveries.

Straw is bought in the neighbouring 25 km. The wood itself comes from neighbouring sawmills in order to avoid transport. The operation of this company has positive consequences on local employment in the matter of consolidation and creation.

RESULTS

- The boiler delivers 2/3 of the CEA energy use
- Supplying this plant gives an extra outlet for straw at 10 local farms
- Wood fuel instead of fossil fuel reduce the greenhouse emission gases with more than 6000 tonnes/year
- Reduction of 29 tonnes SO_x/year

The heating plant is using wood and straw as fuel.



Wood boiler building project ASSURC, Rhône-Alpes

The ASSURC - Association of Users of the Bourg-en-Bresse district heating system – initiated in 1999 a wood boiler building project which terminated in 2006, allowing heating more than 3,000 dwellings and offices of every type. Energy wood instead of fossil fuel is an environmental friendly solution and economical for its users.

The installed boiler has a capacity of 4 MW which is 10% of the total capacity of the heating system. The yearly consumption is 8,000 ton raw wood waste, mainly from the Bourg basin. The wood energy is supplied from sawmill residues and non spoiled fuel wood (pallets, casings). The boiler also allows using several energies: natural gas cogeneration, wood, natural gas and fuel oil.

The new boiler will help the association to save energy, pollution and reduce expenses.

RESULTS

- Capacity, 4 MW
- 23% reduction of the energy costs
- 2,5 millions litres of oil are saved each year
- Economical and ecological benefits
- Reduction of GEG-emissions with 4,000 tonnes/year



*Pictures of the biomass heating plant,
Rhône-Alpes, France.*



England, UK

Batsford Estate Biomass Heating

The **Batsford Estate** decided to convert the existing oil fired heating system to a 300 kW automated wood pellet boiler, with wood fuel supplied from their current forestry and woodland management activities. The project has been supported by technical advice and a subsidised hire of a wood chipper through Gloucestershire Wood Fuels, a local wood fuel supply co-operative established through the Biomass Partnerships project. The economics appear to be very favourable, saving in excess of £18,000 per year in oil heating costs and providing a 4 year simple payback on the investment by the owner after allowing for a capital grant. The total project cost was approximately £85,000 (126,740€) of which a 20% capital subsidy. £17,000 (25,350€) was supplied by the installer through a national biomass heating support programme.

One of the objectives was to make existing Batsford Estate forestry management more economically viable, for example by providing a market for things and small diameter round wood, currently with little market value, and later on to supply other local end users (e.g. schools) with wood chip heating fuel.

This project could be directly replicable anywhere in Europe where there is a large country estate, typically with high heating bills since large older properties are difficult to insulate, and the availability of a local wood fuel resource.

RESULTS

- A total annual heat output of 600,000 kWh from own wood fuel supplies.
- Savings in purchased oil heating cost of £18,000 each year
- Great CO₂ reductions.



300 kW wood chip boiler.

Gloucestershire Wood Fuels

Gloucestershire Wood Fuels Limited was legally established in April 2006 as a wood fuel supply co-operative by local members of the Biomass Partnership. Eight months after being legally established Gloucestershire Wood Fuels has 4 wood fuel producer-members plus two co-opted members, one from the County council and one from a regional agricultural college interested in developing training courses for farmers and woodland owners. The business plan includes a target to make the business financially viable by year 4 through a £5/tonnes (7,5€/tonnes) levy on wood chip fuel sold through the co-operative and through a number of higher profit margin contracts, for example supplying wood chips from slab wood off cuts from local sawmills.

Gloucestershire Wood Fuels has been successful in tackling the “chicken and egg” situation by creating an end user market and fuel supply infrastructure at the same time. A key success factor was the availability of tapering national funding to support the establishment of Gloucestershire Wood Fuels including the financial support for members of the co-operative to hire wood chippers- therefore there is a direct benefit in joining the co-operative and low financial risk.

RESULTS

- Increased automated use of biomass from 125 kW of installed capacity in Gloucestershire to
- 2,500 kW in 2005, plus further 2,500 kW under consideration.
- Generation of 1.5 direct new rural jobs for each MW of biomass installed capacity, already creating 3-4 new jobs.
- A proposition for a wood chip district heating installation to supply 600 homes, which would be the largest wood fuel domestic district heating system in the UK.



Members of the Gloucestershire Wood Fuels.

Scotland, UK

Biomass Heating - Wood-for-Warmth, Perthshire

Wood-for-Warmth is a wood-fuel supply business in Perthshire in Scotland. The owners have installed a new, sophisticated, wood-fuel boiler in their premises to provide heating to their farmhouse and adjacent offices. This installation is part of the development programme for their wood-fuel business which also includes investment in a purpose-designed wood-fuel chipping machine. The installation provides a working example of wood-fuel heating good practice and serves as a model for other property managers, illustrating the benefits and reliability of this technology. It also demonstrates to local authorities and decision-makers how indigenous, renewable energy resources can be utilised to provide comfort and environmental benefits. The boiler installation received support from the Scottish Community & Householder Renewables Initiative.

The 50 kW Austrian Herz boiler can operate on wood-chips or wood-pellets and has been chosen as it offers sophisticated performance and it demonstrates how automated wood-fuel heating can be. The boiler is the first of its kind in Scotland.

There is only a very immature wood-fuel marketplace operating in Scotland at present. With this demonstration of heating good practice and the investment in wood-fuel production, Perthshire is ready to develop its local biomass resources and to use its indigenous biomass sources for heating. The total cost of the wood-fuel boiler installation is 29,000€.

RESULTS

- A clear demonstration of how operators of all types of buildings can benefit from using indigenous energy to satisfy the major energy use in buildings – providing heating.
- Comfort and environmental benefits such as replacement of non renewable energy sources.

*A wood-fuel
chipping machine*



Bio-energy Business Development - Angus Biofuels

Angus Biofuels is a new business development associated with existing building and farming enterprises. The objective is to establish a new bio-energy business offering renewable energy heating to building operators in the county of Angus and neighbouring regions in Scotland. To date four bio-energy heating installations are operating – or near to completion – three using pellets and the fourth, when completed, is to use grain. The installations to date comprise an office, a nursery school, a retail warehouse and an equipment store/workshop.

The objectives of these bio-energy installations is to acquire installing and operating experience of different systems with pellets and grain as fuels and to create demonstrations installations for potential customers to see in future. There is an emerging market for bio-energy for heating in Scotland, it's still under-developed and the progress made by Angus Biofuels is based on collaboration and partnership, taking advantage of opportunities to learn from the experience of established markets in project partner countries.

RESULTS

- Several imported boiler designs have been installed to gain installation and operating experience
- High-specification wood-pellets have been imported; locally sourced grain will also be used
- Plans for a wood-chip production facility are well-advanced; a chipper has been purchased
- The installations provide valuable experience of installing and operating, prior to promoting sales in future



A 50 kW wood boiler using pellets as fuel.

Belgium

First pellets heated social housing project in Belgium, Zonnige Kempen

Zonnige Kempen is a progressive social housing company, building lots of new projects in which renewable and sustainable techniques in materials, water and energy are integrated. Together with VITO they started up this pellet boiler project. The pellet project consists of the building of 26 new collective heated dwellings. The project is located in the municipality of Grobbendonk. The pellets project consists of the building of 26 new collective heated dwellings.

The heating installation consists of a wood pellets boiler (100 kW) in combination with a gas fired boiler (100 kW). Both boilers are working in cascade with priority to the pellets boiler. The supply of pellets is not completely secured in Belgium because at the moment certified pellets have to come from abroad. That's why the social housing company decided to install a gas boiler too as back-up system.

The total investment cost from the design till the construction is 84,000€, including tax. Pellets instead of fossil gas will reduce the energy costs with around 3,000€/year - a good example of a sustainable solution.

RESULTS

- 90% of the heat demand is covered with wood pellets
- Integration of a pellets boiler results in a reduction of fossil fuel consumption with 85% or 190 MWh/year
- CO₂-emission will be reduced by 38 tons/year

Buildings in the municipality of Grobbendonk heated with pellets



Wood boiler for heating greenhouse, John Vermeiren

John Vermeiren is the owner of a greenhouse company in Loenhout where tomatoes are cultivated. Up until now the company used heavy fuel and gas for the heating of their greenhouses of 8.3 ha. When planning for expansion, the alternatives for economically viable sources of energy were investigated. Together with Innovatiesteunpunt (Flemish knowledge centre for agriculture and horticulture) and the Flemish construction company of biomass combustion installations Vyncke, a feasibility study showed the potential economical advantage of the system. It was decided to go for a biomass heating installation as basic heating system.

The wood boiler is designed for 4.9 MW hot water and covers the base load. Even though the initial investment is a multiple of a classic gas or heavy fuel boiler, the final financial result is advantageous. The total investment cost for the wood boiler was 900,000€. For the investment a subsidy of 28% of the Flemish Government was given. With a woodchip price of 20€/ton, the fuel saving in comparison to gas can go as high as 585,000€/year. The rate of return is 3 years.

In Flanders this was the first project with use of recycled woodchips for heating of greenhouses, and others have now followed the example contributing to the growth in suppliers of woodchips.

RESULTS

- A reduction of fossil energy consumption of 95% or 27,800 MWh/year in comparison to the reference situation (gas fired boiler).
- The CO₂-emission reduction of the wood boiler will be about 5,300 tonnes per year or 95% compared to the reference situation.



The 4,9 MW hot water boiler

Bulgaria

Improvement of the Heating System of “Multi-profile Hospital for Active Treatment - Svishtov” Ltd., Municipality of Svishtov

The main goal of the project is implementation of technical measures for cost reduction through substitution of the liquid fuel (mazut) for wood briquettes. To install a more energy efficient boiler based on wood briquettes the costs are expected to be reduced by 33.8% compared to the present ones. The boiler is of type KVDB with a capacity of 2 MW. The wood briquettes are provided by “Svilozha” Jsc, situated only 6 km away.

The total project costs are about 160,000€. The expected pay-back period of the investment is about 3 years.

RESULTS

- Emissions CO_2 would be reduced by 360 tons for the year 2003
- For the period between 2003 and 2018 the reduction of the emissions of CO_2 , as a result of the project will be 11,342 tons
- substitution of the fuel base will reduce the emissions of sulphur and nitrogen



The boiler on wood briquettes.

Improvement of the Heating System in Different Types of Buildings

The main goal of the project is implementation of technical measures for reduction of the cost in two residential, four production and three public buildings through substitution of light fuel oil or electricity with biomass-wood wastes. The project consists of construction of nine heating boiler facilities for production and delivery of heat through burning of biomass. Biomass is in the form of wood wastes – bark, covers, and shavings from wood processing.

Three groups of buildings are involved in the project: 2 residential buildings with a total installed capacity of boilers 367 kW; 4 production buildings with a total installed capacity of boilers 597 kW and 3 administrative buildings with a total installed capacity of boilers 269 kW.

The total project costs amount to 412,000€ and the expected pay-back period of the investment is 3,5 years.

RESULTS

- Savings of 349 tonnes/year of light fuel oil
- Emissions reduction of 1,075 CO₂ equivalents
- Almost 7 tons annual emissions reduction of SO_x
- About 2 tons of NO_x annual emissions reduction
- Costs for heating are expected to be reduced by 30% compared to the present ones.

Boiler on wood chps



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Visit the website: <http://www.biomasspartner.info>



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