



## Płońsk, Poland

### Modernization of the Heating System of Płońsk

#### Combined generation of electricity and heat from biomass

#### DESCRIPTION OF THE ACTION

The modernisation of Płońsk's heating system is an example of a model solution, the target of which is to decrease emissions of CO<sub>2</sub>, ash and other combustion gases into the atmosphere, and the production of clean electricity is compliant with the guidelines in the Polish National Energy Policy, which promotes the production of energy from renewable resources.

The fundamental objective related to the erection of a combined heat and electrical energy production system based on biomass firing is to decrease the emission of greenhouse gases by replacing the type of fuel combusted from fine coal to biomass, that is wood cuttings. The most important element for the project implementation was the modernisation of the existing central heating source in order to convert it to become biomass fired, modernisation of the heat distribution networks and heating substations.

The financial resources from the National Fund were utilised to partly cover the cost of the delivery and assembly of the steam, biomass-powered boiler with nominal power of 10.2MW, delivery and assembly of the steam turbine and the costs of the majority of works and deliveries of devices used in the modernisation of CHP and the heating system. The combined heating and power station in Płońsk was adjusted to be wood cuttings fired. The Energy Globe awarded technology allows for the production of energy considered to be 100% ecological.

#### PARTNERS INVOLVED

- Ecofound
- National fund for environmental protection and water
- City municipality of Płońsk
- Heating System Company





## DESCRIPTION OF THE ACTION

The annual energy production will be equal to 11,000 MWE. The annual combustion will include 25,000 tonnes of biomass and the consumption of fine coal will decrease by 70%. The CHP Station will be able to manage and combust biomass from an area of around 800 hectares of cultivated energetic plants.

As part of the investment, about 8000 m of traditional networks were replaced with pre-insulated pipe networks and 15 single-function nodes and 14 dual-function nodes were built. This allowed to significantly reduce transmission losses and distribution of the heating medium. A biomass-fired boiler was installed, cooperating with the turbogenerator. Almost 80% of heat energy and 100% of electricity is produced from RES.

The heating network is one of the few effective networks in the country. The project of the municipal company consisting in the comprehensive modernization of the Płońsk heating system in 2007 was awarded the global Energy Globe award. The total investment cost was over 8,5 mln euro. Płońsk was the first town in the country to invest in such a modern and comprehensive renewable green fuel energy.

**Time period: 15.06.2006- 31.12.2007**

### **Success factors**

Over the period of 10 years of operation of the Heating Power Plant, approximately 2.3 million GJ of heat were produced and approx. 60 thousand MWh of electricity. Around 250,000 were burned tons of biomass. Burning biomass, the amount of burnt coal was reduced by 125 thousand tone. It allowed to reduce the emission of:

- Carbon dioxide - 275,000 tons,
- Sulfur dioxide - 1530 tons,
- Nitrogen oxides o - 450 tons,
- Dust - 3250 tons,
- Ashes - 17,500 tons.



## FINANCING

<b>Investment costs</b>	<b>8.430.500 EUR</b>
- Own sources	1.154.500 EUR
- Subsidies (Ecofund)	2.819.750 EUR
- Loan - National fund for environmental protection and water management; 10 years, interest rate 2%	4.456.250 EUR
<b>Lifetime (service life)</b>	<b>25 years</b>
<b>Annual operational costs (incl. repairs, maintenance and other specific costs)</b>	<b>12.000 EUR</b>
<b>Annual operational cost incl. salaries, repairs, maintenance and other specific costs</b>	<b>180.413,45 EUR</b>
<b>Annual operational cost incl. salaries, repairs, maintenance and other specific costs</b>	<b>42.766.825,75 EUR</b>
<b>Annual revenues</b>	<b>44.274.191,00 EUR</b>

### Financial indicators

Net present value - NPV	23 066 650,35 EUR
Internal rate ratio - IRR	109,12%
Payback period - simple	1 years
Payback period - discount	1 years
Evaluation year	2007
Lifetime period	25 years
Discount	4,00 %





## BARRIERS ENCOUNTERED

- Lack of qualified engineering staff - necessity of employing a substitute investor - increase of investment costs,
- Difficulties in familiarizing with a similar, working installation,
- Negotiation of the amount and quality of loan collateral from National fund for environmental protection and water management - necessity of joining the City,
- Conviction of the City Council to establish collateral for a preferential loan from the National fund for environmental protection and water management
- Difficulties with complete financial closure - the need to obtain a trade credit,
- Ensuring decent working conditions for the crew during the implementation of the investment, in particular during the winter,
- Significant increase in prices of materials at the turn of 2006/2007 - convincing the contractor to continue the investment on contractual terms from 2005
- The problem with choosing a turbine,
- The problem with obtaining a license for electricity production and start-up of a combined heat and power plant.

### Ways to deal with barriers


- Efficient coordination of activities, development of a plan, taking into account some flexibility in the implementation of investments, compliance with the schedule, support of the city.



## Key results

- Reduction of pollutant emissions due to the increased efficiency of production and combined economy as well as the replacement of coal with biomass
- Reduction of CO<sub>2</sub> - 35.000 Mg / year, ie 77.2%
- Reduction of SO<sub>2</sub> - 144 Mg / year, ie 63.8%
- Reduction of NO<sub>x</sub> - 54 Mg / year, i.e. 63.3%
- Reduction of Dust - 151 Mg / year, ie 76.7%
- Reduction of CO - 29.8 Mg / year, ie 19.3%
- Reduction of soot - 4.8 Mg / year, ie 76.5%
- Reduction of the emission of the secondary pollution from stored coal, whose storage inventory has decreased by approx. 50%
- Reduction in the amount of noise emitted - as a result of a smaller number of devices emitting noise located outside the building
- Reduction of solid waste (slag and ash) by approx. 65%.



**CONTACT:** [Przedsiębiorstwo Energetyki Ciepłej Sp. Z o.o.](mailto:kontakt@pecplonsk.pl)  
 [kontakt@pecplonsk.pl](mailto:kontakt@pecplonsk.pl)