

# **A PUBLIC-PRIVATE PARTNERSHIP INITIATIVE TO CREATE A FUEL SUPPLY MARKET FOR SMALL SCATTERED SUPPLIERS OF WOOD-WASTE**

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## **Abstract**

A project developed for the Global Environment Facility (GEF) is described. The main goal is to create a local market for wood-waste produced by small wood-processing manufacturers. The market would be organised and managed on a commercial basis by a Ltd. company, which will be a Private-Public Partnership (PPP) venture involving the local municipalities and a capital investor.

## **Introduction**

The forests in Poland constitute a moderate percentage (ca 28%) of the total area. Therefore, any further exploitation of forests for dedicated fuel production which would deplete this resource is unacceptable. Only wood fuel produced in a sustainable way can be considered. This includes primarily the residues from industrial wood processing or from routine maintenance of the forests, orchards or municipal green areas.

In several countries in the CEE region - notably in Poland - there exist areas where small and medium size wood-processing industries are important, or even dominant, economic activity. In those areas many small or medium size enterprises, manufacturing workshops or timber mills produce limited amounts of wood residues each, which - when taken together - present a significant potential of biomass for energy production. The individual enterprises have a significant surplus of wood waste and only a fraction of it is used for their own needs (mostly, space heating or drying of timber). The remaining part is disposed of, most often, in unauthorised landfills, at river banks or road sides, in the fields or in the nearby forest. This

practice leads to serious local environmental damage: littering of the neighbourhoods, poisoning of waters, creating fire hazard.

In 1995 FEWE's Centre in Krakow, Centro de Estudos em Economia da Energia dos Transportes e do Ambiente (CEEETA), Lisbon, and ADEME, France made a study entitled „Potential of Wood Waste Combustion Technologies in Selected Representative Regions of Poland“ (Oliveira, 1995) within the THERMIE programme. The study revealed that the amount of heat that can be produced using the wood residues can be much higher than reported by wood processing enterprises. Firstly, there exist substantial resources of wood waste generated, which are either completely wasted as fuel or used very inefficiently. The site visits showed that in many cases the main goal of burning wood residues is getting rid of the waste rather than obtaining useful energy. Consequently, the small efficiency of combustion and heat utilisation is a tolerated or even desired factor.

On the other hand, on the end-use side, one can estimate that about 15-25% of heat can be saved by simple, low-cost improvements of the building envelopes. If such saving measures were implemented, the disposable surplus of wood residues would increase correspondingly, without affecting the production process or heating comfort at the facility.

Therefore, in order to increase the benefits of using wood to replace fossil fuels for heat production, an integrated approach is needed in Poland, which combines fuel conversion with end-use efficiency and fuel security. This observation has led to a project proposal, the main objective of which was to optimise the use of the existing potential of wood-waste for space heating in Poland in order to achieve maximum environmental and economic benefits.

### **Project description**

In January 1999 the Kraków Centre of FEWE submitted to GEF a proposal entitled “Integrated Approach to Wood-Waste Combustion for Space Heating in Poland”. As a first stage, PDF-A grant of 25 000 USD has been awarded to develop a Medium Size GEF grant proposal (maximum MSG award is 1 m\$). The PDF-A study was completed in January 2000 and the work on the so called Project Document (ProDoc) which gives the basis for the final grant approval began. Since the GEF funding was over by that time, further work was financed from FEWE's own resources, and was supported by the University of Mining and Metallurgy (AGH) in Kraków, Polish Pumped-Storage Power Stations Co. S.A.(ESP SA), and a consulting company CityProf in Kraków. After detailed studies the final version of

ProDoc (FEWE, 2001) was approved in March 2001 and a GEF grant of 950 USD was awarded to the Poland.

The project which totals 3.6 m\$ (with 950 000 GEF contribution) envisages establishing a wood-waste storing/reprocessing facility and building three district heating network systems with the respective boiler capacities: 4.7, 0.9 and 0.7 MW in the city of Jordanów (population ca. 5000) and neighbouring villages Bystra and Sidzina in Southern Poland. All buildings connected to the grids are heated by burning coal (as are most of the buildings in the area), usually in inefficient old boilers.

A Private-Public Partnership (PPP) company will be established as a common venture of the involved municipalities and a capital investor (in the approved ProDoc it was ESP S.A.). The PPP company will enter long term contracts with wood waste suppliers on one hand and customers buying heat for about 40 housing blocks of flats, schools and other public buildings. Prior to the connection to the grid the buildings will be thermally retrofitted using the low-cost approach developed in a previous USAID project (Gula et al., 2000).

It was first assumed that the project would start in June 2001. However, due to prolonged procedures on part of the Polish institutions it has been delayed by more than a year now (it should be noted that the reasons for the delay were beyond the influence of the project proposer FEWE).

### **Estimating the wood waste potential**

Although the amounts of wood waste produced by individual units are rather limited, a study commissioned by ESP showed that the total potential is quite significant. In fact, the results of the study turned out to be even higher than expected. The survey covered 647 out of about 1000 workshops running different types of wood processing activities. On the basis of interviews the volume of softwood and hardwood waste was estimated to be ca. 250 000 m<sup>3</sup> annually, most of the which, 221 000 m<sup>3</sup> (ca. 84%), is softwood. Workshops use about 30-35% for their own production and heating needs; of which more than 50% is used for heating. The majority of workshops burn their wood-waste in central heating furnaces. However, merely 36.2% of them are equipped with special wood waste burners. Other users use furnaces, which have been designed for coal. Some wood processing workshops use wood waste in kitchen stoves or sawdust-fuelled stoves.

All in all, workshops were selling at the time of the survey 85,000 m<sup>3</sup> of residues. Together with the amount transferred free of charge to other recipients, the workshops dispose of

107,000 m<sup>3</sup> per year which amounts to 40% of all wood waste produced estimated at 172,000 m<sup>3</sup>. This gives an amount of 65,000 m<sup>3</sup> annually which could be offered for sale to the PPP company. However, one should notice that due to the huge delay in the initiation of the project many potential providers have entered or committed themselves to enter into long term agreements with other buyers even though the prices offered are equally or less attractive (remote ply wood industry, brick factories etc).

### **Expected reduction of carbon dioxide emissions**

It is difficult to determine precisely reduction of carbon dioxide emissions that will result from the fuel conversion in this project; still sufficiently good estimates of the order of magnitude can be given. The most complex task is to assess calorific value of the wood-fuel. Therefore, let us consider rather the lower limit of wood waste potential (the actual may increase significantly in the course of further activities). Let us assume that the 65,000 m<sup>3</sup> of wood waste corresponds to 20,000 tonnes of wood fuel of 40-50% humidity. If one takes a rather low calorific value of 9 GJ/t, one obtains heat production potential of approximately 180,000 GJ/y which for the efficiency of the heating system merely 75% gives 135,000 GJ annually.

Preliminary audits of the buildings to be connected to the grids show that the current demand for heat is  $E_0 = 300 - 500 \text{ MJ/m}^3/\text{y}$ . If we take the upper limit, i.e.  $500 \text{ MJ/m}^3$ , then thus defined potential of wood waste will suffice to heat 270,000 m<sup>3</sup> of space. Assuming that, due to thermal improvements, average consumption reaches  $400 \text{ MJ/m}^3/\text{y}$ , this number will increase up to 337,000 m<sup>3</sup>. Given local conditions this is a very high value. For instance, 270,000 m<sup>3</sup> correspond to approximately 50 medium sized four-storey four-stairway blocks of flats. Thus, the potential is significant, even taking into consideration such cautious calculations as we have made. Precise estimates for the amount of CO<sub>2</sub> emissions reduction cannot be given in advance. However, a very conservative approximate of CO<sub>2</sub> reduction is 5760 tonnes annually. This number could be much higher if the project expands successfully.

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