



Integrated logistics for the use of biomass energy

LIFE 03 ENV/SK/000577
SLOVAK REPUBLIC

ABSTRACT:

Creation of a sustainable market of biomass energy for heat generation in Slovakia, GHG emissions reduction and promotion of the renewable energy sources adoption in Slovakia were the main goals of BIOMASA Association through its LIFE project "Integrated logistics for the use of biomass energy".

In this project a new plant for pellet production has been built and 42 boilers in schools and other public buildings were converted from fossil fuel to pellets. The project was located predominantly in Northwest Slovakia and it was multinationally financed through several grants. It was the first project in Slovakia which received the financial support from LIFE Environment Program, in 2003 - the first year open also for Slovakia.

The project presents complex solution for the implementation of biomass heating and establishment of the market with wood pellets in Slovakia. It is solving production and consumption of pellets as one integrated unit.

It was built on the strong partnership at local and regional levels, which has been created inside BIOMASA Association.

This report presents results and experiences with the development of the new pellet market in Slovakia and project implementation.



1. INTRODUCTION

Slovakia is considered to have ideal natural conditions for developing biomass energy, it is definitely among countries that are rich in biomass. Almost half of Slovakia is afforested with a huge amount of biomass. But generally, Slovakia considerably lags behind in the utilization of biomass in comparison to what is actually available and technically feasible. The present utilization of biomass figures about 1,6 % of the gross domestic energy consumption. But biomass heating is strongly developing in present, with increasing trends for the near future as in municipal district heating sector, as in

households; about 55 MW of biomass boilers capacity were and should be installed for district heating in 2005 and 2006 together.

Biomass and renewable energy sources cannot fully replace the energy from primary sources. However, it could help to solve the energy and ecological situation in individual regions.

Even wood was the traditional fuel in the past, than its utilisation decreased in favour of gas and coal which profited from low energy prices and strong state support. Aim to increase the renewable energy sources and especially biomass utilization in Slovakia, reduction of CO₂ emissions as well as modernization of old inefficient boilers were (stood) at the beginning of the Project realisation. Biomass as a modern fuel, which can provide convenient, reliable, environmentally friendly and trouble free source of energy was unknown in that time. On the other side it was necessary to solve the problem of many municipalities with the technical conditions of old obsolete boilers combusting coal, coke or sludge in schools, which were unreliable, ineffective and polluting the local environment.

The project idea was based on connecting production of a "new" fuel wood pellets from local sources with reconstruction and operation of boiler rooms combusting this fuel, energy efficiency measures and promoting the biomass, which can be based mainly on these practical examples.

2. PROJECT ACTIVITIES AND EXPECTED RESULTS

The project was focused on creation and management of innovative integrated logistics system of sawdust collection, transport, processing to wood pellets, distribution of wood pellets, heat production and delivery of heat to the end users.

A logistics production plant for wood pellets (Central Processing Unit CPU) was constructed and 42 boiler rooms in BIOMASA member municipalities, currently combusting coal/coke were replaced by the pellet-firing ones. Reconstructed boiler rooms are placed mainly in public buildings and they produce replicable, economically viable and environmentally friendly source of heat for them. Also several private houses have being reconstructed as pilot examples.

Creation and management of such complex logistics system have never been used in Central and Eastern Europe before in such a way.

Main project activities:

- * Adjustment activities for reducing institutional, financial and informational/awareness barriers
- * Construction of the Central Processing Unit (CPU) for wood pellet production
- * Reconstruction of 42 old fossil fuels boiler rooms in public buildings to modern pellet ones
- * Pellet production and boiler rooms operation
- * Monitoring and evaluation, information / dissemination and management

Expected results

- * Realisation, demonstration and verification of new innovative logistics system for establishment of pellet heating in Slovakia that could be used in other CEE countries
- * Annual production of 6,000 tons of pellets and their consumption in the region
- * Increased re-utilisation of local wood waste residuals land filled in the region in amount of 9,000 tons
- * Upgrading old heating system and improvement of energy efficiency in public buildings
- * Increased job opportunities in the region.
- * Improvement of air quality by annual reduction of CO₂, SO₂ and other emissions
- * Biomass Information Centre in CPU promoting biomass usage, providing consultancy on the base of practical experiences gained from the project
- * Strengthening of local economics
- * Increased interest and general public awareness in biomass use
- * Enforcement of legislation improvement in the field of renewable energy sources usage in Slovakia

3. PELLETS PRODUCTION

The new pellet plant in Kysucky Lieskovec in Zilina region is in operation since October 2004. Its production capacity reaches 12 000 tones per year using approx. 20 000 tones of wood residues. The initial investment costs for the plant construction were about 3,5 millions Euro. The technologies used are from Slovak producers besides the pellet mill, which was delivered by CPM Europe in Netherlands. The hourly production of pellet mill is 2 - 3 tons.

Pellets production plant also serves as a (so called) Central Processing Unit and it ensures the following activities:

- * Collection of wood residuals in the form of wet and dry sawdust
- * Technological processing of sawdust to wood pellets respecting quality standards
- * Packing, storing and sales of pellets
- * Distribution of pellets to boiler rooms operated by BIOMASA
- * Central management of boiler rooms

Sawdust is collected by the own transport system (two containers sets) from local producers. The collection logistics is oriented above all to small sawmills with continuous and reliable supply. Production in 2005 reached 7 000 tons of pellets of 6 and 8 mm diameter.



Pellets production plant in Kysucky Lieskovec

4 500 tons were used for own boiler rooms and 2 500 tons for domestic market and export. For the next years the production will reach 12 000 tons. Then, boiler rooms operated by BIOMASA will consume 4 500 tons of pellets and an amount of 7 000 tons will be intended for domestic market and export.

The main priority of BIOMASA Association is to develop the Slovak pellet market and to increase yearly the sales of pellets in Slovakia (except consumption in own boiler rooms). According to signed contracts production of 6 000 tons should be consumed in Slovakia in 2006. But mainly in the starting phase of the production and in the time of Slovak pellet market development in present, the export of pellets is crucial.

Distribution channels for pellets are different and gather all possible distribution methods. Pellets to biomass boiler rooms operated by BIOMASA are distributed by tank truck. These boiler rooms are located in BIOMASA member municipalities, which are mostly small villages in mountains, often with difficult access for transport in winter.

Pellets for sales in domestic market and export are packed in big-bags of 1 000 or 1 200 kg and sacks of 15 kg. In some cases, they are sold in Slovakia also in bulk and transported by own tank truck or in containers. Pellets are exported mainly to Italy, Poland and Austria.



4. BOILER ROOMS RECONSTRUCTION AND HEAT PRODUCTION

A total of 42 boiler rooms with capacity ranging from 15 kW to 2 500 kW were reconstructed within the project. Old inefficient coal, coke and sludge fired boilers were replaced by wood-pellet boilers. Reconstructed boiler rooms are placed mainly in public buildings and they produce replicable, economically viable, and environmentally friendly source of heat for them.

Reconstruction of boiler rooms included:

- * dismantling existing systems, reconstruction works - preparation of building for technology installation; construction of new heat distribution system and grids; connection of buildings with central heating system, regulating nodes;
- * supply and installation of new boiler plants;
- * upgrading of old heating systems and energy efficiency improvements in connected buildings - heating systems regulations, valves, replacement of old radiators, windows replacement, outside thermal insulation regulating nodes, etc.

The biggest 2.5 MW heat production plant in Lubochna (Liptov region) was converted to biomass in 2003 so ensuring a ready market for the pellets. It heats 14 buildings of the health sanatorium, among them also flats, plus 3 school pavilions, kindergarten and municipal office building.

In 2004 another 9 pellets boiler rooms were reconstructed above all in schools and 19 boilers in public buildings as well as 12 small pilot boilers in private houses and NGO's were installed and put into operation in 2005, e.g. in municipalities: Horna Poruba, Hrustin, Mutne, Nemsova, Novot, Povina, Nova Bosaca, Slanicka Osada, etc. The boiler rooms reconstruction within the project finished in March 2006, when the last school boiler room was put into operation.

Installed capacity	Number of boiler rooms
over 1 MW	1
425 kW - 1 MW	11
50 - 300 kW	17
Up to 25 kW	13
Total	42

In many cases replacement of the heat source was connected with realization of equithermic adjustment of heating systems, and other energy efficiency measures (insulations, windows reconstruction, etc.). The Association is owner of the installed technology in the reconstructed boiler rooms and sells the heat to the end users.

Operation of boiler plants includes:

- * Heat production and its sales to end customers (Association's members and others)
- * Control and monitoring system of all boilers - all operated boiler rooms are electronically connected to the central monitoring and control system in CPU. This makes possible to control, monitor and to make evaluations from distance.
- * Maintenance and reparation services of boiler rooms operated by BIOMASA.

5. PROJECT RESULTS

Project created the real market with wood pellets in Slovakia, promoted biomass and considerably contributed to development of biomass heating in Slovakia

Pellet production in 2005 reached 7 000 tons, plan for 2006 is 10 000 tons and the final capacity is 12 000 tons of pellets.

Through the project, local biomass sources were re-utilised directly in the region - 12 400 tons of sawdust from the local wood processing industries were re-utilised in 2005; it will increase in the future to 23 thousands tons of sawdust.

The project replaced more than 28 000 kW of coal and coke boilers by installation of 12 145 kW of modern biomass boilers capacity. The reconstructed boiler rooms were the pilot ones in public buildings in Slovakia.

42 new biomass boiler rooms replaced in total 96 obsolete inefficient boilers in 52 old coal/coke boiler rooms. In many buildings energy efficiency measures, modernization and regulations of heating systems were realized, new heating operational regulations were introduced and many beneficiaries noticed better heating quality in buildings (very welcomed especially in schools and kindergartens). It also decreased heating costs of many end users.



Boiler room before reconstruction

6. INFORMATION ACTIVITIES FOR AWARENESS RISING

The main barriers for pellets in the Slovak energy market are lack of information and awareness of the end users (costs, benefits, technologies, constraints of biomass heating), lack of complex and expert information and practical experiences, higher investment costs, lack of trained professionals to promote and support biomass energy activities, and to ensure reliable operation of the new installations; ambiguous and inflexible national RES policy, lack of cross-sectoral strategy and policy and absence of stable long term financing mechanism to support RES.



As a leader in biomass utilisation in Slovakia, BIOMASA Association has been targeting information activities to a wide range of different kinds of stakeholders with the aim to remove numerous different barriers.

At the beginning, it was necessary to develop a biomass market in Slovakia. With this aim, BIOMASA entered in contact and developed very strong partnerships with mayors, representatives of self governments, schools and healthcare institutions. Intensive communication through direct personal contacts were carried out in order to persuade the politicians and state officers at national and regional levels about the project since the schools, where reconstruction of boiler rooms were planned were at that time in the ownership of the state. We needed to communicate intensively and to convince mayors of municipalities, directors of schools, parents of scholars, inhabitants in the members municipalities and also a lot of professionals, experts in the energy field and officers delivering various approvals and permissions.

Building a complete wood pellet market (from collecting the raw material to the environmental friendly burning of pellets) gives all stakeholders and beneficiaries the possibility to see that it works very well. BIOMASA organizes excursions to reconstructed boiler rooms as well as to pellet production. It allows to reach the “first step” necessary to overcome barriers: to show in practice to people that wood pellets are competitive and cost-effective fuel usable for heating. As a consequence, it has promoted confidence of a wider part of the population in these innovative and environmental friendly alternatives to fossil fuels.

In order to enlarge this newly created energy market in public buildings, another 12 pilot projects consisting in installation of biomass technologies in family houses were targeting the broad public. The owners of these 12 buildings are obliged to open their cellar to the public interested in this new technology and give them information about it.

It is also important to show to the public that it is not as expensive as they think. During information activities, BIOMASA highlights that the price for pellets is fully competitive compared to the price of gas and is significantly lower than propane and electricity in Slovakia. But still one barrier remains concerning the initial investment costs.

Although biomass can be sold at a competitive price, the technology and manufacturing facilities are higher than for fossil fuels. However in the long-term the use of renewable energy sources is cheaper than fossil energy sources. But despite of that, a rising interest for pellets as a fuel among small companies and public is observable. Another group BIOMASA was targeting with seminars and excursions is teachers and students attending schools where biomass boilers have been installed. The goal was to inform them about the advantageous of the new technology used to heat their school.

In the future, BIOMASA is planning to intensify the communication towards boiler installers and vendors through practical seminars based on operation experiences from 40 biomass boiler rooms in Slovakia in order to increase their knowledge in specificity of biomass technologies and their operation. The goal is to palliate to the lack of trained professionals able to promote and support biomass energy activities as well as able to ensure reliable operation of new installations.





Boiler room after reconstruction

Efficiency of old obsolete boilers was only about 50 % (30 years and older technologies). By replacing of fuel source in reconstructed boiler rooms and realization of energy efficiency measures the annual direct reduction of CO₂ is 12 100 tons. But additionally another 3 000 tons of CO₂ are saved by consumption of 1 800 tons of pellets which will be sold in the Slovak market in 2006. In the future it can reach 5 400 tons of CO₂. Considering that biomass promotional activities done within the project led and will lead to the increase of biomass heating in Slovakia also outside the project, another indirect CO₂ reduction might be calculated.

Although sawdust is not more waste as it used to be, even thought about 10 % of sawdust, which is processing to pellets would be decomposed in landfills and it leads to the saving of 150 tons of methane or 3 150 ton of CO₂ equivalent. The reduction of other gases is following: 53 tons of SO_x, 15 tons of NO_x, 77 tons of particulates and 350 tons of CO.

The project has created 33 jobs and it considerably contributes to the regional development. Biomass generally can create or save a lot of jobs and this fact was not very considered in Slovakia in national strategies yet. The project was awarded by the European award for local climate protection activities Climate Star 2004 and international Environmental Price ÖGUT in 2001.



Climate star 2004 award for the project

Project strengthened the local economics as it has created a lot of contracts with local companies (raw material, construction, technology, services), new biomass fuels producers as well as new pellets consumers.

It is helping also on expansion of business and supporting services for renewable energy and energy efficiency, strengthening companies assembling and projecting RES (biomass) systems through experiences gained in the project implementation. It also developed basis for accession of boilers/ stoves producers and sellers to the Slovak market due to increased demand.

Experiences gained from the project were and will be used in the process of preparation of different regulations and legislation, e.g in the field of fire protection in such similar plants (as no relevant regulations exist in Slovakia), biomass utilisation development strategies or supporting regulations in the field of RES utilization (consultation in Ministry of Environment, Ministry of Economy, etc., newspaper articles).

Different activities for biomass promotion and dissemination of result were done: organisation of 3 annual international conference (340 participants together), 40 seminars for decision makers (mayors, director of schools, energy managers, NGOs) and other target groups (students, pupils, public, energy experts, environmental officers) with about 300 attendants, project presentations at energy related conferences and seminars (up to 40), printed presentation materials leaflets, panels, book "Heating with wood pellets", web site, media campaign - 84 articles/news in national and regional media, information panel has been placed in each reconstructed boiler room; excursion to CPU and biomass boiler rooms; meetings and daily consultancy for potential biomass users;

Project was implemented in the time of structural changes (state administration reform, decentralization, EU entering new rules and regulations, free market opening, etc.), what sometimes created problems, but on the other side also the challenges to solve them. Project gives example of strong partnership building and cooperation of a wide range of participants (municipalities, NGOs, health institutions, state administration, etc.)

Sustainability of the project logistics system is ensured by the possibility to enlarge the network of sawdust suppliers as well as consumers of heat and pellets with the BIOMASA member Kosice Self-governmental Region, the project has been enlarged also to the East Slovakia, with a great potential for biomass heating development. All dissemination activities allow transfer of know-how gained from the project and possibility for the project replication.

Finally, meetings and seminars with officers delivering various approvals and permissions for biomass boiler installation are still very important. As no standards for biomass fuels have not been adopted legally in Slovakia yet this information campaign will allow accelerating the deliver of permits and better adapting the whole administrative process to the biomass energy sector by improving the State government officer knowledge in the specificity of biomass technologies.

As many of BIOMASA information activities, the aim is to show the possibilities of biomass and pellets as an energy source and that it is practical and a very comfortable fuel for family houses and small facilities. Also information campaign in media through many articles and news in regional and national newspapers was running over the whole project.

7. MULTINATIONAL FINANCING AND BIOMASA ASSOCIATION

Project Integrated Logistic for Use of Biomass energy was implemented from 2003 to 2006, but the preparation activities started in 2000, when also 2 pilot boilers were installed. The project was implemented with the financial support of: the European Community LIFE III Programme, Global Environmental Facility, through UNDP, Ministry of the Environment of the Slovak Republic, Austrian Environmental fund Programme

through Kommunalkredit Public Consulting, GmbH, loan from Dexia banka Slovensko, Inc. and own BIOMASA sources as well as sources of its members. The project budget approved by the EC was 6,2 million Euro, although the total costs with costs of members for reconstruction and energy efficiency measures reached more than 8 million €.

Project was the first LIFE Environment project supported in Slovakia. Contribution of EC reached 30 % of the eligible costs that was 1,012 million €.

BIOMASA, Association of legal entities - project holder is a non-profit organization joining municipalities, schools and health care institutions. The aim of the Association is to participate in the process regarding the use of renewable energy sources, through the information dissemination and implementation of the new environmental friendly technologies powered by biomass.

Association was founded in 1999 and since that time it is leader in biomass utilization in Slovakia. BIOMASA activities:

- * pellets production and sales
- * reconstruction of boiler-rooms into biomass ones
- * installation and operation of pellet-fired boilers
- * production and sales of heat
- * biomass promotion in local market
- * consulting and information activities
- * project development and implementation

Contact:



Association of Legal Entities

Kysucky Lieskovec 743
023 34 Kysucky Lieskovec
Slovak Republic

Phone: +421-41-423 15 00
Fax: +421-41-423 15 05

E-mail: biomasa@biomasa.sk
Website: www.biomasa.sk

