BIOMASS DEVELOPMENTS AND RESEARCH IN SLOVENIA

Nike KRAJNC

Slovenian Forestry Institute, Vecna pot 2, SI-1000 Ljubljana, Slovenia
nike.pogacnik@gozdis.si

ABSTRACT

In Resolution on Efficient Energy Supply and Use in Slovenia (1996) particular attention is made on wood biomass [5]. Momentary share of wooden biomass in primary energy in Slovenia is around 4 %. Strategy of development anticipate that in next 10 years this share should rise up to 8%. To achieve this goal a National programme and Action plan for use of wood biomass was proposed to government in the end of year 2000. According to this plan 50 new district heating systems, 100 new biomass systems in industry and 5000 modern small biomass heating systems should be built in next 10 years. With this program share of wood biomass in primary energy should increase for 1,8 % and CO_2 emissions should lower for 1,6 %. Value of this program is 179 mio €, expected subsidy from the state will be from 20 % to 40 %.

INTRODUCTION

Wood biomass was and still is an important source of energy for rural population in Slovenia. According to official data more than 30 % of Slovenian households are using wood or wood waste for heating. Beside small users there are 78 medium size wood biomass heating installations in industry and few biomass district heating systems. In common for the majority of all this systems are out-of-date technologies. The main characteristics of this technologies are low efficiency and high emissions. For promotion of modern, efficient and ecological acceptable technologies government support is necessary. For this reason special national programme "Action programme for use of wood biomass in Slovenia (from 2001 to 2010)" was introduced in the end of year 2000. The question is, what consequences will this programme have for rural population, forest management and market development.

ACTION PROGRAMME FOR USE OF WOOD BIOMASS IN SLOVENIA (FROM 2001 TO 2010)

To achieve goals in Resolution on Efficient Energy Supply and Use in Slovenia an action programme was introduced to Slovenian government. With realisation of this programme the share of renewable sources of energy in primary energy would rise for 1,8 % and the emissions of CO_2 would lower for 1,6 % (according to Kyoto protocol the emissions of CO_2 in Slovenia should lower for 8 % by the year 2010). The program anticipate building of 50 new biomass district heating systems (average power 50 MWt), 100 new biomass systems in industry (average power 300 kWt) and 5.000 small biomass heating systems (average power 30 kWt).

Expected installed power of 5.150 projects is 330 MWt, production of heat power will be 1.200 GWh per year. The estimate value of the programme is 179 mill. € [4].

The main goals of this programme are:
- enlargement of share of renewable sources of energy in primary energy consumption (in harmony with White paper of European Union of Renewable sources of energy);
- reduction of CO_2 emissions;
- contribution to sustainable and multi- purposes forest and agricultural management (use of wood biomass from abandoned agricultural land, development of market for thin and low quality wood from thinning in early stages of forests);
- contribution to rural development (new activities on farms, job creation, new possibilities for tourism);
- in long run lowering dependency on imported energy, higher reliability in energy supply.

Expected benefits of this programme are:
- savings from fossil fuels (20 milli. € / year),
- increase of added value in regions, increase of net income in regions (337 milli. € / year),
- reduction of CO_2 emissions (320.000 t CO_2 / year)
- job creation in rural regions (7.818 man year).
- Use of wood biomass will be increased for 38.7 %.

For realisation of this program another 500.000 m^3 of wood biomass is needed. The question is will there be enough wood biomass?

Expected consequences of the programme

Presented programme was still not adopted from Slovenian government at the moment so we still have time to study what are possible consequences and what can we do to prevent negative ones (over cutting in forests for example) or to accelerate the positive ones (new job creation, market development, lowering CO_2 emissions,).

With 1150 new installation's on wood biomass the programme will have grate effect on:
1. urban population (50 new district heating systems will be installed in small towns - small urban centres all over the Slovenia): lower CO_2 emissions, better quality of living, better possibilities for tourism.
2. rural population, especially forest or land owners: new market for low quality wood, new activity creation (preparation of wood chips on farms), new source of income, new possibilities for land use (creation of shortrotation plantations).
3. forest management: larger demand for lower quality wood from younger stages of forests, market development, pressures on higher allowed annual cut.

FORESTS IN SLOVENIA

Slovenia is with 55% of area cowered with forest one of the most wooded countries in Europe. There is 0.56 ha of forest land per capita. The forest area has grown considerably (180,000 ha) in last 40 years. The problem lies in the process of abandoning agricultural land.

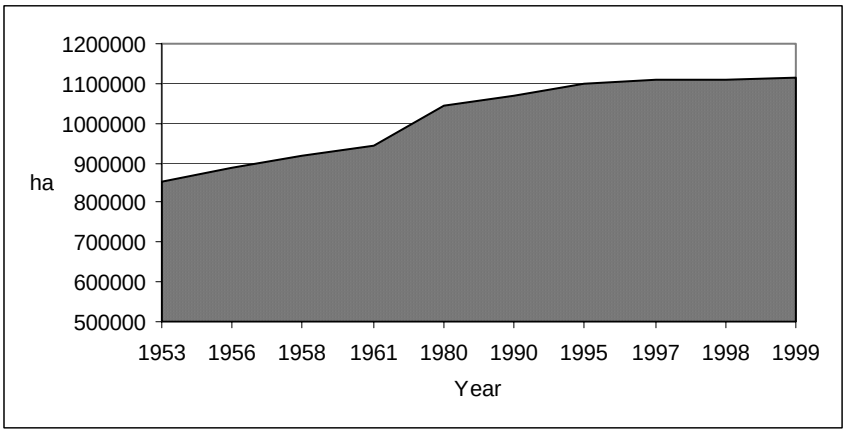

Figure 1: Changing of forest area in Slovenia

Growing stock has increased for 45% in last 40 years but production of raw wood has decreased (for 23%) in last 10 years. After denationalization (it is not finished jet) more then 65% of all forests in Slovenia will be owned by private owners.

TABLE 1
STRUCTURE OF FORESTS, GROWING STOCK, ANNUAL INCREMENT AND FELLING IN SLOVENIA (IN 1999)

	STRUCTURE OF FORESTS	**GROWING STOCK**		**ANNUAL INCREMENT**		**FELLING**	**FELLING IN RELATION TO ANNUAL INCREMENT**
	%	m^3	m^3/ha	m^3	m^3/ha	m^3	%
DECIDUOUS TREES	51	121.042.000	108	3.398.000	3	1.047.000	31
CONIFEROUS TREES	49	116.234.000	104	2.849.000	2,5	1.349.000	47
TOTAL	100	237.276.000	213	6.248.000	5.5	2.396.000	38

Annual cut in Slovenia is around 2.390.000 m^3, which is nearly enough for wood self-supply. Import of forest product was 567.000 m^3 in 1999. Slovenia exported only 14 % of total felling in 1999. From total amount of available wood (felling + import - export) 60 % is used in timber and paper industry, 15 % for energy and 25 % for home consumption [3].

POTENTIALS OF WOOD BIOMASS

Potentials of wood biomass on national level

Detail analyze of wood biomass potentials was done by Slovenian Forestry Institute[2]. According to this study potentials of wood biomass in Slovenia are:

- 450.000 dry ton of wood biomass per year from forests. In long run we can count with 1 m^3 of wood biomass per ha of forest. Important source of wood biomass for energy purposes is thin wood from thinning in early stages of forests. To develop stable and quality forest,

regular thinning is necessary. This means of forest management results in large amounts of thin wood. Most of this wood is still remaining unused in the forest, which is ecologically desired, but economically inadmissible.
- 120.000 dry t of wood biomass per year from abandoned agricultural land.
- and 361.000 dry t of wood waste per year from wood processing industry.

The majority of this potentials are already used for energy purposes. Wood biomass directly from forests is mainly used by forest owners. Wood wastes are on the contrary used directly in industry for production of process steam or electricity. Largely unused are potentials from abandoned agricultural land.

All this estimations on national level are important for creating national policy for efficient us of wood bimass. But they are uselessness for small user or forest owners.

Wood biomass potentials on forest estate

As not many studies were done on wood biomass assessment on forest estate we decided to make a detail study on selected farms in Slovenia (in the year 2000) [1].

The assessment of forest potentials on farms was not problematic, for it turned out that the data from forest management plans (wood stock, the annual cut, work to be carried out in forests) meet the needs. While gathering certain data on forest potentials, assistance by the owners and foresters was needed (estimation of the assortment structure). Considering that the calculations of wood stock, its additional growth and accurate assessments of the expected assortment structure are expensive and lasting, a conclusion was reached that the existing data were sufficient for the needs of advice-giving.

Somewhat more problematic was the assessment of wood biomass potentials outside the studied forests. As not many calculations regarding the quantities and assessments of the expected structure are at hand, we decided that within two farms the potentials should be calculated on abandoned agricultural land. On 11 sampling surfaces (4 ha) all trees were measured. The number of tree individuals was on all surfaces rather high, with individuals prevailing in the lower thickness and lower height classes. Wood stock was in spite of the large number of individuals per ha relatively small (161 m^3 / ha on the first surface and 81 m^3 / ha on the second). We have estimated that the quality of individuals was very poor and should therefore be used, in future, particularly for fuel purposes [1].

If a sawmill also exists on the property, wood remnants can be a very important source of energy, which is for the time being not interesting for the market. Wood remnants are purchased only for the production of chipboards, and purchase price of wood remnants most often covers only transportation charges.

A very important estimate during the collection of data on a farm is the momentary use of separate sources of wood biomass. By comparing the momentary use and the potentials, we can show where certain reserves and a possibility for extra earnings can still be found.

CONCLUSION

Slovenia is country with a lot of forests and unused wood biomass potentials. In the past wood biomass was an important source of energy for rural population (for cooking and heating). The situation has changed in last 30 years when oil was very cheap. The importance of wood biomass as an energy source has grown in last 5 years. but we still can not say that wood biomass is "popular" among people. In general they are sceptical about new technologies. The main reasons for this situation are insufficient information, lack of knowledge, insufficient written sources (brochures, pamphlets) and unclear governmental policy. To overcome this problem some action has to be taken. First step is "Action programme for use of wood biomass in Slovenia (from 2001 to 2010)". Second step in transfer of information to target groups. In this case we can divide people in to four larger groups: urban population, rural population, forest owners and policy makers. For better understanding of benefits of wood biomass we should prepare special oriented educational programmes. For example we prepared a method of advice-giving to forest owners for an effective use of wood biomass. The purpose of such advice-giving to forest owners is transfer of knowledge on:

the potentials of wood biomass on somebody's estate,
various technologies for the preparation of wood biomass and its use,
economy of various technologies.

Advice-giving is no doubt important, for in this way we can call the owner's attention to the mistakes he is making during the preparation of fuel and acquaint him with some new technological solutions (mechanised preparation of logs or preparation of chips). But this is only one way of education. To get better understanding of benefits of wood biomass we should launch a larger campaign for all target groups.

REFERENCES

1. POGAČNIK (KRAJNC), N. (2000). Extension for forest owners in the field of effective use of wood as energy-producing raw material : master of science thesis. Ljubljana: University of Ljubljana, Biotechnical faculty, 199 p.
2. ROBEK, R. / MEDVED, M. / POGAČNIK (KRAJNC), N. / BITENC, B. / ŽGAJNAR, L., (1998). Removing barriers to Biomass District Heating Projects in Slovenia. Analysis of Wood Biomass Potential in Slovenia.- Project report, Ljubljana, Slovenian forestry institute, 45 p.
3. POGAČNIK (KRAJNC), N. (1998). Forestry, timber industry, and the use of wood biomass in Slovenia. In: HILLRING, B. (ed.). *Recycling, energy, and market interactions: workshop proceedings*. Istanbul: Ministry of Forestry, Turkey, No.9., 87-89.
4. (2000). Programme of use of wood biomass in Slovenia. Proposal to the governoment., Ministry of the environment and spatial planning, 46 p.
5. (1996). Resolution on Efficient Energy Supply and Use in Slovenia (1996). Ministry of economic affairs, 126 p.
6. KRAJNC, N, / DOMAC, J. (2001). South-Eastern European Biomass Action - A new international research cooperation between Slovenia and Croatia. V: Woody biomass as an energy source - challenges in Europe. Finland. Joensuu: European Forest Institute: Proceedings No. 39, p. 131 - 139.