The Development of Bioenergy in Austria and in the EU

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1 The Motivation for Developing Bioenergy - the Example of Austria

A country's interest in the utilisation of biomass for energy depends on four problem areas: its energy policy; its environmental policy; its agricultural policy; and its social policy. In all of these areas there are good reasons in Austria for the utilisation of biomass for energy.

Energy policy: The Austrian consumption of primary energy is about 1200 PJ/a and has a slightly increasing tendency. The indigenous energy production is only 350 PJ/a so that more than two thirds of the energy requirement have to be imported.

An analysis of the development of the Austrian energy production shows that the contribution of fossil energies, i.e. of coal, petroleum and natural gas, has been constantly decreasing during the past years. This is due to the slow exhaustion of the domestic reserves. For this reason the decrease would continue in the next years and cause an increasing dependence of the country on imported energy. A compensation of this decrease of the indigenous energy sources was only possible in the past years by an corresponding increase of hydropower and of bioenergy utilisation and will in the future be possible only by using these resources: but about 70 % of the domestic hydropower potential are already used and against the use of some of the remaining 30 % there exist serious environmental objections. So in the future the compensation of the decrease of indigenous fossil fuels production will have to rely on bioenergy.

Environmental policy: In this context the carbon dioxide problem has to be mentioned primarily. The quantity of the emissions is still increasing and the attainment of the Kyoto target of a 13 % reduction of the emissions by 2010 will be possible only with great efforts. In this respect the intensified utilisation of bioenergy would be very attractive, as it is neutral with regard to carbon dioxide emissions.

Another environmental aspect is the sustainabilty of the energy production from biomass. Whereas the use of fossil fuels is limited by the stocks available bioenergy, like hydropower and solar energy, will be available for an unlimited time.

Forestry and agriculture policy: With a share of 46% Austria is the most densely wooded country in central Europe. The use of fuel wood for space heating has a very long tradition and was always of great importance in rural areas. In the forests large quantities of by-products are produced, such as limbs, bark and thinnings, which can only be used for energy production. The timber industry also produces great quantities of by-products, which are partially used for cellulose and particle board production, but also as a fuel. Securing and enlarging the utilisation of the indigenous raw material wood is of great importance.

As in most European countries there is a considerable surplus production of food and feed crops in Austria: The surplus production can be expressed as surplus area and comprise about 300 000 ha arable land and 50 000 ha greenlands. The cultivation of new and of special crops, such as vegetable oil, protein and some speciality crops can take care of about 180 000 ha, which reduces the surplus area to 170 000 ha; this area is available for the production of energy crops. The possible importance of the energy market as a possible customer for agriculture and forestry is shown by the comparison of the values of the end products in both areas in 1993:

Agriculture and forestry	ATS 74 (US)billion
Energy	ATS 125 (US)billion

Social aspects: In a number of rural regions in Austria there is an acute shortage of jobs and, as a consequence, a high rate of unemployment and a migration of the population into towns and cities. The creation of new jobs in the undeveloped rural areas is a priority target of the Austrian social policy. The regional utilisation of biomass for energy production prevents the drain of buying power from rural communities and creates new jobs and wealth in many economically problematic regions. An estimation of these effects shows that per megawatt installed capacity of energy from biomass about 2 to 3 new jobs are generated in the rural areas and thus the migration of 2 to 3 families into the towns is prevented. Each family migrating from rural into urban areas costs the public economy large sums of subsidies for new jobs in industry as well as for new housing, schools and other infrastructure.

2 The contribution of biomass to the Austrian energy supply

The Austrian energy production is characterised by a high share of hydropower for electricity - about 70 % - and a rejection of the use of nuclear energy.

Statistical data of the Austrian energy production and consumption show that the share of bioenergy is 10,9 % of the primary energy consumption or 13,5 % of the end energy consumption. The utilisation of bioenergy in Austria was slightly, but continuously decreasing until 1978; at this time there was a reversal of the trend and since then there is a continuing increase to about 128 PJ/a, which is a doubling in 15 years.

This high share of bioenergy is mainly due to its use in space heating. About 800 000 or 28% of the Austrian households use wood for space heating, most of them wood billets. About 26 000 wood chips and pellets furnaces with a total capacity of 2,5 GW are in operation. About 90 % of them are small installations with a capacity less than 100 kW, the rest are predominantly installations of medium capacity (100 to 1000 kW), 364 installations have a capacity larger than 1 MW.

Until about 10 years ago emissions from wood stoves were a problem. In this area considerable technical progress was made in recent years:

Type of furnace		Billets		Chips	
Year		1981	1991	1981	1991
Efficiency	%	60	80 - 90	75	84-91
Emissions					
CO	mg/m^3	>10.000	2.000	>2.000	<200
Hydrocarbons	mgC/m^3	>	20-150	20-150	2-25

At present about 50 district heating systems with capacities of 1 to 6 MWth are built annually in rural areas most of them using wood or bark chips as a fuel. The operating experiences with these installations are good, the emissions are very low. The main problem is that systems built some years ago are now too large as the houses supplied with heat are now better isolated and have a lower heating requirement. The plants are, therefore, running below capacity which decreases their efficiencies.

Industrial steam boilers in the range of 20 to 120 MW are not included in the statistical data mentioned above as they underlie different economic conditions compared with space heating. They use predominantly bark, waste wood and, to a considerable extent sulphite liquor as a fuel. The combustion technology for the solid fuels is fluidised bed furnaces and they all include co-generation systems using steam. They are employed in the pulp and paper, the particle board and the wood processing industries. Some of them also use sludge from water treatment plants and municipal waste as additional fuels. It is interesting to note that about 25 % of the biofuels are used in industrial installations and about 75 % in space heating. This shows that the best use of the advantages of biofuels is apparently made in installations of small and medium capacity.

According to a law passed in 1998 the Austrian utililty companies have to produce at least 3 % of the electricity they sell from renewable sources starting from 2005. This implies that a number of co-generation plants based on biomass will have to be built until that time.

Biogenous motor fuels: A number of plants for the production of RME have been built in Austria with a production capacity of 25 000 t/a, but they are not operating at full load as the product sales are not coming up to expectations. Some of them are of small capacity and are owned by farmers' co-operatives.

3 The situation in the European Union

The preconditions necessary for the utilisation of bioenergy on a broad scale are not the same in all European countries. One of the most important precondition is of course land availability, which is the inverse of the population density. The land availability varies between 0.28 ha per inhabitant in the Netherlands and 6.67 ha per inhabitant in Finland. It is obvious that this fact has a great influence on the chances for bioenergy implementation. On this basis the European countries can be arranged according to their chances for the implementation of bioenergy:

Group 1: Chances for bioenergy limited --> long term interest
(Area available < 0.5 ha/inhab.)

Belgium	Germany	Netherlands	United Kingdom

Group 2: Some chances for bioenergy --> medium term interest
(Area available 0.5 - 1 ha/inhab.)

(CFR)	Denmark	France	Hungary
Italy	Poland	Portugal	Switzerland

Group 3: Good chances for bioenergy --> short/immediate interest
(Area available > 1 ha/inhab.)

Austria	Bulgaria	Finland	Greece
Ireland	Romania	Spain	Sweden

The European commission has in its recent White Paper "Energy for the Future - Renewable Sources of Energy" formulated a very ambitious target of trebling the use of renewable energies in the EU from at present 45 mtoe to 135 mtoe by 2010 which would bring the present contribution of renewables to the total energy consumption to 12% in 2010.

It is obvious that not all countries of the EU will be able to reach this target. It is interesting to note that not only the countries traditionally using fire wood as a source of energy, like the Nordic countries and Austria, make considerable efforts to increase their use of renewables but also France, Greece and Italy. As shown in the table above the East European countries have good chances to develop bioenergy and to decrease their energy import in this way. At the same time the problem of surplus agricultural production could be solved and an additional income for the farmers secured.

Important efforts of the EU to reach the target of 12% are research, development and demonstration projects under the Fifth Framework Programme of the European Commission. Numerous projects to improve existing and to develop new technologies in bioenergy were already supported under the Third and the Fourth Framework Programme and produced interesting results. Two reports have been published recently describing these projects and the present state of art in biomass conversion technologies and are available from the Office for Official Publications of the EU in Luxembourg.