

# Recent Developments in Bioenergy

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## Summary of Presentation

Ukraine is a big Eastern European country which is developing dynamically. An annual growth of GDP is about 2% except for 2009 due to influence of the economic crisis. Historically, Ukraine has a highly developed agricultural sector that is the main source of biomass resources available for energy production. On average, 15% of Ukraine's territory is covered by forests with up to 40-45% of forest lands in Western regions (the Carpathians and some other areas).

Natural gas (NG) is the main energy carrier in Ukraine contributing with about 41% to the final energy consumption. At that only 30% of the consumed volume is produced domestically and 70% is exported, mostly from Russia. The share of RES in the country's energy balance is now very low, some 0.8%, including 0.65% coming from biomass.

The current challenge is a very high price of NG that puts Ukraine's industry on the verge of its viability. While during 2001-2006 the price of NG was quite stable (about 60 \$/1000 m<sup>3</sup> – an average wholesale price at the border on Russia), it began rapidly rising since 2006 and came to about 229 \$/1000 m<sup>3</sup> in 2009 that is nearly 4 times higher than it was before. At that the internal prices of NG are quite different for different kinds of consumers in Ukraine. The lowest price, below the market level, is for population, whereas the highest price, above the market level, is for industry. That leads to such a phenomenon as internal cross-subsidising. In fact the industry subsidises the population and this is not good for the national economy.

While NG is an expensive fuel, solid biofuels are relatively cheap in Ukraine. Comparison of the costs made on the basis of energy content shows that wood processing residues are about 90 times cheaper than NG (the price for industrial consumers is taken into account), firewood and straw bales are about 4 times cheaper, and wood pellets are 2 times cheaper. Ukraine has increasing production of biomass pellets, mostly wood ones, but practically all the produced volume (about 200,000 t/yr) is exported to Europe. It is due to the fact that boilers for pellets are too expensive for the Ukrainian consumers and as a result there is no internal market for pellets in the country.

Ukraine has quite a big potential of biomass available for energy production – about 27 mill tons of coal equivalent (mill tce) – economically feasible potential estimated on the basis of official statistical data for 2007. The two main constituents of the potential are agricultural residues and energy crops. The first is a “real” part of the potential, and the second is currently a “virtual” one. At present there are only a few small pilot plantations of energy crops in Ukraine but a fast development of this sector is expected in the near future. It is due to the fact that currently there are 4-5 mill ha of unused agricultural land in the country of which, according to expert estimation, up to 3 mill ha can be used for energy crops production without causing competition with food and feed production. Last year Ukraine had the highest harvest of agricultural crops during the last 20 years.

Nearly the same high harvest is expected this year. Taking into account this increased production, the potential of biomass for 2008 can be estimated at least at 35 mill tce/yr. And Ukraine has further room to increase the potential via approaching the European level of agricultural crops yield (now the yield of some crops like rapeseed, corn for grain and others in Ukraine is 2-3 times less than in Europe).

At the end of 2008/beginning of 2009 Ukraine had another “energy conflict”, or crisis, connected with supply of NG by Russia. Just after that Ukrainian government issued a number of resolutions relating to different aspects of biomass usage. The purpose of the resolutions

was to encourage replacing NG by biofuels. In addition two important laws have been passed in the country in 2009. The first is "the law on biofuels". The law introduced a number of privileges for the producers and consumers of solid, gaseous and liquid biofuels and also for the producers of bioenergy equipment. Mostly, these privileges are tax exemptions, which will come into force from the 1st January 2010 for 5-10 years. The second law is "the law on green tariff" for power produced from RES including biomass. The strong side of the law is the introduction of quite a high value of the green tariff for power from biomass – 13.45 Euro cents/kWh. The weak, or at least disputable point of the law, is that the value of the green tariff is the same for all the types of biomass installations regardless the feedstock used and their capacity. For this the law is much criticized by local and European experts.

Another important document in bioenergy sector of Ukraine is "Biomass Action Plan for Ukraine" (BAP U) drafted within the G2G Dutch-Ukrainian project "Biomass and Biofuels in Ukraine" (2008-2009). Scientific Engineering Center "Biomass" took part in the elaboration of the document and acted as a local consultant in the project. The draft BAP U was approved by the Ministry of Agricultural Policy of Ukraine and is supposed to be submitted by the Ministry to the Government for consideration. This document identifies the main challenges of Ukraine's biomass sector and suggests actions to solve the problems. One of the suggested actions is adopting a political declaration with clear statement of the national targets on biomass. The following contribution of biomass/biofuels to the final energy consumption seems to be reasonable: 1% (2 mill tce) in 2010, 5% (10 mill tce) in 2020, 10% (20 mill tce) in 2030.

Current status of introducing bioenergy technologies in Ukraine is the following. Over 20 straw fired boilers, mostly below 1 MW, are in operation in rural areas of the country. About 500 modern wood fired boilers are already installed, and over 1000 old boilers were converted from coal and oil to biomass in the forest industry. Heat production from biomass is feasible in Ukraine under present conditions, the relevant projects have a payback period of about 2 years. There are 3 big biogas plants in operation in the country, and 12 biogas plants are under construction/designing. One of the 3 operating installations is the first biomass plant which obtained the license for CHP production and obtained the right to sale the produced power at the green tariff. At the moment there are no CHP plants on solid biomass in the country, but they are expected to appear in the near future due to the quite high green tariff introduced this year.

Still, some types of bioenergy equipment of domestic manufacture are missing in Ukraine's market. They are biomass boilers > 2 MW, steam biomass boilers, and reasonably priced individual boilers of 10-50 kW including boilers for pellets. The latter will help to develop internal market for biomass pellets.

Ukraine has quite good opportunities for implementing biomass projects as Joint Implementation projects in the framework of the Kyoto Protocol. Usually the income from selling Emission Reduction Units (ERUs) covers 20-30% of the project investment costs. In some cases like utilisation of landfill gas the income from ERUs sale can cover over 100% of the investment costs.

Bioenergy equipment which is considered priority for introduction in Ukraine in the nearest future includes hot water boilers operating on wood, straw, other agricultural residues and peat. Since this year mini-CHP plants have been also included in the priority fleet of bioenergy equipment. Total volume of Ukraine's market is estimated at about 57,000 units of 8380 MWth + 100 MWe total installed capacity.

The SWOT analysis of Ukraine's bioenergy sector shows that, inter alia, the strengths (S) include big potential of biomass and availability of unused arable lands; the weaknesses (W) include some gaps in Ukrainian legislation and unstable political situation; the opportunities (O) include strengthening energy security and direct substitution of NG; and the threats (T) include potential competition with food/feed production (that is not a case at the moment). To speed up the development of bioenergy sector, Ukraine should further work at the relevant legislation, create favorable conditions for attracting foreign investments, carry out dissemination of appropriate information and improve management in the sector in question. Hard work in these four fields is the keystone to success.