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Biogas and biodiesel market prospects in Romania

When joining the EU, eastern countries have increased the proportion of renewable energies in total energy production⁽¹⁾. This was mainly due to high investment rate in hydro-power prior to 1990. Nevertheless in 2003, 49 per cent of the total gas need of the EU was based on internal production and the rest was imported (mainly from Russia). In 2030, the net import of gas will reach as much as 80 per cent of the total gas need. Those are two of the multiple factors that contributed to the development of the Common European Energy Policy and these are also two of the main drivers for the energy policy in Romania. Romania has implemented many of the European directives including those on efficient energy use and promotion of renewable energies (GO 63/1998, Electricity Law no. 318/2003, Energy Efficiency Law no. 199/2000).

Total energy production, sources and trends

For the year 2006, the energy production in Romania was approximately 62 TW_h in a total installed capacity of 17,630 MW. In 2005, a draught year, the majority was produced in thermal power plants (about 66 per cent), almost 23 per cent in hydro power plants and ten per cent was provided from nuclear facilities. During the period 1999 to 2003, electric energy production had increased by 10.7 per cent. The percentage of hydropower could be higher in normal hydrological years, reaching more than 32 per cent. This allows Romania to meet the targets set by the EU

directives. Direct implication of already meeting the targets is the reason that for the moment there is little interest in stimulating other sources of renewable energies (e. g. wind energy, solar, biomass and geothermal). Nevertheless, there are regulations, including the present compulsory admixing of two per cent of biofuels in all fuel consumed, that are driving forces for biodiesel, bioethanol and the biogas market.

Renewable energy potential

The Romanian potential (table 1) in the field of renewable energies is significant. Five areas

surface the vegetable oil producing plants (sunflower, soybean and rapeseed) are representing nine per cent, with a mean production between 110 to 2,400 kg/ha. In less than a year, the production could increase from the nowadays production of 1 to 1,5 million tonnes to approximately 2 million tonnes. Based on the total crop surface for sunflower (1,188,000 ha) and a mean production per ha of 1,268 kg and taking into consideration also the internal consumption, the maximum potential biodiesel production is around 275,300 tonnes per year. Under real market conditions there will be a competition with the food sector. Based on the trends it is possible that more than 45 per cent of the sunflower oil

Table 1: Annual renewable energy potential in Romania

Source		Annual potential		End use
			ktoe	
Solar energy	thermal	60 x 106 GJ	1,433	Heat
	photovoltaics	1,200 GWh	103	Electricity
Wind energy		23,000 GWh	1,978	Electricity
Hydro energy		40,000 GWh		Electricity
	<i>Of which small HPPs < 10 MW</i>	6,000 GWh	516	
Biomass		318 x 106 GJ	7,595	Heat
Geothermal energy		7 x 106 GJ	167	Heat

are important: hydro-electric power, biomass, solar and wind energy and geothermal energy. Renewable energy is a new market, with very few players at this moment, but with a rapid increase and also with a huge potential. As a result there are some series of associated risk factors as well as attractive investment opportunities.

In order to better evaluate the size of Romanian biodiesel market the analysis should be based on the actual farm land of about 14,8 million ha with an arable surface of about 9,37 million ha. In the same time we took into consideration the crops used for the production of biodiesel: sunflower, soybean and rapeseed. All the calculations are based on the surfaces and productions registered in the year 2003 but also on the evolution of those parameters in the period 1998 to 2003. From the total arable

will be directed to biodiesel production. For rapeseed the surface at this moment is 85,000 ha and the mean production per ha is 1,750 kg. Total production is 14,875 thousand tonnes and internal consumption is estimated at only 110,000 tones. The total biodiesel production under this condition is estimated at 11,772 tonnes.

Sunflower and rapeseed could support now a total market of about 290,000 tonnes. Soy bean is now a secondary crop. The trend of the last two years, being an increased quota of rapeseed crops, is to be kept, especially in the western plains and into the south-east region of the country. Based on the local production of biodiesel, we could observe new pathways into the agriculture system, mainly creation of new associations with the goal of producing vegetable oil for biofuels emergent market.

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An increasing trend is the development of small and medium size facilities, (with local oil and biodiesel production and utilisation). Large size facilities are more and more dependent on the global vegetable oil market, eventually diminishing the already narrow margins of the business.

For the next three to five years an increase of the small size facilities, much of them integrated with seed storage, crushing equipment and also integration with small biogas facilities⁽²⁾ can be expected.

Biomass potential and estimated trends for the biogas production

Romania is covered by 40 per cent of agricultural land and 27 per cent of forest (figure 1). The share of biomass regarding the total energy of the country is almost ten per cent. Currently, biomass is used mostly for heating purposes, direct burning for cooking and hot water preparation. About 95 per cent of the biomass currently used is firewood and agricultural waste, the rest is wood waste from industrial processes.

The history of biogas production in Romania is characterised by two main phases. The first one was research activities linked with the

Table 2: Main producers of biodiesel in Romania

Investor	Investment	Technology	Observation
1. Petromidia Rafinare	9 million USD		December 2006 capacity 60,000 t/y
2. MAN Ferrostahl AG	138 million Euro	MAN	Total investment 120,000 t/y
3. Martifer Co.	80 million Euro	BDT	Lehliu
4. Merom plus Greenline Industries			Capacity 25,000 t/y
5. SC Agropan SA			20,000 t/y
6. Elite – Baia Mare			5,000 t/y
7. SC TibiOil SRL – Comarnic	800,000 Euro	Ageratec	5,000 t/y
8. SC Star 2000 SRL – Tulcea	150,000 Euro	Ageratec	500 t/y
9. Ulvex SA – Urziceni		SK	5,000 t/y
10. SC Tehnic Instal SRL – Giurgiuva	200,000 Euro	Ageratec	600 t/y

development of the biogas facilities, a period that started back in 1958.

In 1978 the scattered research programme was joined into a national programme called "Research and implementation of new energy resources". The second phase was the implementation of the facilities developed during the first phase. At the end of 1982, there were over 400 facilities active with a total energy production of 0.18 TW_h year⁻¹. The situation has changed in the sense that no

major investment in the sector has been done after 1990 and even the maintenance work on the already existing facilities was stopped. At the end of 1994, the biogas production decreased to a level of 0,06 TW_h year⁻¹.

In the same time there are very few reports on new projects (most of them in the conception phase). Despite this there are studies that are estimates that biogas may supply 2,2 TW_h year⁻¹⁽³⁾ by the year 2010.

Figure 1: Land covering by forest and agriculture (main agricultural land is in the south eastern region)

- Legend**
- Romanian land cover**
CORINE LC
- 111, Continuous urban fabric
 - 112, Discontinuous urban fabric
 - 121, Industrial or commercial units
 - 122, Road and rail networks and associated land
 - 123, Port areas
 - 124, Airports
 - 131, Mineral extraction sites
 - 132, Dump sites
 - 133, Construction sites
 - 141, Green urban areas
 - 142, Sport and leisure facilities
 - 211, Non-irrigated arable land
 - 212, Permanently irrigated land
 - 213, Rice fields
 - 221, Vineyards
 - 222, Fruit trees and berry plantations
 - 231, Pastures
 - 242, Complex cultivation patterns
 - 243, Land principally occupied by agriculture
 - 244, Agro-forestry areas
 - 311, Broad-leaved forest
 - 312, Coniferous forest
 - 313, Mixed forest
 - 321, Natural grasslands
 - 322, Moors and heathland
 - 324, Transitional woodland-shrub
 - 331, Beaches, dunes, sands
 - 332, Bare rocks
 - 333, Sparsely vegetated areas
 - 334, Burnt areas
 - 411, Inland marshes
 - 412, Peat bogs
 - 421, Salt marshes
 - 511, Water courses
 - 512, Water bodies
 - 521, Coastal lagoons
 - 523, Sea and ocean



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Trends in the biofuels market

The cultivated surfaces as well as the obtained productions per hectares are low if we compare this to the Western Europe or with the total Romanian agricultural potential.

As a direct consequence of EU accession, Romania will receive subsidies for each hectare of "energy crops". This will have a positive impact upon the surfaces cultivated with sunflower but especially with rapeseed. The surface with rapeseed could increase from the actual surface of about 85,000 ha up to a maximum of ten per cent of the total agricultural land and this could mean an increase up to 1,480,000 hectares. Even if not the entire surface but only five per cent of the agricultural surface will be used for this activity then we would expect an increase up to 740,000 ha of the rapeseed surface. The increase compared with the actual surface is of about 8.7 times (for five per cent) or of about 17.4 times for ten per cent. This would mean also an increase in the biomass available for biodiesel production. The potential support capacity would then be of 377,849 tonnes of biodiesel for the five per cent increase in surface or about 755,698 tonnes for the ten per cent⁽⁴⁾. If we would also consider an increase in the mean production per hectare up to the level usually encountered in the EU, the figures could be actually much higher⁽⁵⁾.

Institutional and organizational environment

Romania has adopted many of the needed laws in what concerns fuel policy and it is working towards complete harmonization. All the directives valid on the European community have been put into law in Romania.

Main projects

As the Romanian biodiesel market is at its beginnings there are only few competitors. The demand is high at least up to the required five per cent by the European directive for 2010. Table 2 is presenting the main installations on the market as well as the investment for the equipment and their production capacity. Trend is to develop facilities of 5,000 to 50,000 tonnes biodiesel/year, especially technologies using variable oil specifications. □

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Bioenergy use in Latvia

There are no significant fossil fuel resources available in Latvia. Only different kinds of renewable energy sources (RES) and peat are locally available. However, starting from year 2000, peat extraction and use has rapidly decreased. Considering the existing energy situation, renewable energy sources play an important role in Latvia's primary energy balance. The main renewable energy sources used in Latvia are biomass (mainly wood) and hydro energy. Wind energy, biogas, and straw are less significant. But the potential of those resources is not fully used.

District heating systems play a very important role in use of energy sources in Latvia. More than 70 per cent of heat is produced in these systems.

According to the Central Statistical Bureau of Latvia, the proportion of renewable energy sources in the primary energy balance was 29.1 per cent in 2006 (see figure 1). The main part of this amount (approximately 80 per cent) is wood. Considering that the available amount of hydro resources depends on meteorological conditions and water flow in rivers, the proportion of renewables in primary energy

balance is fluctuating. The share of wind and other biomass energy sources is less than one per cent from all energy produced from renewable energy sources.

Renewables up to 35 per cent

Regarding the proportion of renewables in primary energy balance there is a target (set in the RES development strategy elaborated by the Ministry of the Environment of Latvia in 2007) to increase this proportion up to 35 per cent in 2010 and to reach 37 per cent in 2016. The detailed structure of renewables in Latvia is given in figure 2.

The share of renewables in electricity production is also very significant. The target of RES share in electricity production is based on the RES-e directive and is defined by the law on the electricity market – in 2010 Latvia will have to reach a 49.3 per cent of RES share in electricity production. Currently hydro energy sources are mainly used by large hydro power plants owned by the Latvian state company "Latvenergo". Independent electricity producers – small hydro power plants, wind and biogas plants produced only 1.8 per cent of all electricity generated in Latvia in 2006.

Wood is the most used bioenergy source in Latvia. Wood is widely used both in district heating and local heating systems. It also

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Figure 1: The structure of primary energy resources and proportion of renewables in primary energy balance

