

Memo: **Report<sup>1</sup> on BUS ticket no. 48**

By: Marieke Meeusen and Siemen van Berkum, LEI-WUR

Date: May 14, 2004

## AVAILABILITY OF BIOMASS IN EASTERN EUROPE

### Definition of the problem

In 2004 the EU 2004 was expanded with ten new Member States. These acceding countries have a large agricultural area, which could imply a significant increase in production level. It is certainly conceivable that these countries may produce biomass at lower costs. Biomass production should be sustainable and not compete with the production of food and feed crops.

### Questions

How big is the market for biomass for energy purposes in the new Member States?

What is the potential for biomass production when taking into consideration the developments in the demand for food and feed.

### Motive

As of 1 May 2004, the EU has expanded with the accession of a number of Central and Eastern European countries (CEE countries). These countries bring a large expanse of agricultural land into the EU, with the potential for agricultural production. These countries may be better able to produce biomass at low costs for the purposes of producing bio-energy. At the same time, there is a desire to produce biomass in a sustainable manner and to meet the needs with respect to food and cattle fodder. Assuming that there is sufficient demand in Europe for biomass for the purposes of producing bio-energy, the question arises of whether there is a role for the CEE countries in the provision of biomass for bio-energy, and what that role could be.

This paper first gives an impression of the current supply and the production potential in the CEE countries. The emphasis is placed on agricultural products, excluding wood.<sup>2</sup> The production potential appears to be great. However, the question is how much of this large potential will actually become available. This question cannot be answered simply; after all, as outlined in this paper, a great many factors combine to determine the actual levels of availability of biomass for bio-energy. For this reason, the decision was made to look at the broad spectrum of factors that ultimately determine the actual availability of biomass for bio-energy. This provides a handle on an initial line of thought on the possible role of the CEE countries as providers of biomass for bio-energy.

---

<sup>1</sup> Copying of (part of) this report is allowed only with proper citation. This report aims to provide a quick scan of the subject matter and should therefore be used as such. The contents do not represent the official view of the BUS nor of any of its affiliates, but are personal to the writer. The BUS accepts no liability for the use of this information nor for any consequences that may result from it.

<sup>2</sup> There is a large expanse of forest in the Baltic states, Poland and Hungary. After the EU expansion, the total volume of wood in forests within the Union will be 21 billion cubic meters, of which 25% is situated in the new EU member states. The current and future availability of wood from the CEE countries could be further elaborated in a separate paper by Alterra.

### Current acreage and current production

The new member states currently cultivate about 15 million hectares of grain, almost two million hectares of oil-bearing seed and 600,000-700,000 hectares of sugar beet.<sup>3</sup> Roughly half of these areas are situated in Poland. Hungary and the Czech Republic make up about 25% of the areas in the CEE countries between them. Together, all the new member states produce approximately 50 million tonnes of grain, five million tonnes of oil-bearing seed and 2.8 million tonnes of sugar. Incidentally, most of the new member states are net importers of important arable crops, milk and meat. Consequently, little of this production reaches the international market. For the time being, the agricultural products are mainly used as food for human consumption and as cattle fodder. There is still no significant production of energy from agricultural products in the CEE countries as yet.

The potential availability of other agricultural products (such as manure and organic waste) for bio-fuel use is still unknown. However, the size of the livestock population in the CEE countries is known. This population has shrunk dramatically in comparison to the situation in the years prior to the start of the transition. Of course, this is one factor determining the availability of manure for possible fermentation for the purposes of producing bio-fuel. The fact that CEE agriculture is characterized by its small scale, with many farms keeping only a limited number of cattle, is also important in this respect. The distribution of the manure becoming available is therefore very dispersed across the whole country.

### Production potential

The production potential in the CEE countries is considerable; there are more than 130,000 hectares of agricultural land, on which the level of production per hectare is only 60-80% of the EU average. This means that there is a potential for greater yields. At the same time, there is still a certain expanse of land that is currently not in use as agricultural land, but that certainly has that potential; there are various factors resulting in not all the land being used for agricultural purposes.

*Table 1: A few characteristics of acceding countries*

	GDP per capita as a % of the EU average (2002) 1)	Population (in millions)	Agricultural land acreage (UAA, in 1000 hectares)	Proportion of agriculture in employment (%)	Proportion of agriculture in GDP (%)
Cyprus	72	0.8	134	9.2	3.5
Czech Republic	60	10.3	4282	4.5	3.4
Estonia	42	1.4	891	7.6	4.7
Hungary	57	10.0	5854	6.0	3.9
Latvia	35	2.4	2488	13.5	4.0
Lithuania	39	3.7	3489	19.6	6.9
Malta	55	0.4	12	1.9	2.0

<sup>3</sup> No cost prices are known as yet for these products; the Farm Accountancy Data Network for those countries is in the making, but as at 2004 has not yet provided insight into the cost price of the various products.

Poland	39	38.6	18800	18.8	2.9
Slovakia	47	5.4	2440	6.7	4.5
Slovenia	74	2.0	491	9.9	2.9
EU 15	100	360	131619	4.3	2.0

Notes: Unless otherwise stated, the data is from 2000 and is taken from: European Commission Directorate-General for Agriculture, *Agricultural situation in the candidate countries, country reports*, July 2002;

1) GDP per capita: index measured in purchasing power standard 2002 (EU 15 average =100). Source: Agra Europe, East Europe, November 2003, p. 4;

The table shows that Poland, Hungary and the Czech Republic are particularly important countries in terms of agricultural production. Latvia, Lithuania and Slovakia are also significant in terms of their agriculture, though to a slightly lesser extent.

### **Determining factors for availability**

The production of bio-fuels from agricultural products is only an attractive option if bio-fuels can compete with mineral fuels and if an alternative use in the form of food and/or cattle fodder does not yield higher profits for the farmer/grower. The price fixing for agricultural products is largely determined by market regulation through the CAP and through international market relations (shortages/surpluses).

Although the production potential is great, the realization of that potential will not happen automatically. The developments in production and prices are influenced by developments in:

- demand for foodstuffs;
- technological developments; and
- agricultural and energy policy.

If the supply is available, the next question is whether and how that supply can be united with the demand. Chain organization and chain-oriented thinking are as yet only partially developed. Many farms produce only for themselves or for the regional market. Logistic organization and processing (in accordance with the EU directives) are just starting to get going. Chain harmonization has made greater progress in sectors where foreign companies are active – in processing and/or in retailing – than in those sectors in which foreign companies are less active. This factor also plays a particular role in animal and/or processed products. For unprocessed (vegetable) products that can be easily conserved such as biomass for bio-energy, the limited chain harmonization forms less of a sticking point.

### **Determining factors for the exploitation of the production potential: the demand for food**

Where developments in demand are concerned, the main issue is the changes that can be expected in consumption over the next few decades. These changes are driven by general economic developments, with consequences for income growth and consumption patterns. Income growth in the CEE region will result in an increase in the demand for food products, and a shift towards animal products and processed products can be expected. This will have direct implications for the availability of biomass for the energy market. After all, the growing demand for food stimulates the domestic production of agricultural products and the growing demand for animal food products promotes the national production of feed grain. If these products yield a higher price for the grower and farmer than the energy market, only a smaller proportion of the great potential will actually become available for the bio-energy market.

### **Determining factors for the exploitation of the production potential: technology**

Supply, driven by technology, relates to matters such as improvements in productivity through technological developments and increases in scale. The relative price development of production factors is important in this respect.

In view of the low industrial and land productivity, there is a lot of room for improvements in productivity in the new member states. Even relatively low investments (since capital is the expensive production factor) can have a great impact on yield per hectare. At present, the yield per hectare is approximately three quarters of the EU average.

Increases in scale<sup>4</sup> can also contribute to increased and cheaper production. Increases in scale can result in the more efficient deployment of labour, land and capital, and lead to higher yields. The possibilities for increases in scale are also dependent on alternative employment (as well as general economic development) outside agriculture. This is not always a rosy picture; there is widespread unemployment in the Polish countryside, with few alternative options for farmers.

One of the reasons for the relatively low yields per hectare is the very limited use of inputs like artificial fertilizer and plant protection products. The increased use of these inputs results in higher yields per hectare. However, one has to consider whether this increased use fits in with the demands made of the final product – *sustainable* bio-energy – and to what extent. It may be that some of the potential for an increase in productivity cannot be exploited as it does not meet the requirements of *sustainable* bio-energy. Other measures, such as better storage facilities, would have a less negative effect.

### **Determining factors for the exploitation of the production potential: the EU agricultural policy**

The application of the Common Agricultural Policy (the CAP) – in its current form, following the Luxembourg Agreement of June 2003 – will to a great extent determine the cropping plan of arable farming in CEE countries. For some agricultural products, the accession of those countries will mean an increase in the relative prices, while other products will see a reduction in their relative prices (in response to the market regulation within the CAP). Consequently, the balances of agricultural products will also change, and farmers will adapt their production plans accordingly. The question is: to what extent will this happen, and how fast? The international market developments are also growing in importance in terms of the retail opportunities of EU agricultural production, in view of the probable reduction of the CAP's border protection effect

---

<sup>4</sup> In most countries, the structure of agriculture is characterized by its small scale. This is the consequence of the privatization of formerly large production units in owned collectively or by the state. There are exceptions to this rule, such as Poland; in Poland, agriculture has always been predominantly small in scale. Today, the individual family farm dominates in all countries, generally small or very small in size. Only in Slovakia are there still a relatively large number of cooperatives and limited companies, with on average 1,000-1,500 hectares of land. There are also large farms in other countries, with a few hundred hectares of land, but this form is not typical of the region. There are, however, a lot of subsistence farmers who often own and farm exceptionally small plots of land, and who consume the greatest part of their production themselves and rely on sources outside farming for their monetary income. The proportion of these farms in terms of the number of farmers varies per country, but this proportion is particularly high in Poland, for example, where a quarter of the farms cover less than two hectares, and 55% cover less than five hectares.

and the availability of export subsidies within the framework of WTO agreements in the coming years. Prices in the EU will therefore draw closer to those on the global market.

In this respect, the role of the CAP in relation to bio-energy is also significant.

For example, Cargill International is commencing ethanol production from wheat in Poland (Agra Europe, East Europe, February 2004:36). To date, Cargill has produced around 60,000 tonnes of HFS (fructose and glucose syrup) from sugar for the foodstuffs industry. However, as of 1 May, Poland is subject to EU sugar market regulation and, as such, the production of HFS will be subject to a ceiling of around 27,000 tonnes. To make optimum use of the factory's production capacity, Cargill is investing in a new production line for raw ethanol production. Part of the production would have to go to the foodstuffs industry and part of it would go to oil companies for use in fuels.

The production of bio-fuels can be encouraged further through government measures like premiums, taxes and obligations. The question is which policy stimuli will have which effects on the demand for agricultural products for bio-fuel products. The following two policy instruments are relevant here:

- The EU encourages the production of energy crops for biomass with a premium of EUR 45/hectare, with a maximum of 1.5 million hectares for the EU as a whole (Regulation 1782/2003). This financial support is additional to the hectare premium and/or farm premium for the area sown with energy crops. The question is to what extent this encourages farmers and processors in CEE countries to produce bio-fuels.
- In various countries (including Poland), the addition of bio-fuels to mineral fuels is supported by means of fiscal measures. This ought to encourage the production of grain and other energy crops for biomass.

## Conclusion

At present, raw materials are produced for bio-energy: grain, sugar beet and vegetable oils. These are currently mainly used in foods for human consumption, and in 2004 there are still insufficient quantities to fully meet the domestic demand; many CEE countries have to resort to importing goods.

There is great potential in the CEE countries in terms of agricultural land and agricultural production. The costs of land use and labour are low, and the costs of biomass will therefore also be low. The potential can be seen in the fact that (a) not all land is used as agricultural land and (b) the yields from that land are not yet at the same level as the yields achieved in other EU member states.

Although there is so much potential, this does not mean that there is an abundance of biomass for bio-energy. Whether the CEE countries will play a role as suppliers of biomass for bio-energy, and to what extent, is dependent on (a) the demand for food, (b) the technological developments within agriculture in the CEE countries, and (c) the effects of the Common Agricultural Policy. If or when the demand for food and animal products in the CEE countries rises (influenced by the general economic upturn), farmers will be more likely to produce for the more financially attractive food and animal feed markets than for bio-energy. The extent to which technological developments that result in increases in productivity can be implemented is partially dependent on the relative prices of the three production factors. Lastly, one needs to consider the influence of the Common Agricultural Policy, the economic situation and the developments in the global market on the cropping plan of CEE farmers. These factors are difficult or impossible to predict. It is possible, however, to calculate and determine their influence. For this reason, the recommendation is made to carry out a follow-up study to calculate the influence of the main factors. The results have absolutely no predictive character, but do help to identify the boundaries of the field within which the CEE countries can play a role and to recognize the influence of the various factors.