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BIOMASS WITH GREAT POTENTIAL

Bioenergy Profits from Surplus Production on Agricultural Markets

Food and fuel supplies are safe and ample. However, surplus production of food products fails to reach the world's needy

As spring has got into bloom in the Northern hemisphere it becomes clear that the supply situation on agricultural markets relaxes. While 2012 was marked by drought in large parts of the United States and in some Eastern European countries, good harvests in big countries in the Southern hemisphere have provided for growing stocks of important agricultural commodities in recent months. This means that demand for both food and fuel can be met. Besides, there is still potential for expanding the area used for bioenergy in Europe and on other continents. Established as well as new energy crops can contribute to tapping that potential. Sugar beets in Europe are an example in that respect. Looking at the global supply situation on agricultural markets, such as for rice as an important staple crop, it becomes evident: Big surpluses exist on food markets. However, those surpluses fail to reach the needy. The root cause of hunger is an unequal distribution of wealth. This is not related to the growth on bioenergy markets.

1 Where does bioenergy come from?

A great variety of raw materials can be used for generating bioenergy. In their turn, these raw materials open up different avenues for the bioenergy sector. For example, biodiesel and vegetable oil fuel are produced from plants such as rapeseed (also known as canola), sunflower seed and soybeans. Bioethanol, which is added to petrol in Germany to obtain the blend E10 (with a maximum share of 10 percent ethanol), is usually generated from grains such as rye, feed wheat and sugar beet in Germany. On the other hand, biogas plants use residues, grass, corn and, increasingly, also grow other energy plants such as sugar beets to produce electricity and heat. Contrary to grains such as rye or oilseeds like canola, long haulage of sugar beets is costly because of the beets' mass. Preferably, beets are processed close to where they are grown. The same goes for silage corn used in biogas plants. Grains and oilseeds markets, on the other hand, are globally connected through world trade. Losses caused by adverse weather conditions in particular regions can therefore be made up for, as seen in the aftermath of the 2012 drought in the United States and Eastern Europe.

2 Growth of the bioenergy sector and surplus production on grain markets

The contribution of bioenergy to Germany's energy supply has markedly increased over recent years and reached a share of 8.2 percent of final energy consumption in 2012, up from 7.2 percent in 2009. Apart from wood and residues, energy plants made important contributions to this development. However, on average German farmers experienced relatively poor harvests from 2010 to 2012. Especially in 2011 yields did not meet prior expectations. Yet, despite below average grain yields in recent years, Germany continues to be a strong net exporter of grains.



According to preliminary data from the German Federal Statistics Office, Germany exported 9.8 million tons of grain in 2012, while imports amounted to merely 8.2 million tons. Compared to 2011, the trade surplus increased by 600,000 tons to 1.6 million tons. For canola, the dominant crop for the German biodiesel industry, it's a different picture. After



relatively poor harvests in recent years, Germany imported sizeable quantities of rapeseed. For the 2013 harvest, farmers in the European Union have expanded their rapeseed area. In its March 2013 forecast, the organisation Coceral forecasts a rapeseed area of 6.64 million hectares in the EU 28, compared to 6.26 million hectares in the previous year. On the whole, market trends show: Even in times of an expanding bioenergy sector, food and fuel needs can both be met. At the same time, Germany with its surplus from arable crop production continues to be a player on world markets.

3 Bioenergy is sensitive to market trends

On a global scale, demand for agricultural commodities is constantly growing. The most important drivers of this trend are the rising world population as well as an increasing consumption of meat in large developing countries and in emerging economies.

Against the backdrop of these two factors - more meat consumption on the one hand, population growth on the other - the impact of stronger demand for the bioenergy sector on the need for a larger supply of agricultural commodities is relatively limited. Just 6 percent of global grain production will be used for biofuels in the 2012/13 marketing year. This share has remained stable in recent years.



The long term trend shows: On global grain markets, increases in demand and consumption have kept pace since the turn of the century.

According to the most recent estimate by the United States Department of Agriculture (USDA) from April 2013, global grain production in the 2012/13 marketing year will reach 2.25 bn tons. This 2.9 percent decline on 2011 is due to the drought in the United States and some other countries, which has now been overcome. The long term trend of global grain production is clearly on the up.

1.1 The global grain market is supplied



DD http://www.usda.gov/oce/commodity/wasde/

Bioenergy is often accused of being dependent on aid and subsidies. The 2012 drought in the United States, however, has shown that bioenergy is not out of touch with market signals. According to an estimate from the International Grains Council (IGC) the amount of grain used for bioethanol will drop to 136.9 million tons in the 2012/13 marketing year, coming down from a record 147.8 million tons in the previous year. Thus, the biofuels industry has reacted to the price signals of the market. The price peaks on grain markets have meanwhile come down.

4 Stocks fail to reach the needy

In recent years, huge surplus stocks of rice have piled up. Rice is an important grain and staple crop in Asia. The Food and Agriculture Organization of the United Nations (FAO) expects global rice production to reach 487 million tons in 2012/13. According to that FAO forecast, India will become the world's biggest exporter of rice and take over this position from Thailand. This shows that the subcontinent produces enough food for feeding its own people. However, according to UN estimates, some 217 million people in India suffered from hunger in the 2010/12 period, which equals 18 percent of the country's population. The development of global rice stocks shows that the causes of hunger are a wealth distribution issue, not a question of supply.



Rice production, utilization and stocks



FAO: "Massive rice supply overhang"

Global rice stocks have reached more than 171 million tons, which equals more than 35 percent of a yearly production level. The FAO has voiced concerns about a "massive supply overhang".

High post harvest losses diminish supplies

However, surplus supplies on agricultural markets usually do not reach the hungry and needy. In industrialised countries such as Germany, the problem of binning huge amounts of food in the distribution chain, in households as well as in the food service industry, slowly enters the public mind. In developing countries, high post-harvest-losses blemish good crop years. According to estimates from the United Nations, waste and post-harvest-losses diminish the global supply of oilseeds by 20 percent. Those two factors post-harvest-losses and waste - diminish the grain supply by some 30 percent and the fruit and vegetable provisions by 40 to 50 percent. Translating this into absolute figures, this would equal an amount of 670 million tons of grain. By way of comparison, last year the World Food Programme (WFP) as the biggest humanitarian organisation purchased some 1.5 million tons of grain to help the hungry.

Successful social policy and biofuel policy in Brazil

Brazil has shown that an expansion of the biofuel sector and a successful fight against hunger can go hand in hand. The number of undernourished people in the South American country decreased to 13 million in the period 2010 to 2012. At the beginning of the century, this number still stood at 21 million. Within the same period, Brazil's agricultural exports as well as its biofuel production increased. The production of bioethanol claims some 50 percent of Brazil's sugarcane output. Varying blends are possible when mixing bioethanol and petrol. After a very good harvest at the turn of 2012/13, the government may consider raising the blending level to 25 percent. As far as conservation of natural habitats is concerned, Brazil has also made significant progress. According to data from the internet site Mongabay, deforestation of the Amazon rainforest in 2012 dropped to 4,656 sq km, following a continual decrease from a sad record of almost 28,000 sq km in 2004. At a time when the biofuel sector in Europe and in the United States boomed in the second half of the last decade, rainforest destruction decreased rapidly.



■■□ http://www.mongabay.com

DD http://gain.fas.usda.gov/Recent%20GAIN%20Publ ications/Biofuels%20Annual_Sao%20Paulo%20AT 0_Brazil_8-21-2012.pdf



5 Plenty of leeway on sugar markets

In Brazil, where ethanol from sugar cane has been blended with petrol since the 1970s, the biofuels industry has been showing for decades the opportunities that lie in store when it comes to exploiting the energy potential of sugar. In Germany, sugar is gaining importance as a raw material for the bioenergy sector in a different way. According to data from industry federation BDB^e, more than 40 percent of German bioethanol production came from sugar beets last year, following some 28 percent in the previous year. For biogas production, sugar beets are gaining importance as well. According to estimates from a leading seed supplier, the German sugar beet area used for biogas reached some 45,000 ha in 2012 and could cross the threshold of 50,000 ha in 2013.

Due to the closure of many sugar beet factories, transport routes for many arable farmers that grow sugar beets have lengthened considerably. The use of sugar beets in biogas plants is a climate friendly energy use on location. The global trend on sugar markets shows that agricultural land for such an extension of biogas usage is available.



Development of global sugar production

http://www.fas.usda.gov/psdonline/circulars/sug ar.pdf

For the 2012/13 marketing year, the USDA forecasts a production of some 172 million tons (raw value) of sugar, which is a 20 percent increase on 2008/09. Brazil shows the biggest surplus, followed by Thailand, Australia and India. The EU, meanwhile, is a net importer on world sugar

markets. This is due to the Common Market Organisation for Sugar (CMO) with its restrictive regulations on cultivation. The CMO sets prices and production quotas. Changes in the CMO could mean setting free potential for the energy use of sugar beets, it is voiced in the German Parliament. On the production level, sugar from sugar beets is easily available for fermentation. That is why many biogas managers reckon sugar beets will be interesting for a more flexible generation of electricity in the future to level out fluctuating supplies from other sources.

6 Co-products from bioenergy for feed manufacturers

When classic arable plants are used for generating energy, co-products for the agricultural sector are created. Those co-products help lessening the demand for agricultural land dedicated to food and feed production. For example, the remainder from the biogas fermentation process, the so called digestate, can be used as a valuable natural fertiliser on farmers' fields. Canola meal from plant oil extraction as well as Dried Distillers Grain (DDGS) from the destillation of starchy biomass are both important feedingstuffs. According to a USDA study, 1 t of DDGS substitutes 1.22 t of a corn and soy feed mix. Hence, energy crops do not only deliver electricity, heat and fuels, but also supply fertilisers or feedingstuffs. The area needs of the bioenergy sector therefore have to be seen in perspective. This is important to keep in mind for the situation in Germany as well as for the global picture. Germany imports more than 5 million tons of soybean products for the feed industry per year. The biofuel industry lessens those import requirements considerably. Because of the co-products of oil mills, above all canola meal from the extraction process, German farmers have an additional 2.3 million tons of feedingstuffs at their disposal. This contribution of the bioenergy sector comes on top of supplying clean energy. In 2012, the bioenergy sector in Germany helped to avoid almost 71 million tons of GHG emissions.

Corn is mainly a feed crop

Considering corn area expansion in recent years, one should bear in mind that corn cultivation has been more widespread in the past than it is nowadays. On the regional level, this holds true for parts of Bavaria. On the global level, it applies to the United States as a whole. Besides, most of the cultivated corn is directly used for feeding animals, not for bioenergy requirements. As far as energy crop cultivation in Germany is concerned, field trials of alternative energy crops gain momentum. Those alternative crops still have to catch up considerably on corn, as corn has very high yields.



The following graph shows the extent of drought damage on the US corn crop in 2012.



Corn area and yield in the United States

Source: Congressional Research Service (CRS)

Despite this drought, global grain production has remained stable. Against this backdrop, prospects for further increases in productivity are still bright. However, such gains have to happen in accordance with conservation efforts. As far as the carbon footprint is concerned, Germany's sustainability regulation, which is based on EU rules, has set standards.

7 Prospects and potential

For the agricultural as well as for the energy sector bioenergy has clearly gained importance in recent years. While production of liquid biofuels strongly increased in the second half of the last decade, growth in Germany since 2010 has practically solely relied on the generation of heat and power from biogas. Total energy crop area in Germany increased to an estimated 2.1 million hectares in 2012.

In Germany as well as on a global scale, the use of bioenergy can further expand while adhering to conservation standards at the same time, experts agree. Depending on assumptions on demographic changes, nutrition patterns and increases in yield per hectare, those forecasts vary considerably. In a very conservative German Biomass Research Centre approach, the (Deutsches Biomasseforschungszentrum - DBFZ) published a scenario that forecasts an agricultural area of at least 2.7 million hectares available for bioenergy in 2020. Other scenarios in the relevant DBFZ study show higher numbers for the available bioenergy area. The long term scenarios on the development of renewable energies in Germany commissioned by the Federal Ministry for the Environment forecast an area of 4.2 million hectares for sustainable

bioenergy uses in 2020. Out of that total, 2.3 million hectares will be available for biofuels, according to that study. A group of scientists from Hohenheim University, among them Prof. Jürgen Zeddies, have come up with an even more optimistic scenario. According to the results of their study, the area available for bioenergy in Germany will increase to 4.7 million hectares by 2020 and may further expand to 7.5 million hectares by 2050. Demographic changes and productivity gains in agriculture both contribute to that development. On a global scale, too, scientists think it is possible to increase energy crop cultivation. Generally, experts agree that the potential of residues from different sources (ie. agriculture, forestry, food industry) has not been fully exploited yet.

At the same time it should not be forgotten that extreme weather events such as the drought in the United States and parts of Eastern Europe in 2012 as well as the heat wave in Australia in early 2013 (meteorologists in Australia registered the warmest summer on record) are harbingers of climate change. Farmers and the agricultural sector as a whole have to prepare themselves for the ongoing changes. An accelerated expansion of the renewable energies sector is the best means to mitigate climate change and its dangers. Bioenergy contributes to those efforts alongside other renewable energy sources.

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Agentur für Erneuerbare Energien Reinhardtstr. 18, 10117 Berlin Tel.: 030.200 535.3 E-Mail: kontakt@unendlich-viel-energie.de Author: Alexander Knebel V.i.S.d.P.: Philipp Vohrer

