AURIGA INDUSTRIES A/S

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Maize is a very important crop in the manufacture of bioethanol. Depending, among other things, on climatic conditions, sugar cane, wheat and sugar beet also play a key role.

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Contents, december 2007

New energy for Cheminova

Following the sale of Skamol in July and Hardi in November, the Auriga Group has reached a significant milepost. The objective was to sell off the two companies in the course of 2007 so we could concentrate our efforts on developing Cheminova. This has now been achieved, and both companies have new owners who wish to develop them. Skamol was sold at a satisfactory profit in relation to its book value, whereas Hardi was sold at a considerable loss. Together, the sale of the two companies has a negative impact on the profit for the Group for 2007. However, the Group's balance sheet total has been reduced while its financial position has been strengthened – this opens up the possibility of Cheminova participating actively in the structural rationalisations which are currently taking place in the agrochemical sector.

Energy shortages and the political desire to reduce our dependence on fossil fuels have had a huge impact on global agricultural production. In the USA, massive investments are being made in maize-based bioethanol production, and in Brazil the areas used to cultivate sugar cane are being significantly increased to meet the growing demand for energy for the transport sector. This in turn is having an impact on global food production, as the ever-growing demand needs to be met by cultivating new areas and increased productivity. One response to this is that the EU has cancelled the set-aside requirements from 2008.

In this issue of the Auriga Magazine you can read about the perspectives for energy crops and their significance for global agricultural production. We will also say goodbye to Hardi and outline the Group's current financial status. Finally, on Rønland, we can welcome a new hydrogen-fed plant which will save Cheminova a not inconsiderable sum each year in energy costs.

Bjørn Albinus
Managing Director

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Filling up with biofuels

Tomorrow's fuels are being grown on farmland.

Sky-high oil prices, CO2 emissions and limited oil reserves are fuelling the debate about developing biofuels from agricultural crops for the transport sector. The debate focuses on bioethanol and biodiesel.

Bioethanol

Today, there are two main methods for producing bioethanol; these are termed either first or second-generation bioethanol production.

In first-generation bioethanol production, bioethanol is produced from sugar and crops rich in starch such as sugar cane, sugar beet, maize, potatoes or grain. It is a method that is already well known from alcohol production in which yeast converts sugar into ethanol.

In the second-generation method, bioethanol is produced from fibre-rich secondary products such as straw, wood, paper waste, pressed sugar cane, grass etc. However, the technology for this method is far more complex and requires further development before it is profitable.

"Ethanol can basically be produced from anything that contains sugar. It is a relatively simple process in the first-generation method, but it is more complicated to separate the sugar in the second-generation method. The sugar in straw and grass is bound in long sugar chains, cellulose, and these chains first need to be broken down before the sugar can be converted to ethanol. There are a number of enzymes which can be used to achieve this," explains Henrik Schlosser, an agronomist with Cheminova.

When you produce ethanol using the first-generation method, the process results in a lot of by-products because you only take the best of the crop, for which reason vast areas are required for crop cultivation. This fact raises a large number of ethical questions about using food for fuel in a world in which 800 million people are starving.

"Another interesting aspect is that this technology uses a lot of energy and nitrogen to produce the raw material, for example maize, compared to transforming secondary products to bioethanol as in the second-generation method," says Henrik Schlosser.

Many possibilities

The challenge therefore lies in developing the second-generation method and thereby ensuring the optimum use of the raw material, regardless of whether it is maize, grain, sugar cane or straw.

"Plants are adapted to retain the precious sugars which are formed through the photosynthesis of CO2 in the air using the sun as an energy source. The big challenge for scientists is being able to utilise part of the crops for food and the rest for bioethanol. In this way, all the sugar molecules will be used optimally, both the easily accessible sugar and starch and the cellulose, which is hard to break down," explains Henrik Schlosser.

The fact that maize and sugar cane, for example, are used in various parts of the world to produce bioethanol is primarily due to a prosperous economy.

"The advantage of growing maize on large areas in the US is that the harvest can be sold via two channels – either as food or for bioethanol production. If, on the other hand, it is possible to cultivate new crops that can be grown on land which is currently not being farmed, or to find alternative energy crops with a very high yield per hectare, you are closer to constructively solving several problems at one go. Food production can continue to grow for the benefit of the world's population, while simultaneously

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There is political agreement that alternatives need to be found to petrol and diesel, which currently cover 95 per cent of energy demand by the transport sector. Biofuels are one alternative.

In the US, maize-based bioethanol production has increased significantly, and it is no longer unusual to see ethanol plants in the large agricultural areas.

››› Filling up with biofuels

"New energy crops could be elephant grass, willow and desert grass, but genetically modified crops with a high sugar content are also a possibility in future," says the agronomist Henrik Schlosser (left), pictured here with his colleague Morten Kaiser Nielsen, Puchasing Manager, in one of Cheminova's greenhouses.

››› reducing our dependence on oil," says Henrik Schlosser.

As examples of new energy crops, he mentions elephant grass, willow and desert grass – but adds that genetically modified crops are also a possibility in this context.

"It could be crops in which the sugar content is optimised," explains Henrik Schlosser.

Biodiesel

Biodiesel is the popular term for fuels based on vegetable oils which can be mixed with fossil diesel. The vegetable oils come from the seeds of oil-rich crops such as rape, soya and oil palms, but the oil can also come from other crops such as maize and grapes. Biodiesel is produced by adding methanol and basic catalysts to the pressed vegetable oil. This produces a product that is called sebacic acid-methyl ester. This product can then be mixed with ordinary fossil fuels, after which it is called biodiesel.

The biodiesel yield from a Danish field of rape corresponds to about 1,200 litres of biodiesel per hectare, which in turn corresponds to about the annual fuel consumption of the average Danish car owner. In 2007, rape was grown on 177,000 hectares in Denmark.

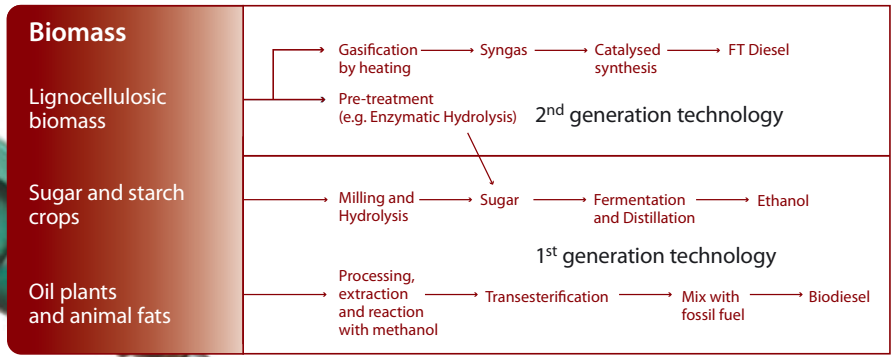
Ambitious EU

At the moment, more than 95 per cent of the transport sector's energy requirements come from oil products such as petrol and diesel. In the EU alone, the transport sector accounts for more than 28 per cent of CO2 emissions, so alternatives need to be found.

Today, all cars can run on bioethanol, but a 5 per cent blending limit has been set as a higher percentage would require adjustments to car engines. However, engines have been developed that can use fuels containing as much as 85 per cent bioethanol.

It is the EU's ambition that bioethanol must account for almost 6 per cent of consumption by the transport sector in 2010 and 25 per cent in 2030, so there is a clear political consensus that bioethanol will be an alternative to fossil fuels in future.

Fuel production pathways



Produce of the land

Sugar cane is a very important crop for biofuel.

By professor Jens C. Streibig

The farming sector must again cultivate energy crops together with food crops.

About six years ago, the International Food Policy Research Institute in Washington predicted that food prices would be stable for the next 20-25 years if the productivity increases in agriculture were maintained. Food production had successfully been increased in step with population growth. However, this does not mean to say that all mouths will be fed as there are still about 800 million people who do not get enough to eat, but this is more of a distribution problem than due to a direct shortage of food.

Food prices and bioethanol

Forecasts of stable food prices have in no time at all been turned upside down. The price of wheat has almost doubled within the space of about a year, and we have all heard about the Mexicans who now have to pay far more for their maize tortillas than they did just a few years ago. Some people maintain that the hikes in corn prices, including maize, are due to the fact that the crops are not being used for food but for producing bioethanol. However, the OECD has just published a report that shows that while the land used for biofuels covers 10 million hectares, this is insignificant in relation to the total cultivated area worldwide which amounts to about 1,500 million hectares. In other words, for every hectare used to produce biofuels, 150 hectares are used for ordinary agricultural crops for human consumption. The myth that bioethanol in your petrol tank leads to famine is widespread, but is not one that holds much water. The area used for biofuels is negligible and has nothing to do with rising corn prices. Poor harvests in Europe, North America and Australia and speculation in increasing corn prices are the real reasons for higher prices.

Energy and crops

Agriculture supplying society with energy is nothing new. It always has done. We have simply forgotten how large areas of farmland were in the past transformed to real horsepower. The horse was used to provide tractive power, for transport and as a war machine. It was only after the tractor came to Denmark that these areas were freed for cultivating crops for other livestock and human consumption.

We cannot carry on using oil, not just because there will be less and less of it, but also because we are burning hundreds of millions of years of accumulated solar energy in the course of just 300 years. And this is certain to have an impact on the global climate. Meanwhile, millions of cars will continue to drive around for many years to come with their unquenchable thirst for ever more expensive diesel and petrol, releasing colossal emissions of, for example, carbon dioxide. In the twenty-first century, security of energy supplies will probably

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"We cannot carry on using oil, not just because there will be less and less of it, but also because we are burning hundreds of millions of years of accumulated solar energy in the course of just 300 years," says the author of the article, Professor Jens C. Streibig from the Faculty of Life Sciences at the University of Copenhagen.

››› Produce of the land

Biofuels provide a number of benefits that go beyond simply supplying energy.

››› be just as significant as the security of food supplies used to be. For which reason the agriculture sector will again have to cultivate energy crops together with food.

The crops used to produce bioethanol can be the same as those used for food and feedstuffs. Politicians and others are busy discussing whether it is ethically correct to use food for bioethanol – a discussion I will not become embroiled in. Many people are also calling for real energy crops to be created with the help of genetic engineering. They are focusing on being able to change both the cell walls and the metabolisms of the plants so it is easier to extract more energy from them, but in their struggle the GMO enthusiasts forget that these plants also have to be grown out in the fields. Outside, the plants are exposed to all sorts of hazards in the form of insects and fungi which can easily destroy these genetically modified organisms.

Sugar beet

My suggestion would be to look at the crops we already have and perhaps grow them differently when intended for energy purposes. Here, I would like to mention sugar beet, which is seldom discussed. Sugar beet is one of the youngest crops we have, and the one which we know most about both genetically and physiologically. During the past approx. 200 years we have, through normal breeding, fertilising and plant protection, successfully achieved a manifold increase in the sugar content and yields per hectare. Today, we can harvest almost 15 tonnes of sugar per hectare. By changing the current growing methods to make it cheaper, we have a carbohydrate producer that is far more effective at catching the sun's rays and converting them to carbohydrate than sugar cane. With the right enzymes and so forth, we can use almost all the sugar beet for bioethanol and the secondary product can be used for feedstuff. The same goes for other crops, for example maize, where the secondary product from bioethanol production is a valuable protein feed for animals.

First and second generation

Whether it actually pays to produce biofuels at all is keenly discussed by the life cycle analysts on the one hand and others who are involved in both the first and second-generation fermentation soup on the other (the first-generation process only uses parts of the plant while the second-generation process uses the entire plant). There is no perfect solution to the energy problem, but biofuels offer a number of advantages that go beyond simply supplying energy.

One side benefit of growing energy crops is that the EU will no longer be forced to dump agricultural products in developing countries, and we will be able to give farmers in these countries the possibility of really being able to develop their own agriculture. Focus on bioenergy will make it easier to remove farm subsidies in the EU, which will be one of the most supportive ways of helping poor farmers in developing countries.

Denmark is one of the world's leading producers of enzymes for manufacturing biofuels and, with the knowledge and technology which Danish agriculture has for engaging in environmentally friendly production, we can make a positive contribution to both the environment and the climate and thereby make a difference. We are on the verge of another green revolution!

The farming sector must again cultivate energy crops together with food crops. For each hectare of crops used for biofuels, there are 150 hectares of land used for ordinary crops.

The herbicide NIC-IT is one of Cheminova's new generic products for maize. The product is based on the active substance nicosulfuron and is being launched in the US in early 2008.

Energy crops give better prices for agricultural products

Cheminova is introducing new products for energy crops.

"Generally speaking, increasing prices on the world market for agricultural products, as we have seen in recent years, represent a positive development for Cheminova. It means that farmers have a greater incentive to protect their crops using insecticides, herbicides and fungicides," says Executive Vice President Kurt Pedersen Kaalund from Cheminova.

"The need for plant protection and artificial fertilizers grows on the important markets when crop prices rise, and larger areas are farmed as a result of the increased cultivation of energy crops. The decision to remove approx. 3 million hectares of land in the EU from the set-aside scheme means that, all else being equal, the agrochemical industry can expect a similar increase in revenues in Europe. In South America, the improved economy for soya and sugar cane will strengthen Cheminova's position, where we already have a strong product portfolio," says Kurt Pedersen Kaalund.

Growing more maize for bioethanol in the US is a challenge for Cheminova as the company's product programme here is weaker than for the cotton and soya, which the maize will to a certain extent replace.

Cheminova is currently introducing a number of new generic products for the maize market. Preparations for this have taken several years, but will now benefit from the current high prices. The first product will be launched this year.

"We expect to introduce ten new products for these crops in the coming years," says Kurt Pedersen Kaalund, and continues:

"According to the OECD, in South America there are more than 100 million hectares of land being extensively farmed which can be used instead to cultivate crops in step with growing demand. Finally, it is expected that, globally, even more land will be farmed intensively to ensure adequate agricultural production in future, as is the case in, for example, the CIS countries. All these factors mean that at Cheminova we are following developments closely in our efforts to seize the opportunities that arise on new and existing markets.

"High crop prices give farmers a greater incentive to protect their crops against pests. We expect to introduce ten new products in the coming years aimed at crops which are used for food and energy production," says Executive Vice President Kurt Pedersen Kaalund from Cheminova.

Cheminova is introducing a number of new generic products for the maize market. Preparations for this have taken several years, but will now benefit from the current high prices. The first product will be launched this year.

Divestment of Hardi strengthens Auriga's financial position

Auriga sold the shares in Hardi at a price of DKK 290 million. Compared with the carrying amounts of equity plus goodwill of DKK 292 million and DKK 169 million, respectively, totalling DKK 461 million, the transaction therefore entails a loss for accounting purposes of DKK 171 million, to which should be added transaction costs. This loss entails a substantial downward adjustment of Auriga's outlook for 2007 as a whole.

The sale of both Skamol and Hardi is in line with Auriga's strategy announcement at the end of 2006 when the Board of Directors decided to focus resources on developing Cheminova. The divestment of the two companies has significantly reduced the Group's interest-bearing debt, which has strengthened the company's capital reserve and financial ratios.

With the positive development in the Group's balance sheet structure and its capital reserves, Cheminova can now play an active role in the consolidation process in the agrochemical industry.

"The divestment of Hardi strengthens Auriga's financial position," explains Jens Ole Jensen, Vice President in Auriga.

Auriga Magazine and annual report either online or by post

It is Auriga's aim to increase awareness and knowledge of the Group and its activities through providing regular and structured information. Through open and active communication with investors, analysts, the media and stakeholders, we endeavour to provide the stock market with the best possible basis for pricing the Auriga stock.

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At www.auriga-industries.com, anyone interested can also request Auriga's publications under "request information".

At www.auriga-industries.com, you can also read about the latest developments taking place in Auriga and find stock exchange announcements, read the Auriga Magazine (extract in English) and annual reports, follow the Auriga share price and much more. It is always possible to request Auriga's publications via our website.

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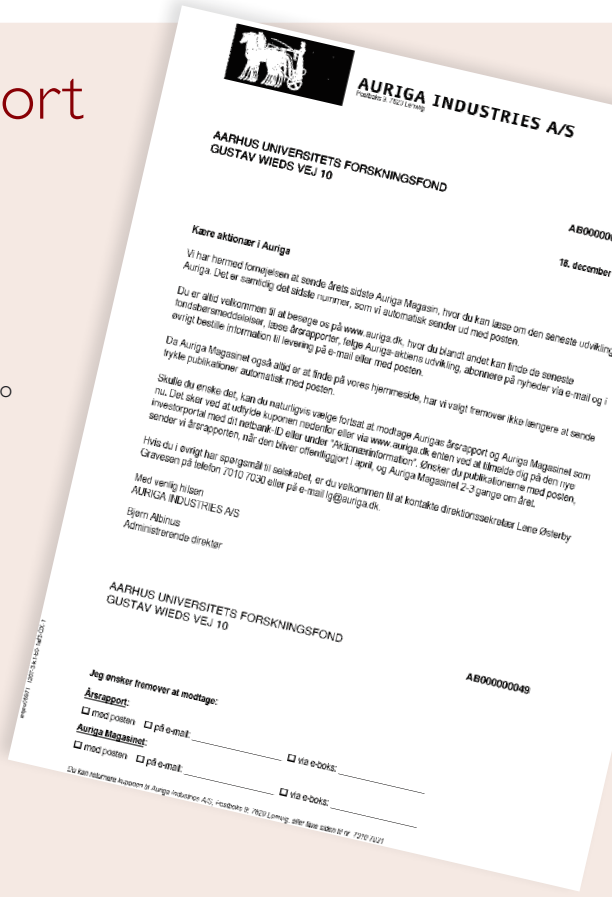

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18. december

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NEWS FROM CHEMINOVA

Energy conservation project uses hydrogen

Construction Manager Henrik Larsen at the hydrogen-fed boiler in the main CHP plant. At the bottom picture, Cheminova employees are in the process of connecting the hydrogen tank close to the glyphosate plant.

Cheminova is now using surplus hydrogen to produce steam. Each year, eight million kroner's worth of energy is being saved – while the environment is being spared considerable volumes of CO2.

Cheminova has just completed the construction of a hydrogen-fed plant which will use waste hydrogen from the large glyphosate plant on Rønland. The hydrogen will be used to produce steam in a new boiler at the natural gas-fired CHP plant. Up until now, the hydrogen has been burnt off from a gas flare without the energy being used. Hydrogen from the production plant is collected in a 50-cubic-metre steel tank near the plant. From here it passes through an almost two-kilometre-long underground gas pipe to the boiler facility at the central CHP plant where the hydrogen is burnt off in a new large hydrogen boiler, and steam is produced. Cheminova's annual energy savings are expected to be in the region of 26,400 MWh – which corresponds to the annual electricity consumption of 7,000 households or the heating consumption for 1,750 households. The energy-conservation project has cost DKK 8 million and is expected to pay for itself in just one year. In future, the annual energy savings of DKK 8 million will help to improve the overall competitiveness of the company.
In addition to the financial benefits for Cheminova, the project is also very positive from an environmental point of view. As hydrogen is CO2-neutral, it will reduce the company's CO2 emissions by 5,400 tonnes a year in future.

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