Ministry of Food,
Agriculture and Fisheries

Second generation bio-fuels

In Denmark one fourth of the total CO_2 emissions derives from the transport sector. Denmark is on track to fulfil the EU 2020 targets of 20 percent of the energy consumption to derive from renewable energy sources and 10 percent share of energy to derive from renewable sources in the transport sector by 2020. For the transport sector it will be a considerable challenge

10 percent from renewable sources in 2020

The Danish Government is committed to the objective that 5.75 percent of the energy consumption in the transport sector shall come from renewable sources by 2012, and 10 percent by 2020. At the moment the only realistic source of renewable energy in the transport sector is bio-fuel which will be blended into fossil fuel such as petrol and diesel.

Currently the demand is being covered by import of bio-ethanol from first generation production, e.g. bio-ethanol from sugar cane. But with the World's ever growing population, the production of biomass for energy purposes will increasingly compete with food production on the arable land. Furthermore, the greenhouse gas emission balance is not always that positive when sourcing the bio-ethanol from first generation production.

Second generation bio-fuel production

Thus, in a Danish perspective the way forward for the transport sector is second generation biofuel production based on agricultural by-product and other waste products. In this process straw and other cellulose/lignin by-products are broken down by a heat and enzyme treatment to enable the sugar content to be used for fermentation in the usual process of making bio-ethanol.

For the enzyme treatment the Danish companies Novozymes and Danisco Genencor are World leading providers of enzymes for the bio-ethanol industry.

The Danish Government finds this new technology so promising that it provides funding for research, development as well as pilot- and demonstration projects through an Energy Technology Development and Demonstration program (In Danish EUDP).

One of the projects is the Danish DONG Energy founded pilot plant Inbicon, a biomass refinery which shall show the potential of second generation bioethanol production combined with by-products from the process. One example is C5 molasses syrup used for livestock feed and as a degraded cellulose/lignin product which is usable either for energy or as fertilizer.

Bio-fuel from dead animals

In Denmark other, more mature production of bio-fuels exists. From agricultural waste products such as dead animals and waste the DAKA Biodiesel plant produce fatty acid methyl esters (FAME) which turns into bio-diesel when blended with methanol.

Bio-fuel from crops

Denmark also has traditional first generation technology bio-diesel production on the basis of rape seed oil (Emmelev Mill) with rape seed cake as by-product. This by-product is used for livestock feed.

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