

Germany is converting wood into diesel

Germany has spent 800,000 man hours on developing and establishing the world's first factory that can produce diesel on the basis of wood waste and wood chips. By using wood as the raw material instead of oil-containing plants, the necessary area for cultivation can be reduced by two thirds.

By Torben Skøtt

While Denmark uses significant resources on developing 2nd generation bio-ethanol, Germany has chosen a somewhat different route. In Germany, there is particular focus on production of bio-diesel, and in the middle of April, the German chancellor, Angela Merkel, could inaugurate an entirely new factory plant that is supposed to produce synthetic diesel through the so-called BTL method. This stands for Biomass to Liquid and briefly means that the biomass is first gasified, after which the gas is converted into liquid fuel.

The next phase will be running-in of the no less than 113 sub-processes that are necessary in order to be able to convert wood into diesel. The goal is to be able to reach full production within 8-12 months, which corresponds to 18 million litres of diesel oil per year. This will require supply of approx. 65,000 tons of wood chips or wood waste.

The technology for production of synthetic diesel is well-known in many ways and was for example used by Germany during World War II. Back then, coal was gasified and then converted into diesel through a catalytic process. Today, biomass is the product that is to be gasified, and this should result in a CO₂ reduction of up to 90 percent compared to traditional diesel oil.

The new factory plant, which belongs to the company Choren Industries, is located in Freiberg. Volkswagen, Daimler and Shell are co-owners, and Shell also has shares in Choren Industries.

Pilot plant

Prior to the inauguration of the plant in Freiberg lies very extensive development



Photo: Choren Industries

Installation of low-temperature gasifier on the plant in Freiberg.

work. Among other things, this includes establishment and operation of a pilot plant for over 22,000 hours as well as testing of the fuel in a number of automobile engines that are produced by Daimler and Volkswagen.

– The plant in Freiberg clearly shows how far we can get with the development of a new technology for protection of the climate when government, industry and researchers work together hand in hand, said the German chancellor, Angela Merkel, at the inauguration on the 17th of April 2008.

The establishment of the factory has been a demanding process, which has involved about 150 sub-contractors. The first phase consisted of establishing a low-temperature as well as a high-temperature gasifier patented by Choren Industries. Af-

ter that, Shell started installing equipment for the so-called Fischer-Tropsch process, which converts the gas into liquid fuel. It is a chemical process that was invented by the German researchers Franz Fischer and Hans Tropsch in 1923. The process has particularly been used by Germany and South Africa, but the main part of the large oil companies has now invested in the technology. The reason for this is that the emission of harmful substances is smaller than for traditional diesel oil, just as the CO₂ emission can be reduced significantly if the production takes place on the basis of biomass.

Choren Industries estimates that the total development work comes to about 800,000 man hours, and that they have worked together with 600 different companies during the process. ■

– the Swedes want to do the same

With help from German researchers, Sweden wants to establish a factory for production of synthetic diesel made from wood chips and household waste. According to plan, the first factory is to be inaugurated during the autumn of 2009 in Åsele in Norrland.

The Swedes, who already have a significant production of ethanol as replacement for petrol, now want to start producing diesel on the basis of wood chips and household waste. The technology will be purchased in Germany, which could recently inaugurate the world's first factory for production of synthetic diesel on the basis of wood and other types of biomass.

It is the environmental debate, the rising oil prices and the significant resources within biomass that have made the Swedish company Eco-Oil become interested in synthetic diesel. The product is cur-

rently more expensive than traditional diesel oil, but Eco-Oil expects that it will be the other way around when the plant is ready in the autumn of 2009.

According to plan, the factory will be established in Åsele in Norrland, where significant amounts of biomass are available. This biomass is primarily various residual products from forestry, such as branches, twigs, top ends and roots, but also household waste and waste from the paper industry have been mentioned as possible raw materials.

Already today, several trucks in Sweden are running on synthetic diesel produced on the basis of natural gas. It costs one Swedish krone more per litre than ordinary diesel oil, but it provides a better working environment, cleaner exhaust and thereby a better image for the companies that have chosen the natural gas-based fuel.

The Swedes are familiar with the process of converting gas into liquid fuel, but when it comes to gasification of biomass, there is still some way to go before the

technology can be considered fully commercially available. In Värnamo, work has been carried out since 1994 on achieving stable operation of a large gasification plant, in Piteå, a group of researchers are working on gasifying waste from the paper industry, and in Väster-norrland, they have the project BioFuel Region, where 18 municipalities work together on promoting the use of biofuels.

Sweden is not planning to use synthetic diesel to replace any of the other types of biofuels that they are currently working with. Synthetic diesel based on biomass is a supplement that is supposed to make the transport sector independent from fossil fuels.

Here in Denmark, a group of researchers from DTU (Technical University of Denmark), Dong Energy and Haldor Topsøe are investigating how gasification gas is best converted into methanol and DME. This project, which is supposed to be finished in 2009, has been given DKK three million in support from the energy research programme EFP. TS

– and Shell is going to test the fuel in the Le Mans

At the legendary 24-hour race in Le Mans on the 14th of June, Shell is going to test how diesel produced on the basis of wood waste will cope in a race for the first time.

Shell is working closely together with German Choren Industries on the development of new types of biofuels, where the biomass is first gasified, after which it is converted into liquid fuel, also called Biomass to Liquid (BTL). Within a year, a large factory plant in Freiberg is supposed to be able to supply 18 million tons of BTL per year, and the engineers are already testing the fuel in various automobile engines.

And what could be better than testing the fuel on the Le Mans race track in France when the legendary 24-hour race is held on the 14th of June? It will not be pure BTL, but Audi is prepared to try a mix of BTL and Shell V-Power Diesel in their racing car.



On the 14th of June, Shell and Audi will be testing a mix of biofuel and Shell V-Power Diesel in the 24-hour race on the Le Mans race track.

In 2006, Shell and Audi made motor-ing history by being the first to win the Le Mans race with a diesel-driven racing car. This success was repeated in 2007, and this year, they will be trying out a mix of BTL and traditional diesel, and they will also be testing GTL, which stands for "Gas to Liquid". In that case, it is not bio-

mass but natural gas that is converted into liquid fuel.

Audi is part of the Volkswagen Group, which, just like Shell, has shares in the BTL factory in Freiberg. The 14th of June will be the first time that a 2nd generation biofuel is used on the Le Mans race track and probably also the first time in a race at all. TS