

Energy Technology Department

Large facilities - Intensification

On 25 September 2009, the Energy Agency authorised SEK 812 million in support for three demonstration facilities. The support will be provided as long as the outcome of the EU commission's state support enquiry is positive.

The three projects that have been presented to the Ministry of Industry, Employment and Communication for further consideration by the EU commission are:

- **Chemrec AB** The project aims to extract biofuels from black liquor at a facility in Domsjö, Örnsköldsvik. Authorised support: a maximum of SEK 500 million.
- **Göteborg Energi AB** The project aims to build and run a facility for the transformation of low-quality forestry materials to high-quality biofuels – bio methane. Authorised support: a maximum of SEK 222 million.
- **Södra Cell AB** The project aims to provide a full-scale demonstration of the LignoBoost concept integrated with the factory in Mörrum. Authorised support: a maximum of SEK 90 million.

The project is not allowed to start until the EU commission's state support enquiry has been completed.

Chemrec AB

Chemrec develop a pressurised, oxygen-blown gasification technology for black liquor which is suitable to connect together either with a synthesis unit to produce fuel/chemicals (BLGMF), or a combined-cycle to generate electricity and steam (BLGCC).

This project relates to a fuel application; the production of renewable fuels in the form of DME and methanol in a pulp mill at the same time as the mill produces cellulosic fibre (viscose fibre), ethanol and lingo sulphonate. This pulp mill is thus already a type of biorefinery and will in this way broaden its product slate. To enable this change the mill need to add biomass energy as a second feedstock to compensate for the withdrawal of energy in the form of DME and methanol.

The BLGMF concept appears to have a high level of energy efficiency and can, in full-size facilities, convert bio energy into fuel at costs that can become competitive compared to fossil fuels. The black liquor is gasified and synthesised to become fuel. To compensate the mill for the energy loss involved, biomass is provided from the forest in the form of branches, tops and roots, or other organic material such as construction remains or waste from municipal landfills. This biomass must be processed to become energy in the form of steam and electricity.

Black liquor seems to be extremely suitable for gasification, but there are challenges, for example upscaling, availability and materials etc. That is why, Chemrec now wants to construct an industrial-scale demonstration facility which is fully integrated with Domsjö Fabriker. Today Chemrec is operating DP-1 which takes 1% of the black liquor from Smurfit Kappa's mill in Piteå. The results from DP-1 form the basis of the upscaling at Domsjö Fabriker. The paper and pulp industry work at a very high level of availability, approximately 98% for 355 days of the year in a modern mill. In order to succeed with the introduction of new processing equipment in this industry, successful implementation of the first biofuel refineries is required.

Göteborg Energi AB

Göteborgs Energi intends to build a 20 MW facility as a first stage for the gasification of biofuels and spillage from the forestry industry and for the production of methane gas. The facility at a later stage will be dimensioned for approximately 100 MW of gas; the production is expected to be around 800 GWh per year.

The facility will be located in Gothenburg harbour and will be an upscaling of the Austrian technology which is based on indirect gasification. In gasification plant, biofuel will be transformed into combustible gases. These gases are cleaned and upgraded primarily to methane gas of a quality comparable to natural gas.

Metso Power will be the supplier of the equipment. Metso Power in turn, has established a relationship with Repotec in Austria, which has developed the technology for indirect gasification. Repotec is a small company that has not had the opportunity to commercialise. By joining forces with a technology company such as Metso, that possess the skills to design and implement plant projects within the energy area, the technology can now be developed.

An implementation of technology-driven projects such as the GoBiGas project can be expected to provide a major advancement in knowledge. To be able to respond to increasing market demands, the supply of biogas needs to be assured for the future. Through full-scale biogas production, GoBiGas is leading the way for the large-scale introduction of gas vehicles.

Södra Cell AB

Date
23 Oct 2009

The project aims to create the prerequisites, via a full-scale demonstration, to commercialise the patented technology LignoBoost, a technology which has been adapted for the production of lignin in chemical pulp mills. The demonstration plant will be built at Södra Cell AB's facility in Mörrum.

The market for this type of facility long term is expected to become very large and global. The objective of the Energy Agency's support for Södra Cell AB is to stimulate industrial development which can produce a reduction in energy consumption as well as an increase in the production of renewable energy types which in turn will lead to increased competitiveness and growth. LignoBoost can be used in applications for renewable energy. The technology makes it possible for the Swedish forestry industry in the future to become a major supplier in areas where fossil products dominate today, for example, new biofuel sources, the manufacturer of carbon fibre based on lignin and the manufacture of chemicals based on lignin.

Through the installation of LignoBoost, high-quality biofuel is obtained in the form of lignin at the same time as the sulphate pulp factory receives a return on its surplus energy. The latter provides an incentive to further develop energy efficiencies. Seasonal variations in the mill's energy balance can also be accommodated more flexibly via the LignoBoost process as it provides a storable biofuel. The lignin obtained from LignoBoost is a high-quality biofuel which can replace fossil fuels such as coal and oil. This means that there will be a significant reduction in fossil CO² emissions.

The LignoBoost process increases the availability of biofuels in general and means that there will be a direct reduction in the use of fossil fuels, primarily as a result of the pulp mill's being able to use lignin as a high-quality biofuel in the mesa oven compared to the fuels available today. Lignin has a calorific value of between 26-27 GJ/tonne while sawdust and bark have calorific values between 18-20 GJ/tonne and in addition, they contain more elements which are disruptive to the production process.