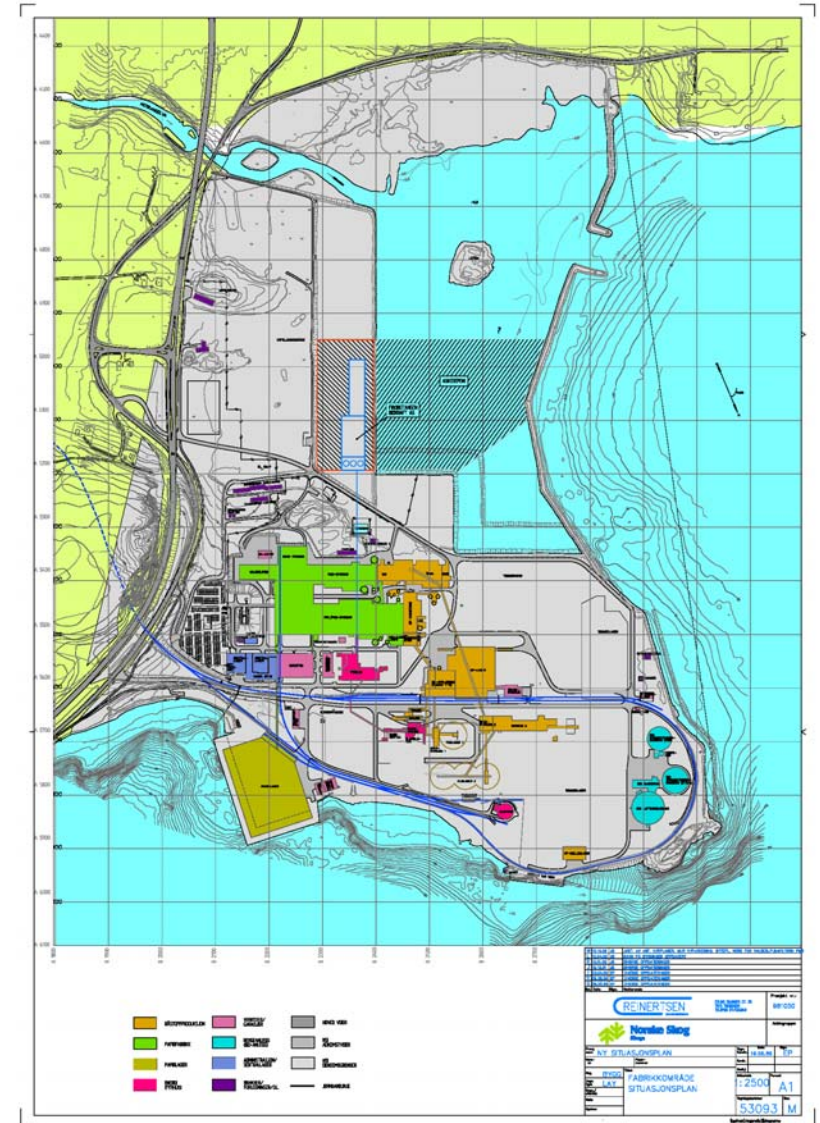


Fiborgtangen Vekst AS

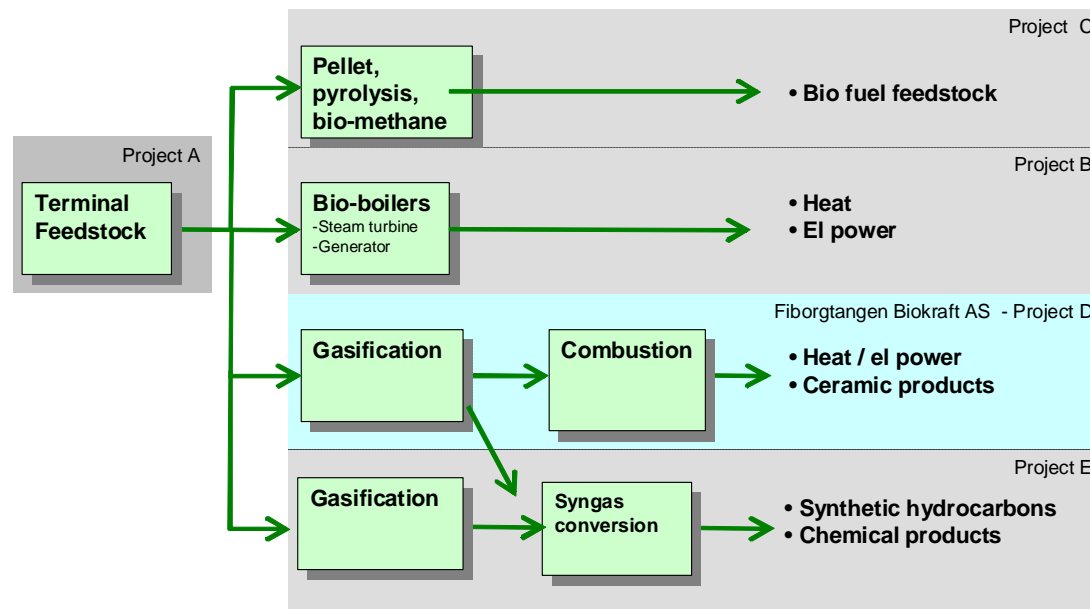
24. November 2011

Olav Dehli



Fiborgtangen Vekst

- Et industrielt fellesskap hvor en oppnår gjensidig styrkning av konkurransekraft.
- Fiborgtangens fortrinn er logistikkintensiv prosessindustri.
- Fokus på utvikling og anvendelse av ny teknologi innen fornybar energi og miljøteknologi.
- Norske Skog, SIVA, NTE, Allskog, Sparebank 1 SMN.



Utvalgte prosjekt:

Fiborgtangen Biokraft AS – Gassifisering av biomasse og kontaminerte avfallsfraksjoner, produksjon av varme og elkraft. Varme leveres Norske Skog. 120 MNOK bevilget fra Enova.

Drivstoff/kjemikalier – Andel av syntesegass fra FBAS konverteres til drivstoff. Bevilgning fra IN via Miljøteknologiordningen.

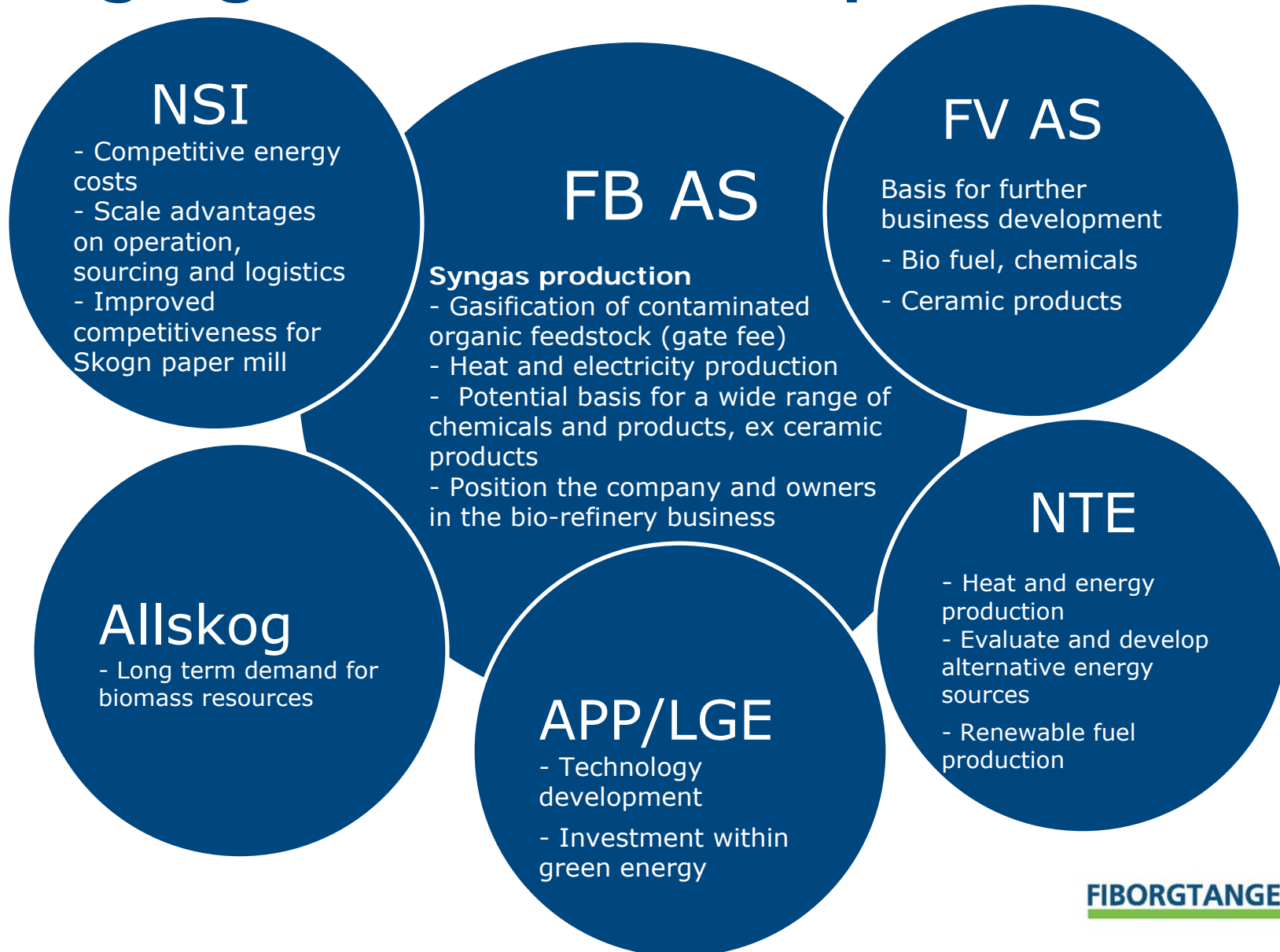
Biokraft AS – Biogassproduksjon av bio-slam fra papirproduksjonen kombinert med substrat fra oppdrett og laksenæring. Leverer flytende bio-metan til transportsektoren.

Terminal, mottak og sortering – Etablere Fiborgtangen som mottakssted og logistikk knutepunkt for råvarer: Pr i dag pågår: Usortert returpapir (Fiber Nor), Returtre (IR Retura)

Fiborgtangen Biokraft AS

Syntesegassproduksjon – Elkraft og damp

Fiborgtangen Biokraft a result of merging interests from partners



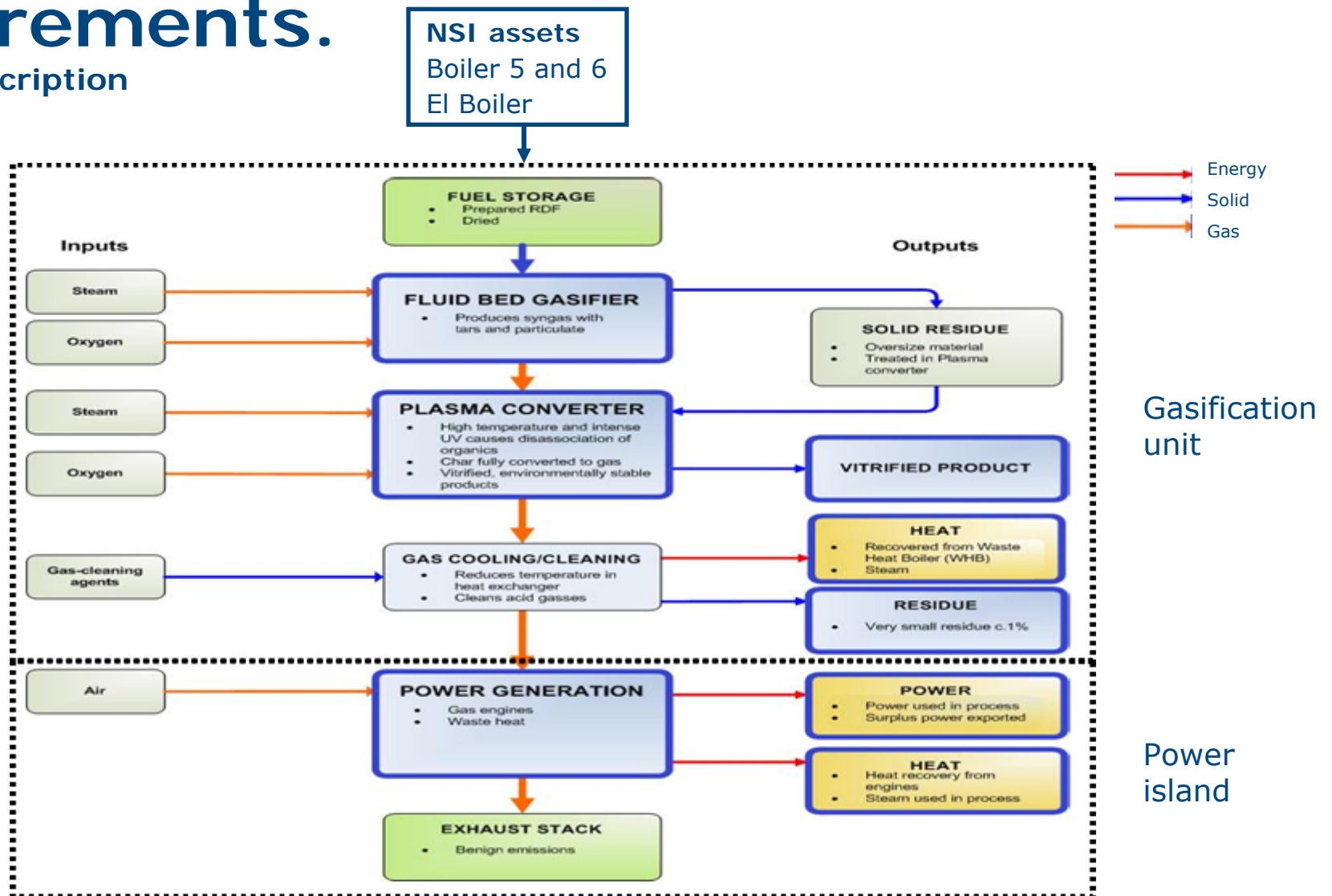
Criteria for choosing the concept at Fiborgtangen Biokraft

Shortlist of requirements:

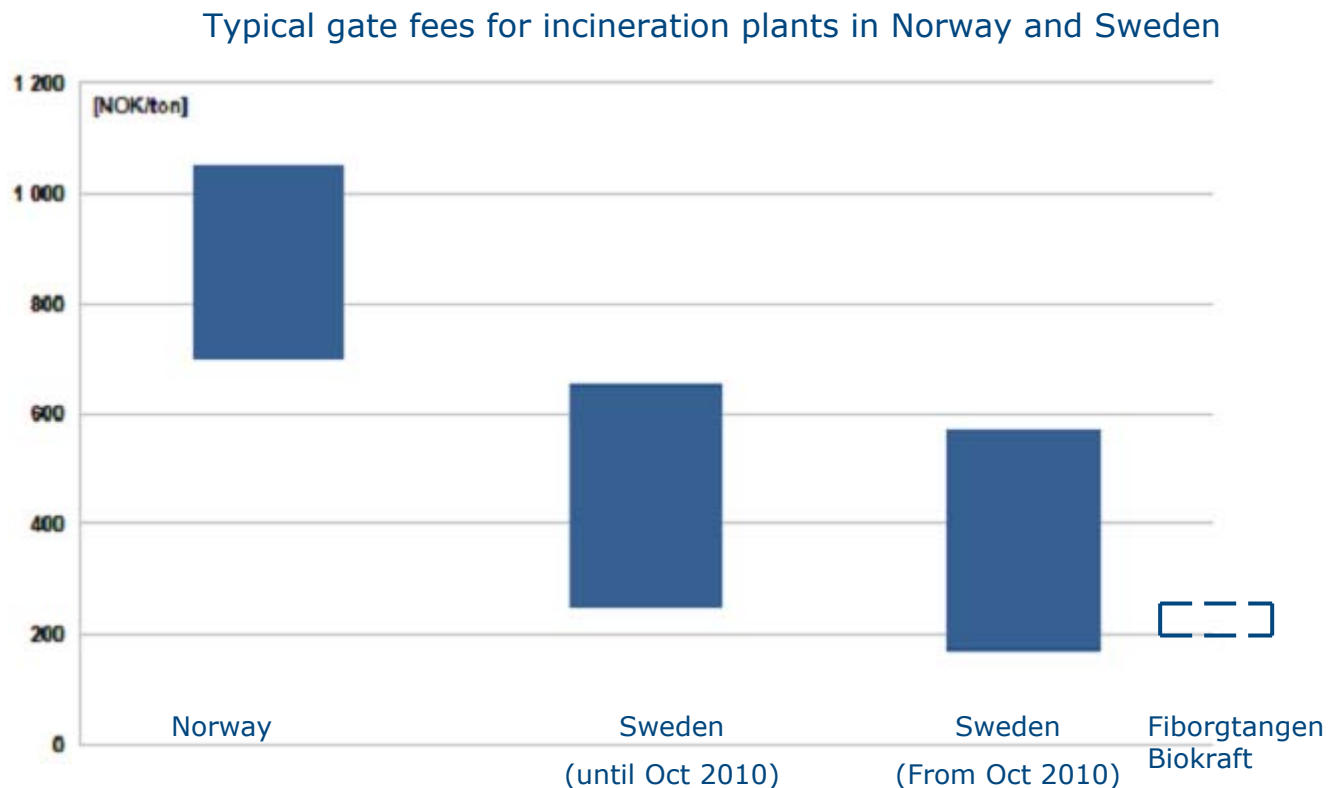
- The gasification process should be feedstock flexible and be able to operate with high temperature so that tars can be cracked and contaminants immobilised in vitrified slag.
- Gasifier technology based on air should be avoided due to high gas volumes leading to high investment costs and N₂ content in syngas.
- Gasification with no high temperature treatment should be avoided because low priced contaminated feedstock will lead to high level of pollution in the syngas and high amounts of contaminated ash and also carbon loss from un-cracked organic substances.
- Gasification where external heat source like plasma or radiation are integrated in main gasifier body should be avoided due to low thermal efficiency.
- Gasifier systems that need addition of fossil fuels should be avoided.
- Due to the capacity for heat supply to Skogn, the size should be in a range from 40 to 70 MW.
- Syngas output must have a quality that is good enough for gas engines or gas turbines, with possibilities for further syngas cleaning and use in catalytic conversion.

APP technology meets these requirements.

Concept description



Fiborgtangen Biokraft competitive compared to Swedish incineration plants



Something new is about to happen

Stora Enso and Neste Oil inaugurate biofuels demonstration facility at Varkaus in Finland

STORA ENSO OYJ PRESS RELEASE 11 June 2009 at 06.00 GMT

Stora Enso and Neste Oil inaugurate today the demonstration plant at Varkaus for biomass to liquids (BtL) production utilising forestry residues. A 50/50 joint venture NSE Biofuels Oy, has been established first to develop technology and later to produce in commercial-scale biocrude for renewable diesel.

The demonstration facility at Stora Enso Varkaus Mill includes a 12 MW gasifier. It will be used to develop technologies and engineering solutions for a commercial-scale plant. The demonstration process units will cover all stages, including drying of biomass, gasification, gas cleaning and testing of Fischer-Tropsch catalysts.

UPM STARTS ENVIRONMENTAL IMPACT ASSESSMENT FOR A BIOFUELS PLANT IN LAPPEENRANTA, FINLAND

(UPM, Helsinki, 25 May 2010 at 13:00 EET) – UPM is starting an official procedure for an environmental impact assessment (EIA) for a biofuels plant in Lappeenranta, Finland. UPM is planning to build a biofuels plant at the Kaukas mill site in Lappeenranta. In the first phase the plant will serve mainly as a test and training facility.

The main end products of the biofuels plant would be second generation biodiesel, bio gasoline, kerosene and naphtha. Raw materials used would be liquid bio-based organic compounds, like fats oils and forest industry by-products. The applicability of different raw materials for the biofuels production will be tested at the biofuels plant. In addition UPM's future operating staff will be trained at the facility for the operation and management of biofuels petrochemical processes.

The facility is planned to be built in stages. In the first phase the plan is to build a 20,000 tonne test and training facility, which could also serve small scale industrial production. The natural location for this facility is UPM's Kaukas mill site, in Lappeenranta, where UPM's research centre is located. The EIA includes also an assessment of a larger scale commercial size plant that has an annual production capacity of maximum 200,000 tonnes.

Chemrec Inaugurates BioDME Renewable Fuels Plant in Pitea, Sweden

Date Posted: September 9, 2010

On Thursday September 9, the world's first plant for production of the renewable motor fuel BioDME was inaugurated.

"A major step forward for the global biofuels market", said **Kyriakos Maniatis** of the European Commission.

The plant is built and operated by **Chemrec**, a Swedish-based technology company, at the company's development plant located at the Smurfit Kappa paper mill in Piteå, Sweden

British Airways, Solena Plan to Create 1,200 London Jobs at Biofuels Plant

By Alex Morales - Jul 20, 2010 11:35 AM GMT+0200

British Airways Plc and **Solena Group Inc.** plan to build a waste-to-biofuels plant in east London, creating 1,200 jobs, sending less trash to the landfill and reducing jet emissions of greenhouse gases. (.)

Solena is negotiating with London's four biggest waste management companies to get feedstock for the plant. Do said, declining to name the firms. The Washington-based bio-energy company will take plastics, paper and food leftovers that would otherwise go to landfill, saving the waste companies from paying taxes on trash, he said.

Gothenburg Biomass Gasification Project, GoBiGas

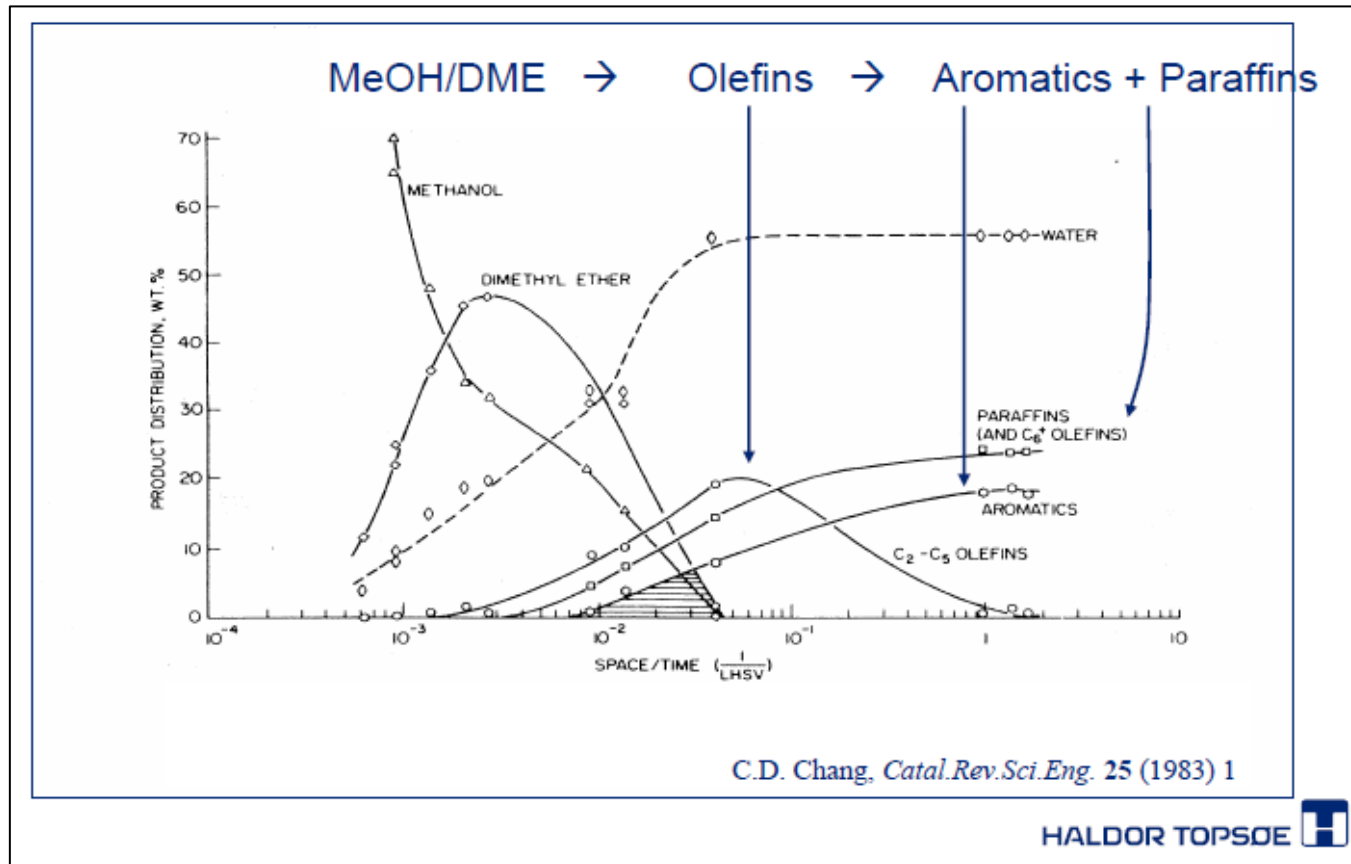
Gothenburg Energy invests heavily in biogas and sees biogas as one of tomorrow's most important energy sources. A major benefit of biogas is that you can use the existing natural gas grid for distribution. Natural gas is becoming a bridge over to the renewable biogas.

Gothenburg Biomass Gasification Project, GoBiGas, is the name of Göteborg Energi's large investments in biogas production by gasification of biofuels and waste from forestry. The project is run in partnership with E.ON.

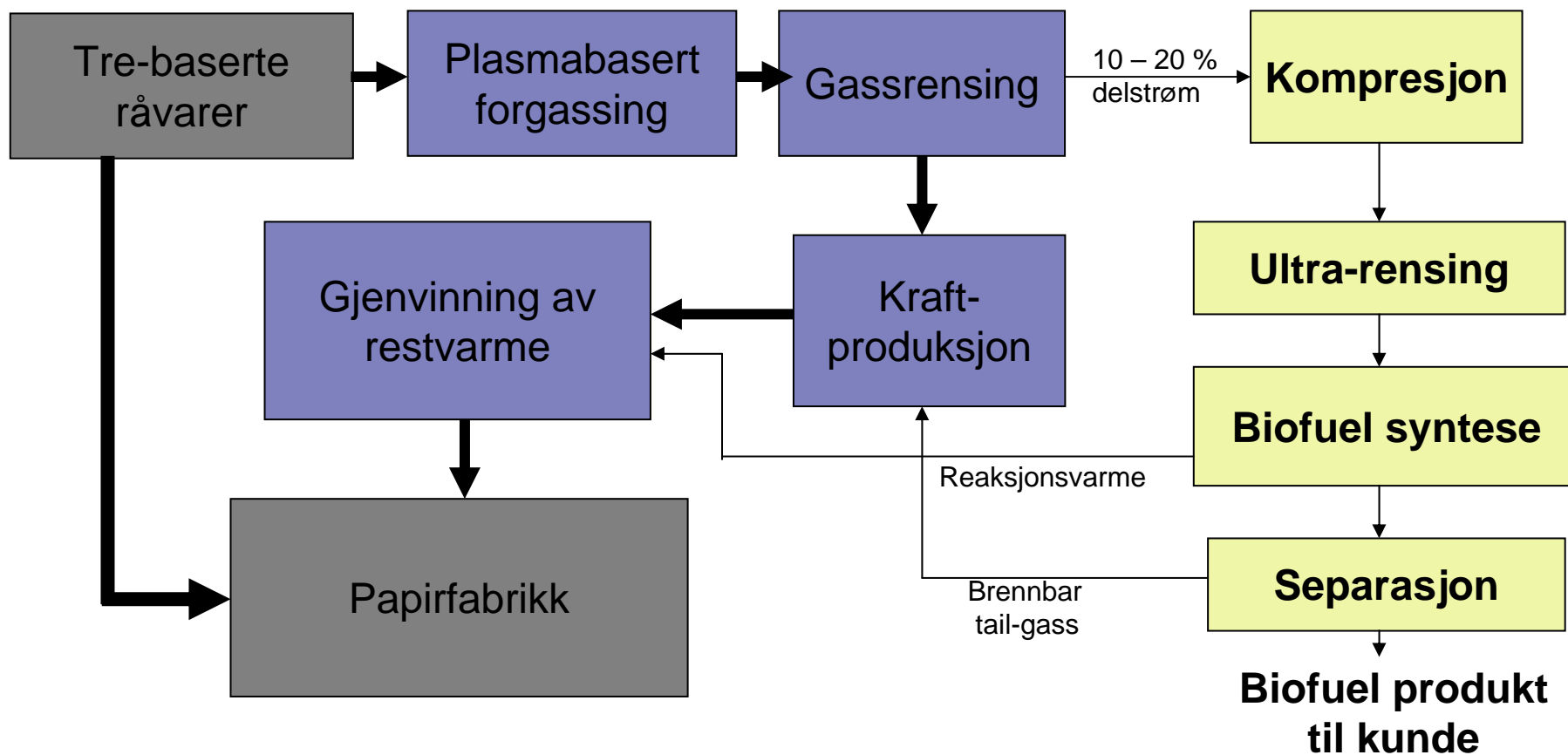
Biofuel extensions (FVAS project)

- Affordable syngas as a basis for affordable bio fuel
- Heat dimensioned plants, high overall energy efficiency
- F-T fuels presently require large scale plants. We focus on alternatives:
 - SNG
 - DME, bio-gasoline, MeOH
 - Olefins (plastic raw materials)

Topsøe have expressed an interest in our project, and have provided preliminary cost estimates



Biofuel demonstrasjonsanlegg ved Norske Skog Skogn, Fiborgtangen



Biokraft AS

Produksjon av flytende bio-metan

Biogass på Fiborgtangen

- **Biokraft** er et selskap som utvikler, eier og driver produksjonsanlegg for bioenergi, herunder produksjonsanlegg for bio-olje og biogass.
- Råstoff: Bio-slam fra Norske Skog, substrat fra Biokraft Marin, avfall fra næringsmiddelindustri og landbruk
- Planlagt ca 150-180 GWh med LBG

