The GoBiGas Project -
Efficient transfer of biomass to biofuels

IEA Bioenergy EXCO66 meeting in York
Workshop of 12 October 2010
Ingemar Gunnarsson Göteborg Energi AB
Göteborg Energi shall actively contribute to the development of a sustainable society in Göteborg

Our vision....
Our vision: Only renewable gas in the future

- Short term target 2020 for Gothenburg > 1 TWh of biomethane
- Short term target 2020 for Sweden > 15 TWh of biomethane
- Long term target – only renewable energy sources
“Green gas concept”

- A huge market potential is opened for biogas
- The reliability of the biogas supply improves
GoBiGas – Gothenburg Biomass Gasification Project

- **Commercial scale**
  - 100 MW biomethane (biomethane)
  - Operating period 8000 hr/yr
  - $80 \text{ MNm}^3/\text{yr}$ or 800 GWh/yr

- **Gasification** of forest residues

- Production of **biomethane for** distribution in the existing gas grid.

- Plant situated **in the harbor of Gothenburg**, fuel transport by ship or by train

- **Joint project** Göteborg Energi and E.ON
GoBiGas – step by step

• **Performance goals:**
  • Biomass to biomethane 65 - 70%
  • Energy efficiency - >90%

• **Phase 1:**
  – 20 MW generating 160 GWh/year in operation 2012
  – Allothermal (in-direct) gasification
  – 2000 Nm$^3$/hr or 16 MNm$^3$/yr

• **Phase 2:**
  – 80 MW generating 640 GWh/year in operation after evaluation of Phase 1
  – Technology not yet chosen
  – 8000 Nm$^3$/hr or 64 MNm$^3$/yr
Commercial development of gasification technology in Sweden

GoBiGas Phase 1: Large scale demonstration plant
GoBiGas Phase 2: 1/2 of specific cost compared to Phase 1?
2020: 1/3 of specific cost compared to Phase 1?
GoBiGas – Phase 1

<table>
<thead>
<tr>
<th>Consumption:</th>
<th>Production:</th>
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<tbody>
<tr>
<td>Fuel (wood pellets)</td>
<td>Biomethane 20 MW</td>
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<tr>
<td>Electricity</td>
<td>District heating 5 MW</td>
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<tr>
<td>RME (bio-oil)</td>
<td>Heat to heat pumps 6 MW</td>
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<tr>
<td>32 MW</td>
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<tr>
<td>3 MW</td>
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<td>0,5 MW</td>
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Reference plant: Gasification in Güssing, Austria

- Gasification in fluidized bed with separate combustion zone (in-direct, allothermal gasification)
  - 8 MW biofuel
  - Gas engine 2 MWe and 4,5 MWth to local district heating system
  - Operating time incl 2009 > 42 000 hours
GoBiGas – phase 1

Existing hot water boilers, fired with wood pellets
Project status – October 2010

• **State funding**
  – **222 MSEK** granted from the Swedish Energy Agency under provision of approval by the EC, discussion undergoing.

• **Gasification**
  – Cooperation between Metso Power and Repotec

• **Methanation**
  – Cooperation with Haldor Topsøe

• **Permits**
  – Environmental permit granted for Phase 1, applications building permit for Phase 1 in process
  – Preparatory work for environmental permit and building permit for Phase 2

⇒ **Investment decision** late 2010

⇒ **Plant in operation** late 2012
Pilot: Gasification of biomass at Chalmers University of Technology

• Built to further develop indirect gasification and grow local expertise for future projects
• Large potential for commercialization, can be added onto any Circulating Fluidized Bed (CFB) furnace
• Currently producing 2 MW of "green gas" now being utilized in existing boiler
• Development of methanation technology would allow for local production of biomethane for e.g. vehicle fuel
Chalmers pilot gasifier in connection with existing boiler
Thank you for listening!