Lidköping Biogas

One of Europe's first production plants for Liquefied Biogas (LBG

Biogas since long

- 1930’s digestion for reduced sludge volumes
- Quick development since 1990 – check poster WP5_24!
- Today 230 biogas plants
- Biogas could substitute natural gas as it is the same molecule
- Biogas often sold as ”vehicle gas” mixed with natural gas
- Gas for vehicles today around 60 % biogas

Biogas in Sweden today

- ”Best Fuel” according to Green Motorists of Sweden
- 40,000 CNG-vehicles, strong growth
  - ~190 filling stations
- Prioritised fuel for several Public Transport Authorities
  - 20 % of the buses used for public transportation run on gas
- Still less than 1 % of total use of fuel in transportation

Biogas tomorrow

Forest waste

Waste from households, industry and agriculture

The Lidköping LBG plant

- supplies the transport sector with 60 GWh of biogas annually, which corresponds to the need of 6,000 cars driving 17,000 km/yr
- realises the possibility for heavy duty transports to use a clean and waste-based fuel

One plant – three partners

Swedish Biogas INTERNATIONAL

Göteborg Energi

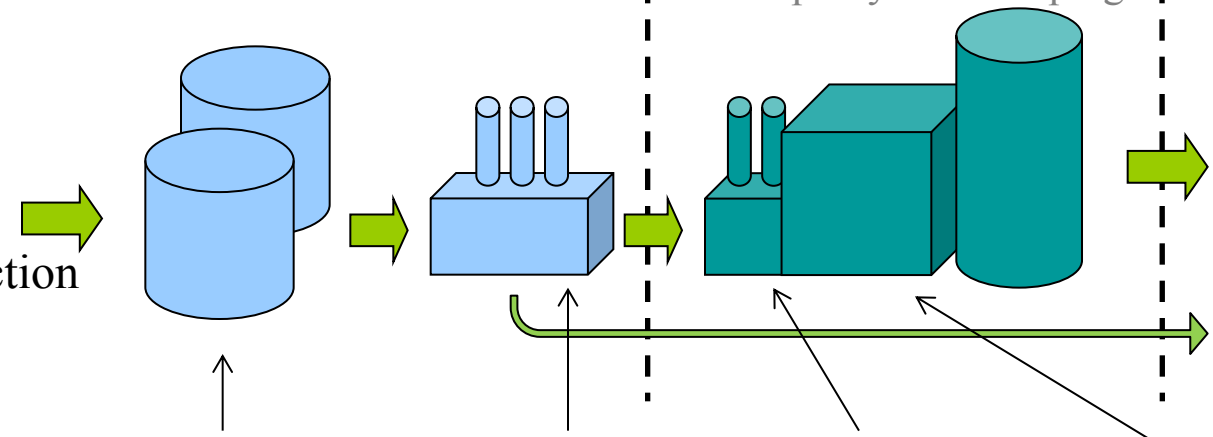
Lidköpings kommun

Working together to develop something new

Swedish Biogas International

Göteborg Energi
&
Municipality of Lidköping

Fordonsgas Sverige



Gas production
ca 1200 Nm^3/h
ca 65% CH_4
+ CO_2, N_2, H_20
+ H_2S

Gas upgrading
Water scrubber
SS 155428
CH_4 > 96%
CO_2+ O_2+N_2< 4%
S_{total} < 23 mg/Nm^3

Polishing
PSA
CO_2 < 10 ppm
O_2 + N_2 < 1%

Condensation
Brayton
Atm. pressure
-163°C

approx. 80 000 ton biofertilizer

Some key figures

- Investment 170 MSEK
  incl. 33 MSEK from the state
- Condensation requires
  1 kWh per Nm³ biomethane
- LBG at –163 °C
- 9,9 kWh/Nm³ biomethane
- 13,6 kWh/kg LBG
- 5,75 kWh/liter LBG

- Operational since April 2012
- First delivery 29 May 2012
- Grand Opening 19 Oct 2012

More efficient distribution

- Liquefied Biogas will greatly improve distribution logistics
- Three times as much energy per volume unit (vs. biogas at 200 bar)
- 2–5 times as much energy on each transport
- Less compression energy needed for filling

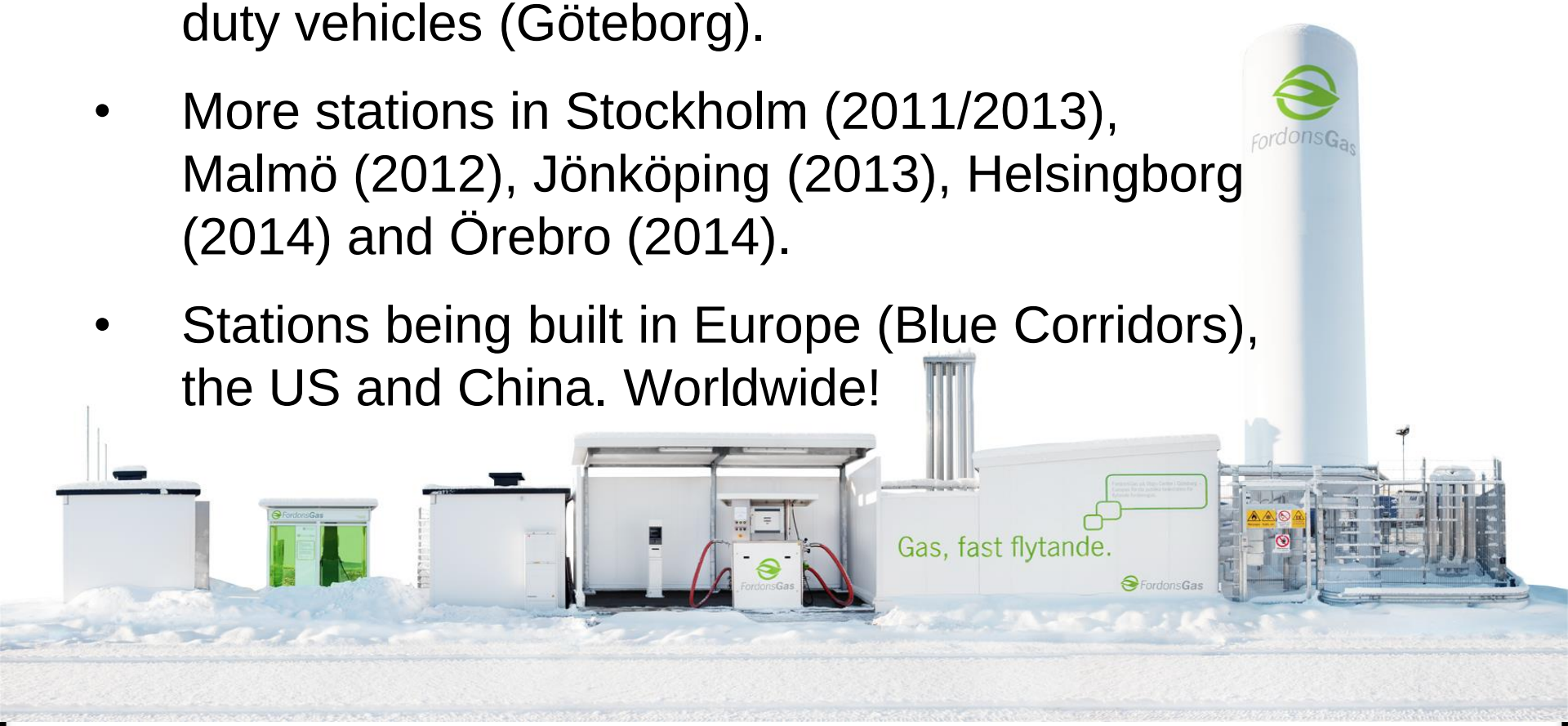
Volvo's Methane-Diesel technology

- Biogas and Natural gas could replace diesel in heavy trucks
- Same efficiency as in Diesel engines
- Can run on diesel if out of methane
- 75 % metan / 25 % diesel possible, depending on driving cycle
- Serial production began 2012
- www.bimetrucks.com

Photo: Volvo

Stigs Center – Europe's first public filling station for LNG/LBG

- At Sweden's busiest filling station for heavy duty vehicles (Göteborg).
- More stations in Stockholm (2011/2013), Malmö (2012), Jönköping (2013), Helsingborg (2014) and Örebro (2014).
- Stations being built in Europe (Blue Corridors), the US and China. Worldwide!



Interest is growing

- More LBG units are planned in Sweden
- More biogas is required to respond to increased demand from transportation sector – and to keep up biogas percentage
- Gasification of biogas is needed for the future – but how to go there?

The next step - GoBiGas!

- The first of a kind
- Gasification of forest residues
- Production of biomethane 160 GWh/y
- Delivered directly to the gas grid
- Starting up now!
- *www.gobigas.se*

Göteborg Energi