Biomethane in transport

“Experiences of biomethane use in different types of vehicles”

Ireland 22 May 2013
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Biogas Syd
Biogas Syd is a regional cooperation organisation for biogas actors in South Sweden.

- Biogas Syd’s objective is to make sure that biogas gets the best regional conditions possible to grow. Both when it comes to production, distribution and use of biogas.
Swedish transport sector is to about 95% dependent on imported fossil fuels. Import means export of capital, mostly to countries outside EU.
Recirculation of minerals: Nitrogen and Phosphorus

- Packed food wastes
- Organic household waste
- Waste water
- Manure & agricultural rest products
- Rest products
- Food industry
Biogas from manure

– lowest CO₂ impact of all available fuels!

The graph is based on life cycle analysis for different fuels.

Source: Bioenergi från jordbruket – en växande resurs. SOU 2007:36
Different applications for Biogas

- **Heat**
- **Transport fuel**
- **Power**

Biomethane = needs upgrading

Injecting biomethane into natural gas grid
In Sweden biogas = biomethane and biomethane in vehicles = vehicle gas

- Vehicle gas is the name used for biomethane and/or natural gas when used as fuel for vehicles
- Biogas was about 60% of the total sold volume of vehicle gas in Sweden in 2011
Which needs must be fulfilled to get a working market for biomethane and CNG vehicles?
Development of CNG/CBG in Sweden

GWh

Natural gas/CNG
Biogas/CBG
In total


0 300 600 900 1200 1500
Number of CNG filling Stations in Sweden

Antal

Public stations
Private stations, depots

150
120
90
60
30
0


www.biomaster-project.eu
Filling stations for CNG/CBG in south Sweden
Development NGV’s in Sweden, 1995 - 2012
NGV’s – Technology and environment
1 Nm$^3$ of methane

5 l compressed methane (200 bar)

1 l of diesel

Same amount of energy, different volume
Regulated emissions – light vehicles, life cycle

- PM
- CO
- SO₂
- CO₂
- NOₓ
- NMVOC

- Petrol
- Diesel
- Natural gas
- Biomethane
Euro 6-kapacitet redan nu med gas

CNG (Measure MAN E2876 LUH03, Lambda = 1 (ETC))

<table>
<thead>
<tr>
<th>Gas</th>
<th>Euro V Limit</th>
<th>EEV</th>
<th>CNG (Measure MAN E2876 LUH03, Lambda = 1 (ETC))</th>
<th>Euro VI Limit</th>
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<td>CO</td>
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<td>NOx</td>
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<td>Particle Mass</td>
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Even oil companies finds biomethane to be the most environmentally friendly fuel!
Some perspectives on biomethane and gas driven vehicles

• Skånetrafiken, Regional public transport (mainly buses)
• Skånemejerier, Dairy industry (mainly distribution trucks)
• Björkmans Entrémattor, door mat service (light transport vehicles)
• Wihlborgs fastigheter, real estate concern
• Sydsvenska Dagbladet, Newspaper (personal cars)
Personal cars

Gas driven personal cars – same use as ”ordinary” petrol or diesel cars
Sydsvenska Dagbladet

- Aims at becoming a carbon neutral company
- Transports are important
- Changing to gas vehicles, in total 100 cars
  - Company official cars
  - Fringe benefit cars
- Bonus – Lower total costs for the cars!
pictures: Taxi Skåne, Taxibil Syd och Sverige Taxi Helsingborg
Light duty vehicles

Light duty vehicles: otto-engines
Wihlborgs fastighets AB

• Main reason for changing to gas driven vehicles was that the older vehicles had poor environmental performance.
• The janitors driving the vehicles are happy with the performance.
Picture: Wihlborgs Fastigheter
Björkmans Entrémattor

- Door mat service with laundry and delivery
- 20 employees
- 2600 costumers
- 8500 door mats in circulation
• Mercedes Sprinter
• Volvo V70
• Mercedes B-class
The Filling station
Experience from changing to gas vehicles

- No different to drive than petrol or diesel vehicles.
- Filling station at back yard has saved a lot of valuable time and driving distance.
- The cars gives us a lot of positive attention and free advertising.
Gas driven city buses: initially a question of cleaner city air
Gas driven regional/inter city buses: Air quality and CO2-emissions
Skånetrafiken

• 128 million journeys a year
• Strong increase in travel
• A part of the regional authorities
• Politically governned – on a commercial market
• Entrepreneurs operate the services
• 66 trains, 550 regional buses, 400 city buses and 400 service transport vehicles.
Strategy for Skånetrafiken, fossil free public transportation

• In 2007 a decision was taken by the board of public transportation – end the use of fossil fuels

• Goals:
  2015 – all city buses
  2018 – all regional buses
  2020 – every vehicle
Solution – supply buses with
locally produced biogas/biomethane
Why gas driven buses?

• Security of supply, not dependent on imported fuel when having locally produced biogas.
• Biogas is renewable
• Biogas is Sustainable (both environmental and ethical)
• Contribute to local job opportunities (local production of biogas)
Gas driven buses so far

- About 400 city buses

- About 300 “regional buses”
  - inter city commuters
Heavy trucks: Mercedes and Scania use Otto-engines. Volvo uses methane-diesel/Dual fuel engines.
Heavy vehicles

Heavy vehicles in long distance transport:
Diesel engine – higher energy efficiency, lower fuel consumption
GASEN I BOTTEN
MALMÖ LBC OCH COCA-COLA KÖR PÅ BIOGAS FÖR MINDRE KÖRFÖRBRUK
LÄS MER...
Heavy vehicles in city distribution:
Otto engine – cleaner exhausts
Skånemejerier

- Mercedes Econic used for distribution of dairy products in several cities in Skåne (about 20 trucks)
- Improved emissions in city
- Improves the trademarks environmental status!
- Only half of the noise compared to replaced trucks
Heavy vehicles working in the cities: Otto engines – cleaner exhaust
Gas driven tractors: being able to produce your own fuel
1 – 13 liter engine volume
68 – 460 bhp engine power
Conclusions/reflexions, biomethane and gas driven vehicles

• It is possible to run almost every type of vehicle on biomethane
• For some customers however it is not the best alternative
• Potential for biomethane is big but it will only cover parts of the needs in the transport sector – use it where it gives the biggest effect!
Biomethane and racing

Bilen - VW Scirocco STCC

Prostans: 0-100 km/h på ca 4,5 sek.
Topp fart: ca 240 km/h.
Effekt: Ca 280hk/310 Nm.
Transmission: Lütgemoer, 6-vxl sakventil.
Vikt: 1200 kg inklusive färare, enligt STCC:s reglemente.
Thank you for your attention!

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