

Biogas in Sweden

- the developement of a vehicle fuel

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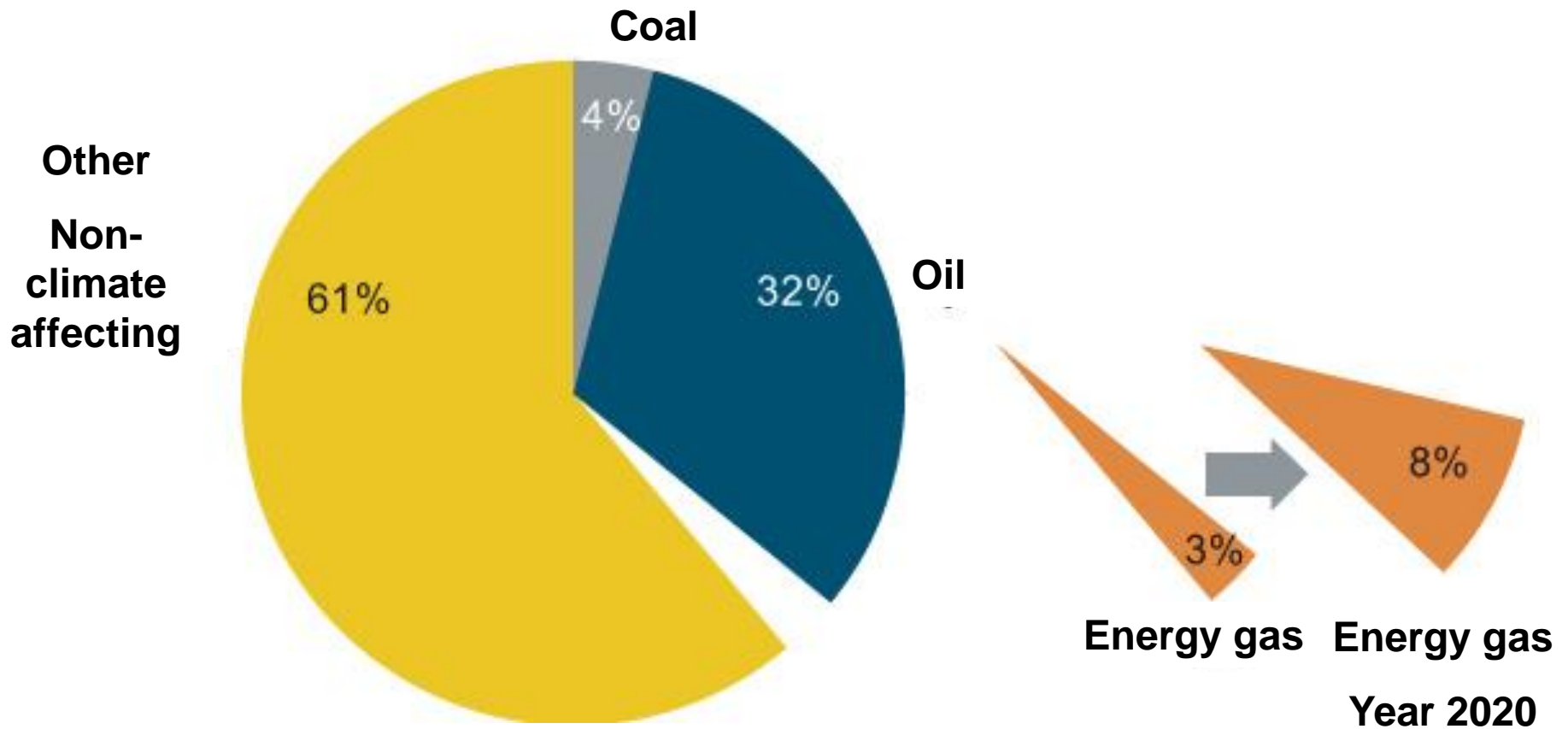
Driving forces?

- **Public awareness in combination with**
- **Government incentives to**
 - decrease the emissions that effect the environment
 - decrease the dependency of oil



"Amanda" by Tekniska Verken in Linköping

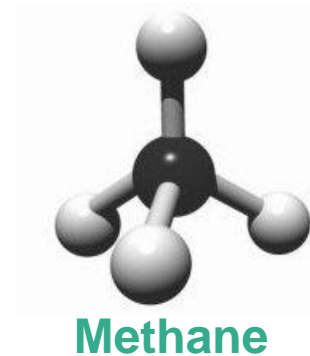
Setting the picture



Energy supply in Sweden (total 600 TWh)

Biogas basics

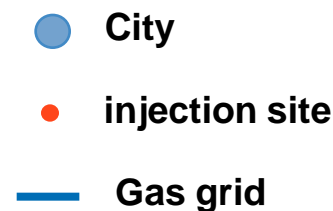
- Upgraded biogas & Natural gas =
= "vehicle gas" (in Swedish)



- Biogas is the cleanest transport fuel on the market today
 - up to 180% reduction of green house gases (well-to-wheel)
 - Reduction of other emissions such as particles and NOx

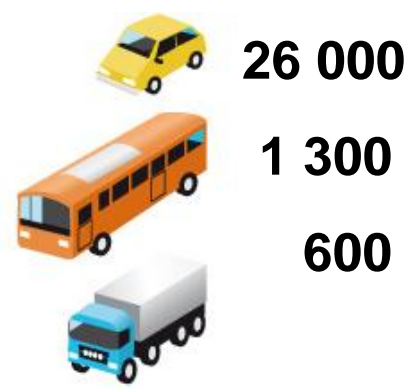
Synergy effects

- Injection of upgraded biogas on the gas grid
- Sweden is the only country with a biogas-standard for vehicle fuel!



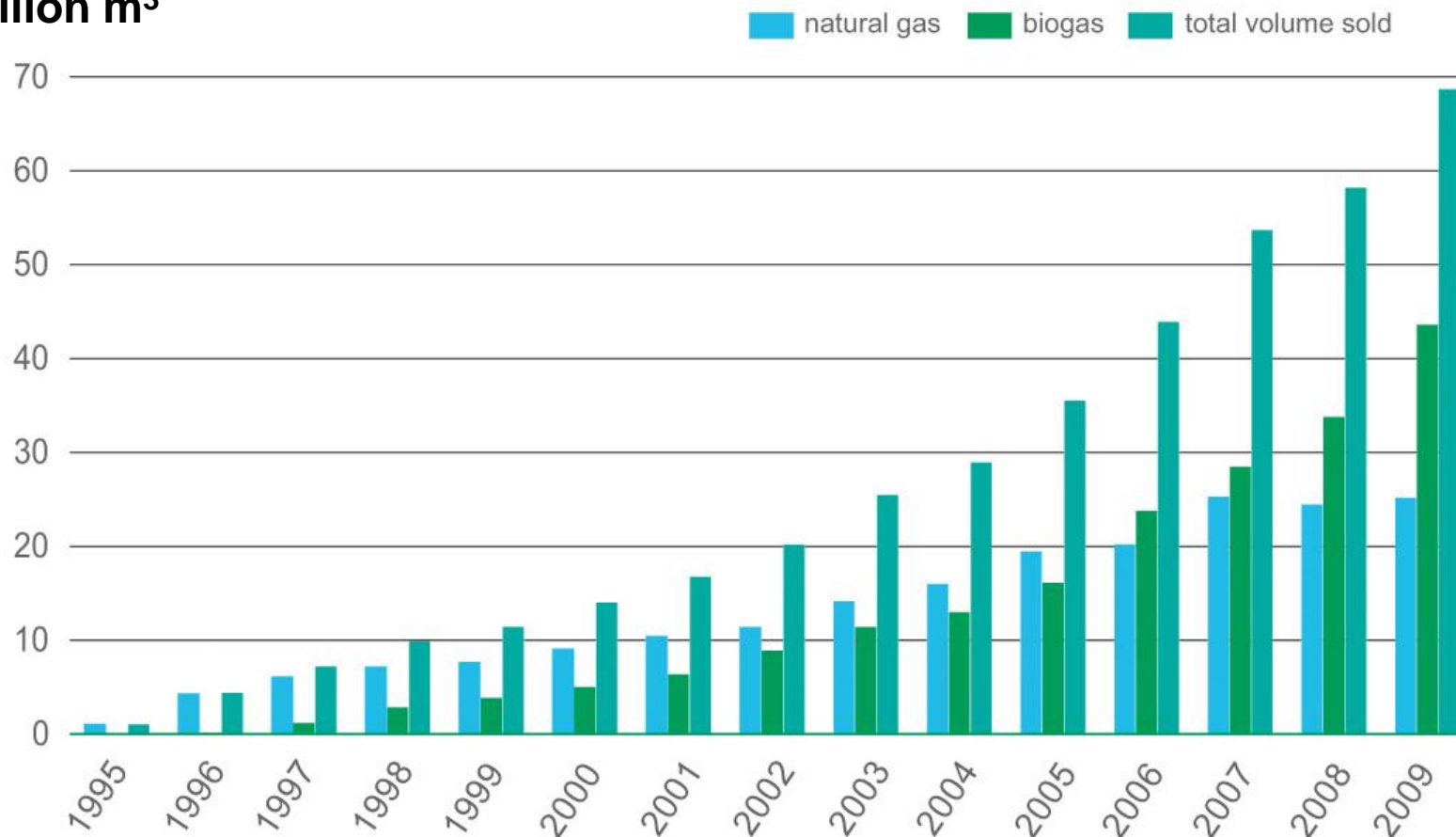
Gas Filling Stations June 2010

- Existing public stations (red)
- Planned public stations during 2010 (blue)
- Today 115 public stations
- Today approx 40 non-public stations for fleets, busses and heavy duty vehicles



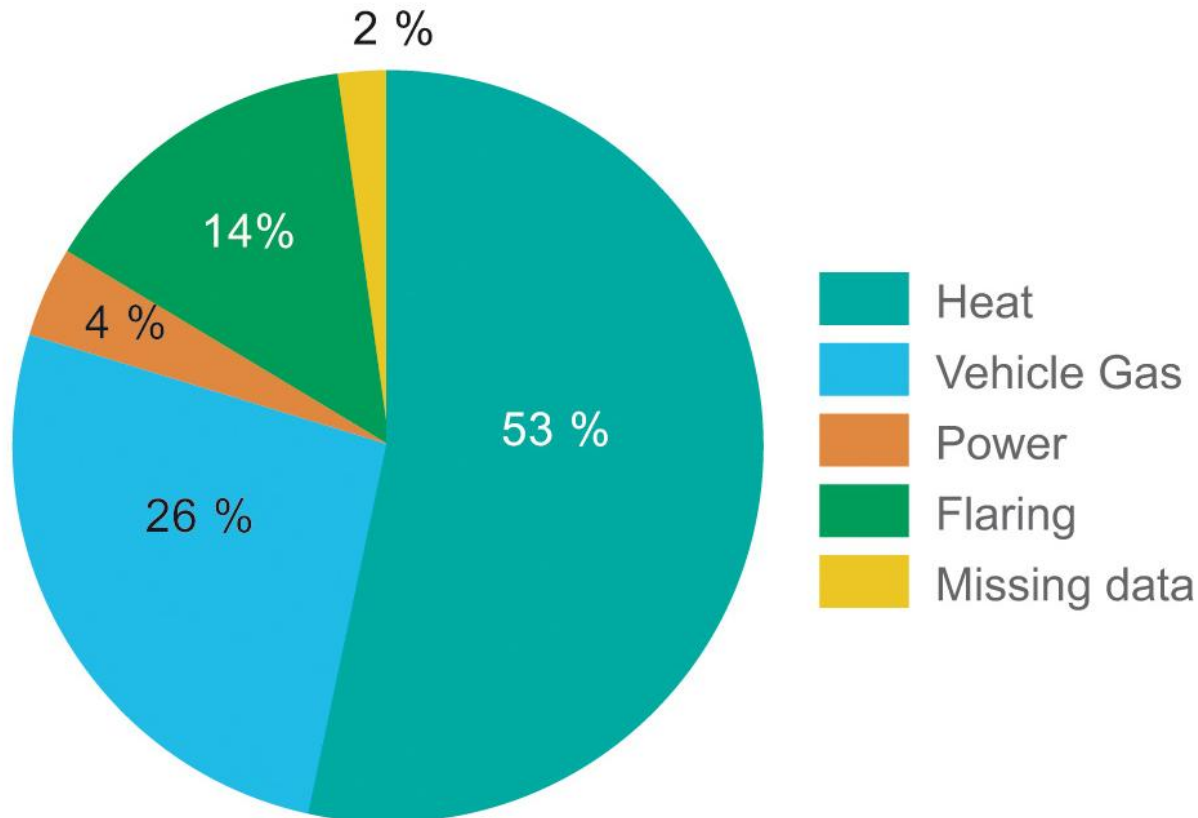
Sold volumes of "vehicle gas" in Sweden

million m³



Source: Swedish Gas Association

Utilisation of biogas in Sweden 2008



Approximately 220 biogas plants

Government incentives for renewable fuel production/distribution

- National grants (Climate program), usually 30% of investments in biogas production and upgrading facilities 2003-2008
- Compulsory to provide renewable fuels at all major filling stations -> **Resulted in ethanol pumps**
- Approx 17 million Euro towards (30% of investment) establishing filling-station for renewable fuels, 2006-2009
- 20 milj Euro, 30 % investment support for farm plants for biogas (2009-2013)
- 5 milj Euro/year for three years for production of biogas
- Established a biogas strategy



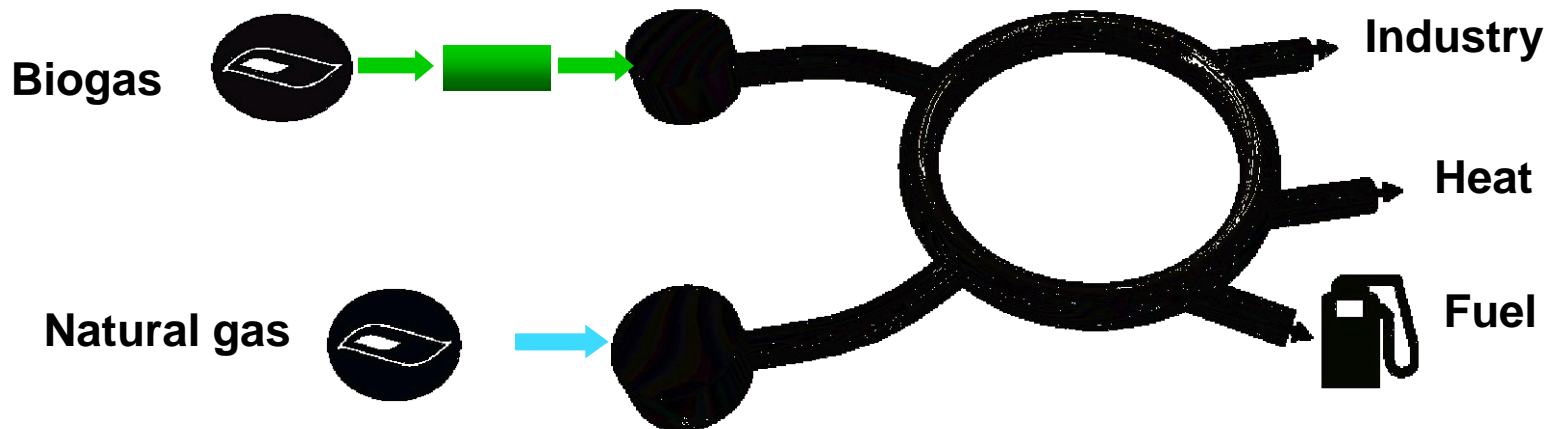
Incentives for clean vehicles

- **Low tax on natural gas, tax exemption on biogas, means substantial fuel cost savings**
- **40 percent reduced tax for use of company gas-cars or electric hybrids**
- **Free parking in certain towns (ended in Stockholm, 2008)**
- **Congestion charge exemption in Stockholm (no new cars since 1 Jan 2009)**
- **Clean taxi are given priority at Arlanda Airport**



The green gas concept

- Same idea as green electricity
- Allows end consumer to order 100% Biogas
- Clearing of input and consumption balance in the grid
- New tax legislation from 2011 makes it possible to use the green gas concept across different grids



New development

- Liquid biogas with cryogenic upgrading
 - Decreases volume (x 600) and distribution costs
- Inauguration of Europe's first public filling station for liquid vehicle gas in Oct, Gothenburg.
- Volvo has developed a methane diesel engine (dual fuel) that is able to run on up to 80% methane



Thank you!

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Filling up biogas in Jönköping