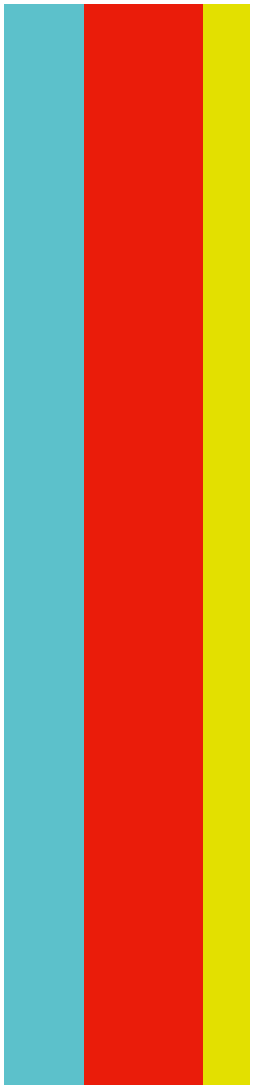
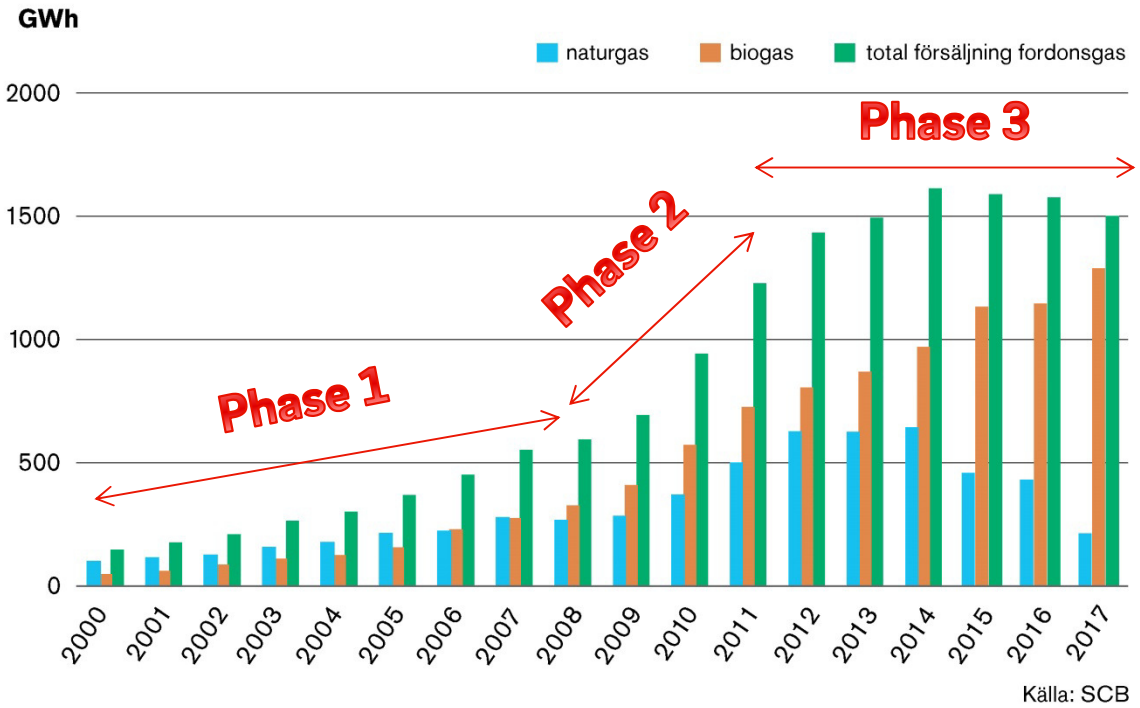
Björn Fredriksson Möller
11.04.2018

Biomethane for transport in Sweden

A roller-coaster ride through the past 15 years



Phases of growth



Källa: SCB

Phase 1: Slow growth – competition with ethanol as greenest fuel for cars, lack of biogas production

Phase 2: Fast growth, increasing investments, constraints in production and substrates

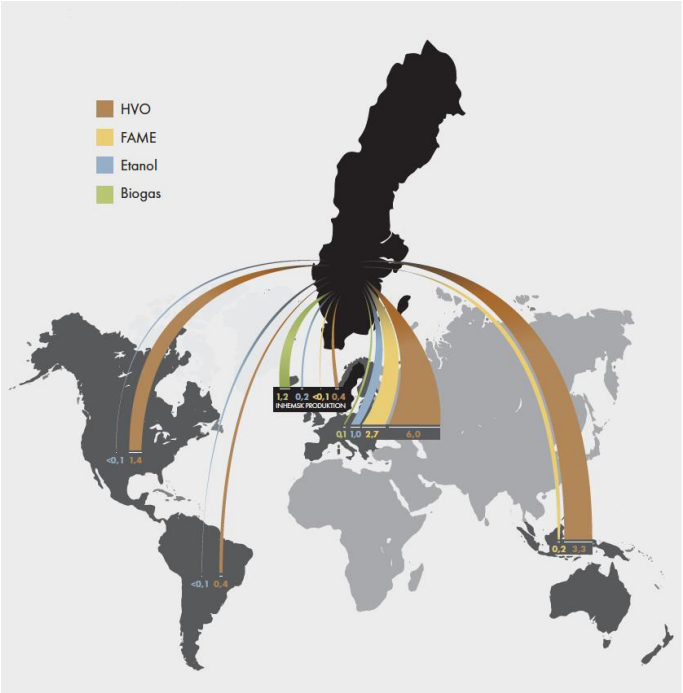
Phase 3: Stalling growth, uncertainties in support and increasing production. Imports possible.

Investments & plans in different phases

1. **Local biogas production**
   Local investment support to projects improving environment – investments in city bus operation using the gas locally

2. **Strong growth expected to continue**
   Anaerobic digestion not sufficient to sustain growth – gasification provide similar economy and big volumes – GoBiGas and Bio2G explore possibilities and develop concepts

3. **Slowing growth, increasing uncertainty in policy development**
   Smaller investments and organic growth preferred, in combination with the possibility to import fuels – biogas as well as others

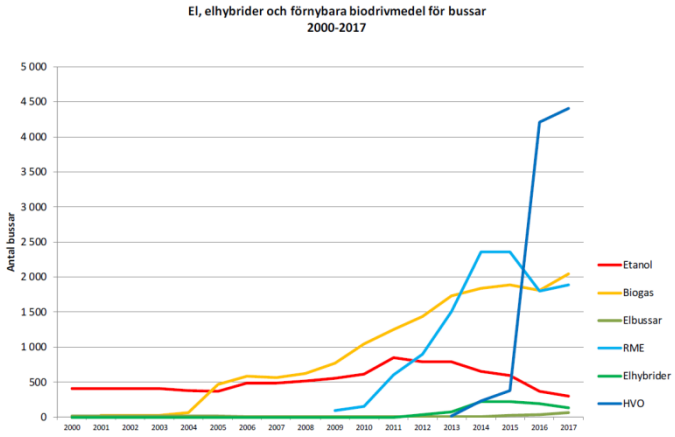


Policy drivers in different phases – Sweden

1. **Adding costs to use of fossil fuels (carbon tax) and setting targets for public transports and fleets**
   A no-brainer to use local waste and residues for local transport needs. Buses, waste collection, car fleets.

2. **Continued support to "green" vehicles – stable policy**
   Alternative solutions (ethanol) get backlash from food or fuel debate. Taxi and company cars increasing, improved technology, etc

3. **New "super-green" vehicle incentive, "green" to include diesel…**
   Super-green - only electric and plug-in, whereas green now including low-CO_2 diesel vehicles increase competition. Increasing volumes of low-cost drop-in HVO provide easy choice for heavy transport.

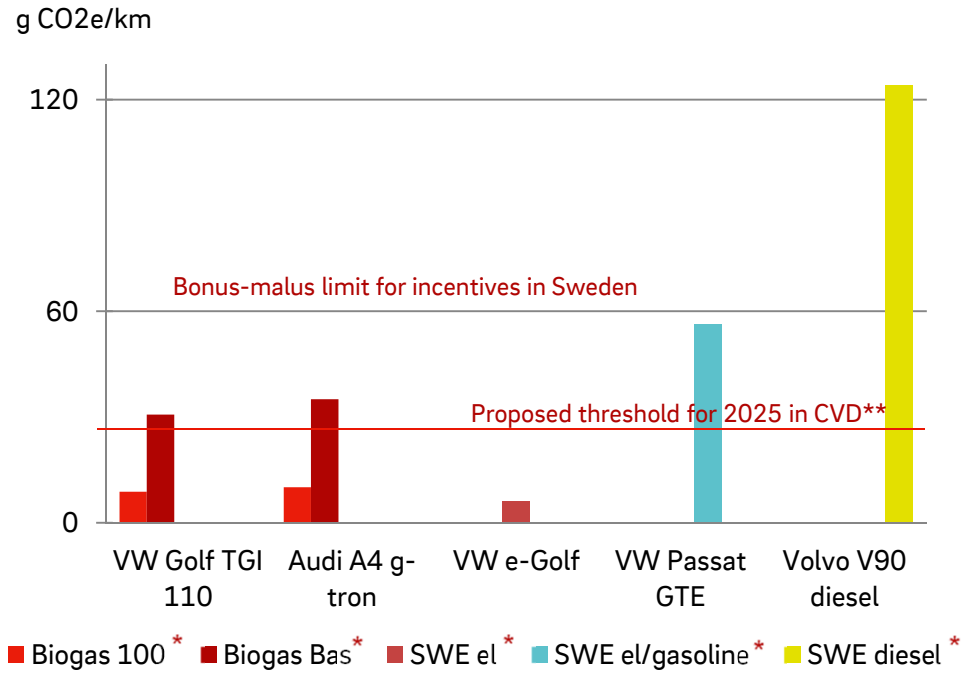


In addition: Continued hesitation on the role of biofuels on a European level from NGO's, policy makers and others slows development and investments

Future outlook for biomethane in transport

1. **National policy tools in Sweden looking strong**
   - 70% climate reduction in transport in 2030
   - Incentives for low-CO2 cars (bonus-malus)
   - Reduction quota for fossil fuels (4% in gasoline and 21% in diesel 2020)
   - Diesel-ban possibility for cities, BEV, FCEV and CNG EUR 6 allowed everywhere
   - Continued climate investment support for new production facilities, fueling stations and even heavy duty LNG vehicles
2. **Alternatives are few**
   - HVO production is limited from sustainable sources and in high demand
   - Electrification is coming but still with uncertain TCO and deployment speed
   - All alternatives are needed
   - LNG/CNG development based on natural gas will increase the need for a renewable alternative – biomethane a drop-in fuel?

Final thoughts – a visionary view for Europe available in Sweden already today



Fresh climate reporting from E.ON public CNG fuels in Sweden 2017. Fuel consumption according to NEDC.

- Biogas 100 score 94% climate reduction compared to fossil baseline.
- Biogas Bas (minimum 70% renewable content) score 80% climate reduction.

- VW Golf TGI on Biogas 100 have similar emissions as e-Golf on Swedish electricity
- A4 g-tron have lower climate footprint than best-selling PHEV (VW Passat).

* Using lifecycle CO2 emission from fuels, not tailpipe. Electricity, gasoline and diesel from 2016 and Biogas most recent data from E.ON 2017
**25 g CO2/km tailpipe. Light-duty vehicles type M1 and M2


Thanks.
Let's renew Europe