

**Bio
Gen
Gas**



Bio-LNG and bio-CNG as a transport fuel in Sweden

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The Swedish Gas Association

15 April 2025

Financed by:



The Swedish Gas Association

- Create the conditions for a growing energy gas market

- Founded in 1915
- Around 180 member companies
- Office in Stockholm
- Member of:
 - EBA, European Biogas Association
 - Eurogas
 - Hydrogen Europé
 - Liquid Gas Europé
 - Marcogaz



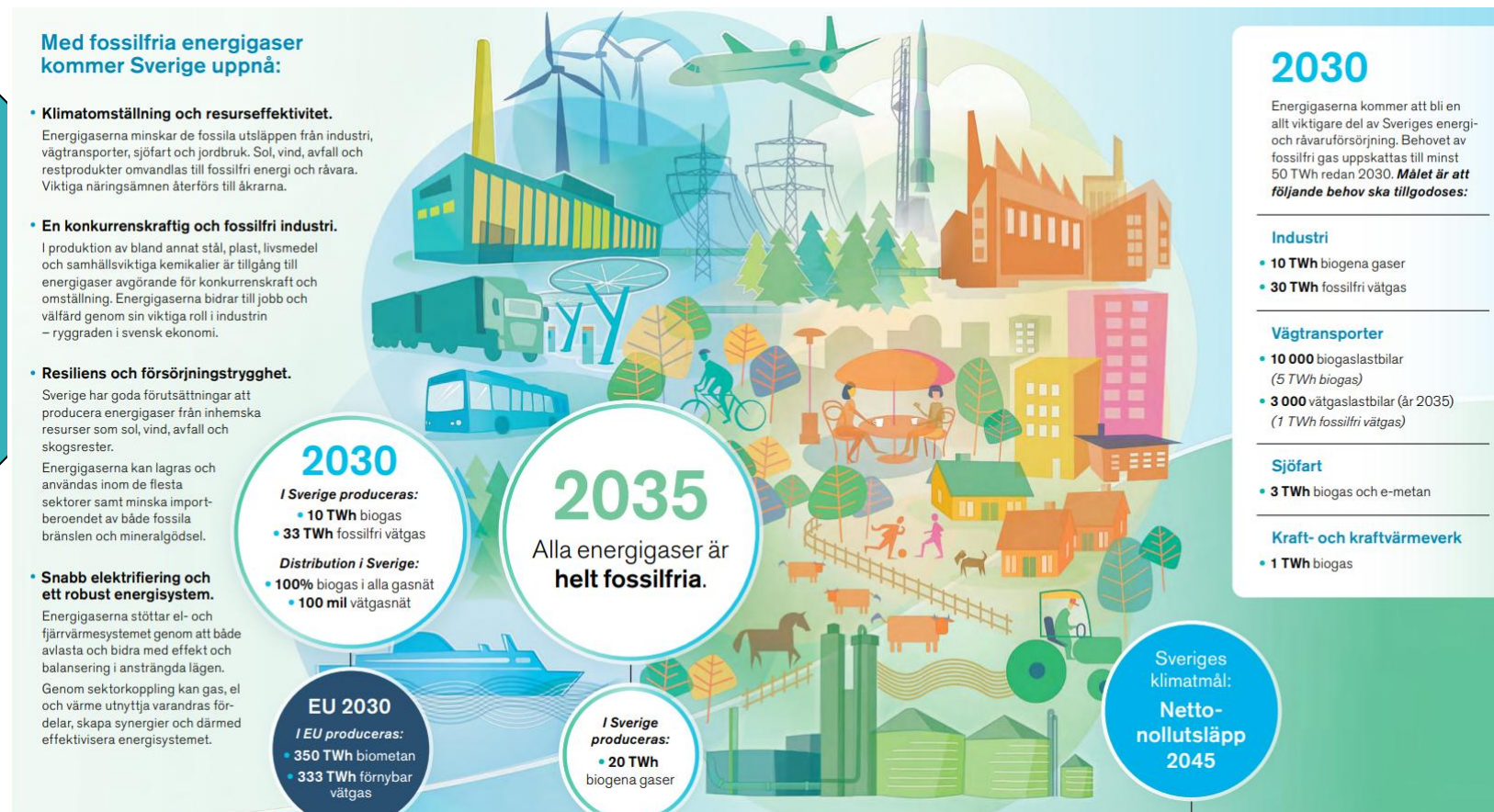
A Member of
The Linde Group



Road Map: Revised 2024-09-23

Goal:
100% fossil free energy gases in Sweden 2035

Download at
www.enerdigas.se



“By 2030, at least 10,000 of Sweden's heavy-duty trucks could be powered by biomethane.”
-> Reduce CO2 with 50% for HDT-segment compared diesel!

Road Map - Summary

Identified need for 50 TWh fossil-free gas 2030

- Industry
 - 10 TWh biogenic gases
 - 30 TWh fossil-free H₂ gas
- Road transport
 - 5 TWh biomethane for 10 000 HDT
 - 1 TWh H₂ gas for 3 000 HDT (2035)
- Maritime
 - 3 TWh biomethane & e-methane
- Power & heat
 - 1 TWh biogas

Overall goal:

2035

All energy gases are completely fossil-free

Targets for increased production:

2030

Sweden produces 10 TWh of biogas and 33 TWh of fossil-free hydrogen

2035

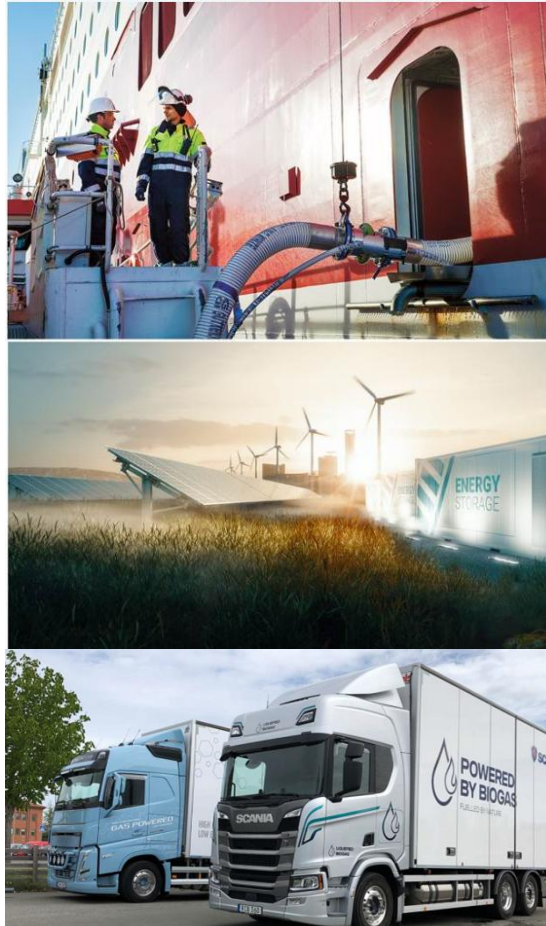
In Sweden, 20 TWh of biogenic gases are produced

Goals for an evolved distribution:

2030

Distribution in Sweden is 100% biogas in all gas networks and 1000 km of H₂ gas networks

Innovation Cluster BioGenGas



- 25 Companies
- 4 Universities
- Period 2023-03-01 – 2025-12-31
- Financed by The Swedish Energy Agency (50%) and Companies (50%)
- Focus on energy gases from biomass:
 - Biogas/Biomethane (CBG/LB)
 - Green H2
 - Bio LPG
 - And more...

Biogas and biomethane production in Sweden

Gas supply in Sweden

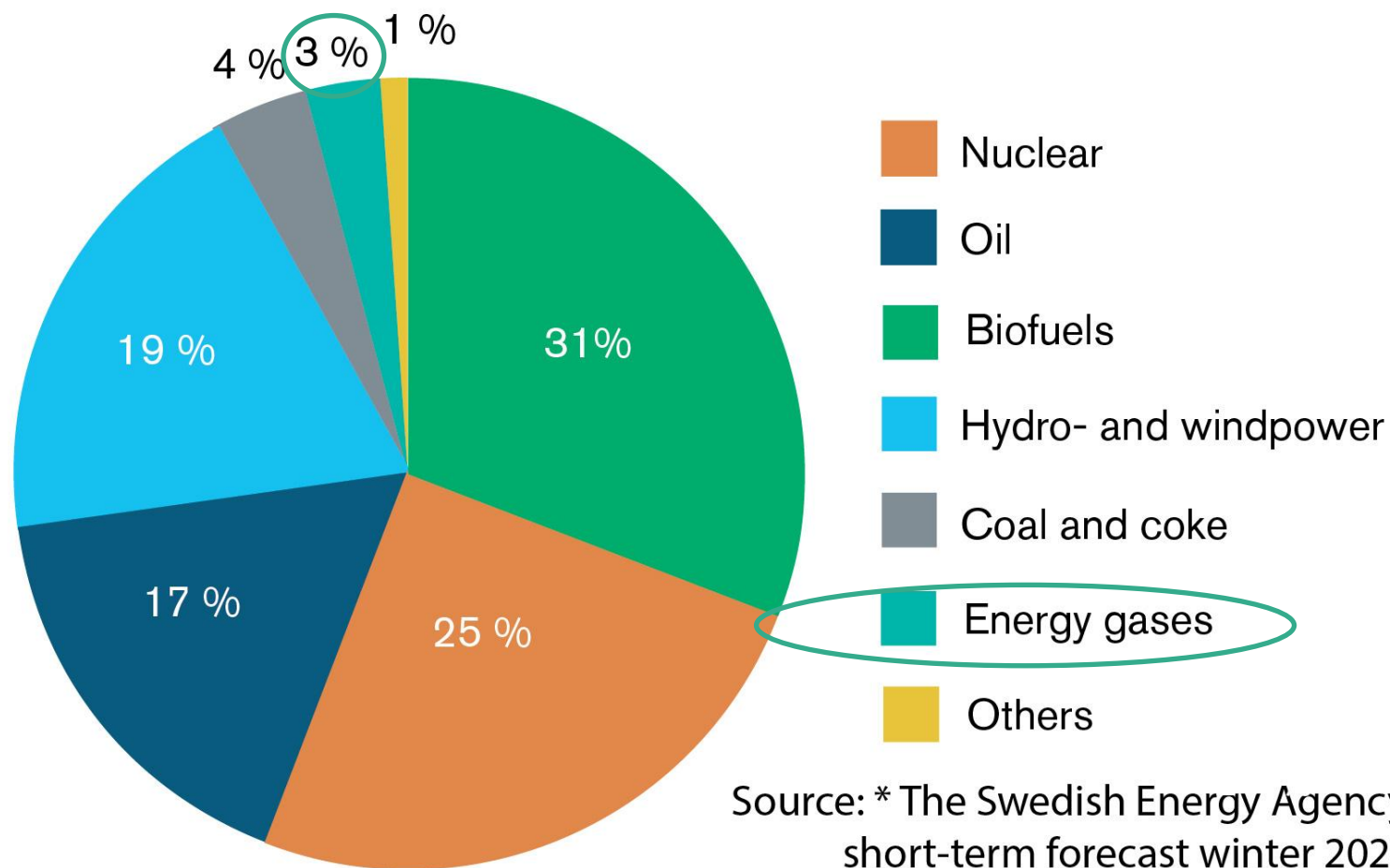
- Sweden – a small gas user in comparison
- Limited pipeline infrastructure for gas.
- Many off grid solutions and small local grids
- Import of natural gas (LNG).
- Import of biogas from Denmark.
- Developed biogas/ biomethane market
 - Transport sector important
 - Now industry
 - Next shipping

Biogenic energy gas = energy gas originating from biomass
Biogas = energy gas mainly containing methane and CO₂ produced through digestion of biomass
Biomethane = upgraded biogas to >97 % methane
CNG = Compressed Natural Gas
CBG = Compressed Bio (-methane) Gas
LNG = Liquefied Natural Gas (cooled to -163 °C)
LBG = Liquefied Bio (-methane) Gas (cooled to -163 °C)



Energy supply in Sweden 2023

(Total 501 TWh)



Source: * The Swedish Energy Agency's short-term forecast winter 2024

Energy gases 2023

TWh

10

8

6

4

2

0

Biogas

LPG

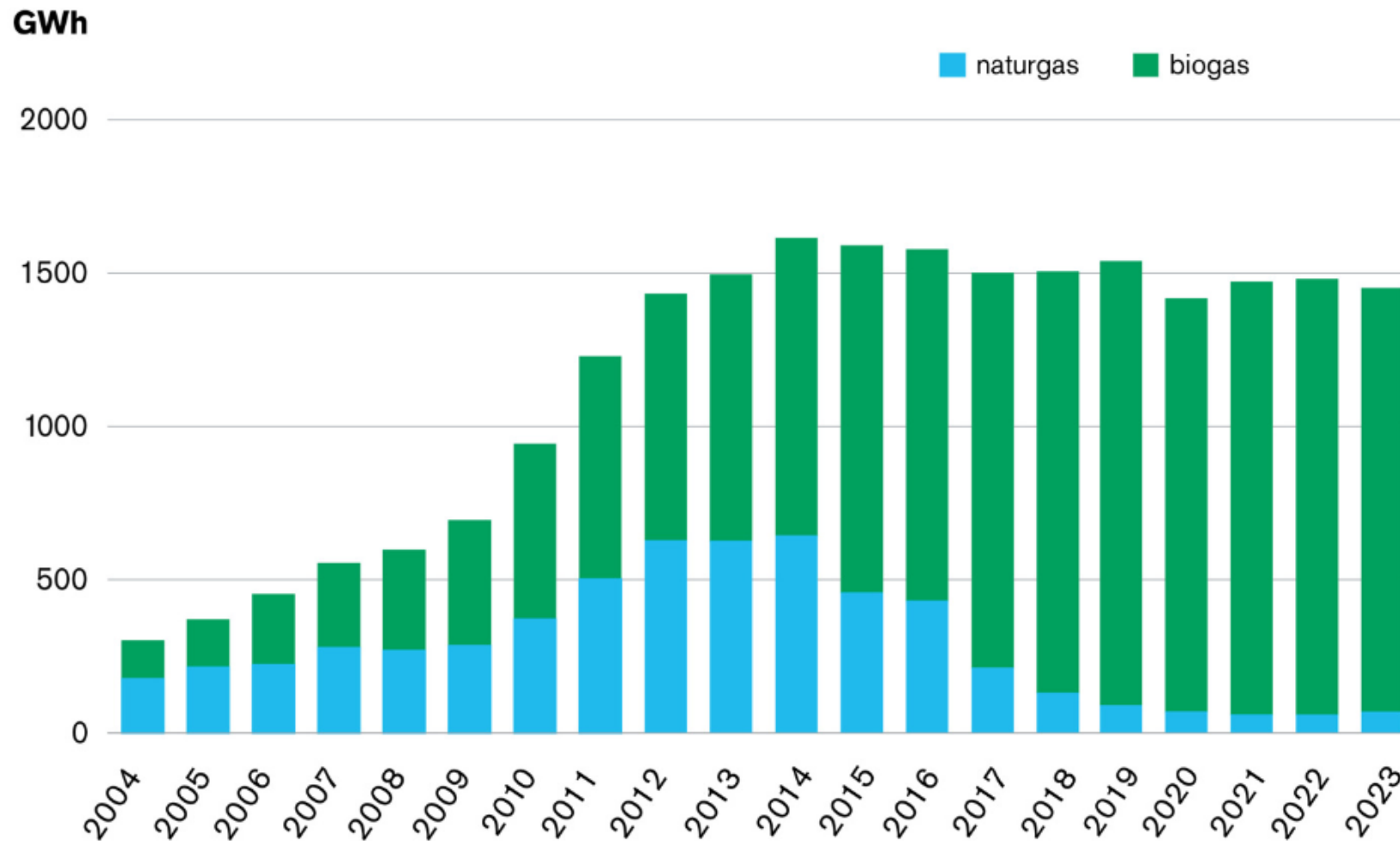
Natural gas

- Swedish biogas production
- Imported biogas
- LPG
- Natural gas
- Liquefied natural gas

Source: Energigas Sverige

*Swedish biogas production 2022

Vehicle gas (CNG/CBG), Sweden



Appr. 50 000 cars/trucks <3.5 ton.
1500 heavy vehicles +3.5 ton.

Källa: SCB

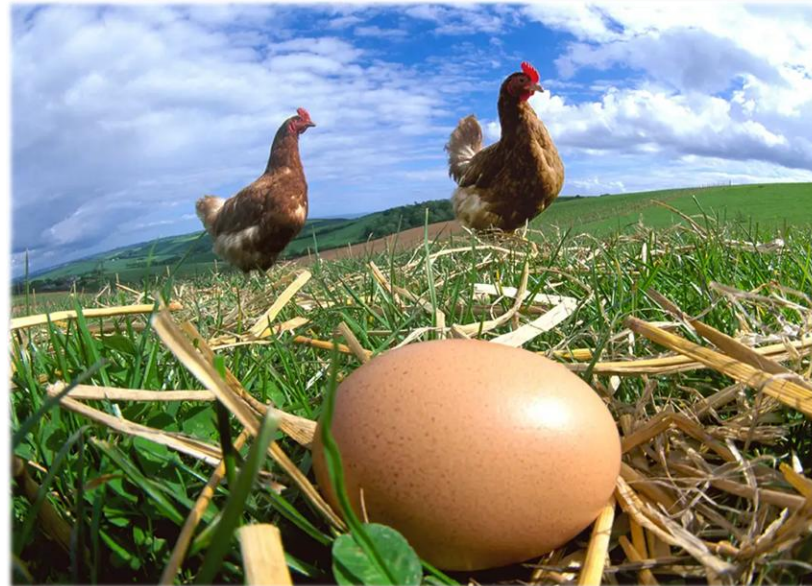
Governmental biogas initiative

- **In the spring of 2018**, the Swedish Energy Agency was commissioned by the Swedish Government to promote the development and use of LBG.
- **Focus on technology** for the production of LBG, operation with **gas vehicles** in regional and or local traffic, and combinations of these techniques in Sweden.
- **In December 2018** the Swedish Gas Association was granted a total of **200 MSEK (20 M€)** for leadership of the **National Innovation Cluster for Liquified Biogas (Drive LBG)** for the period 2019-2021.



Drive LBG – overall goal

- **Establish an innovation cluster for LBG** to collect, demonstrate and increase knowledge, innovation and develop the potential at both national and international levels.
- **Create a well-developed LBG market in Sweden** that can serve as an example internationally, contribute to increasing knowledge about biogas in shipping and strengthen the demonstration of technology



Drive LBG – Actions, Results & Lessons learned

- Goal: 10 Heavy Duty Vehicles (HDV)
- Result: 192 HDV (189 HDT + 3 Long Distance Buses)



**DRIVE
LBG**



Mål	Resultat
Etablera innovationsklustret som erkänd nationell samlingsplats som bygger vidare på och stärker befintliga nationella och regionala satsningar.	✓
Skapa en kommunikations- och varumärkesplattform för innovationsklustret Drive LBG.	✓
Värva minst 25 medlemmar till innovationsklustret Drive LBG.	☹
Att inom ramen för innovationsklustret upprätta åtta demonstrationsarenor som samlat och överskådligt demonstrerar flera olika typer av LBG-lösningar på ett sätt som är optimerat för nationella och internationella studiebesök.	✓
Genomföra en konferens eller workshopserie för LBG-teknik kopplat till demonstrationsinsatserna.	✓

anlagd	Resultat
	☹
	✓
	✓

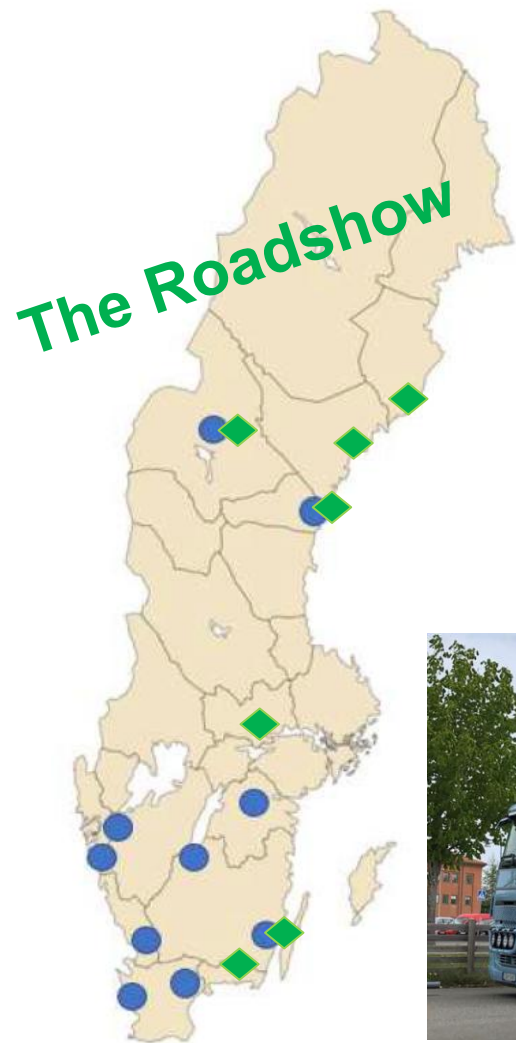
Heavy Duty Trucks +3.5 Ton.

Example Governmental Support:

- Heavy Duty Truck Diesel: 300 k€
- Same truck but LNG/LBG: 350 k€
- Extra cost for LNG/LBG vs. Diesel: 50 k€
- Grant 40% of Extra cost: 20 k€



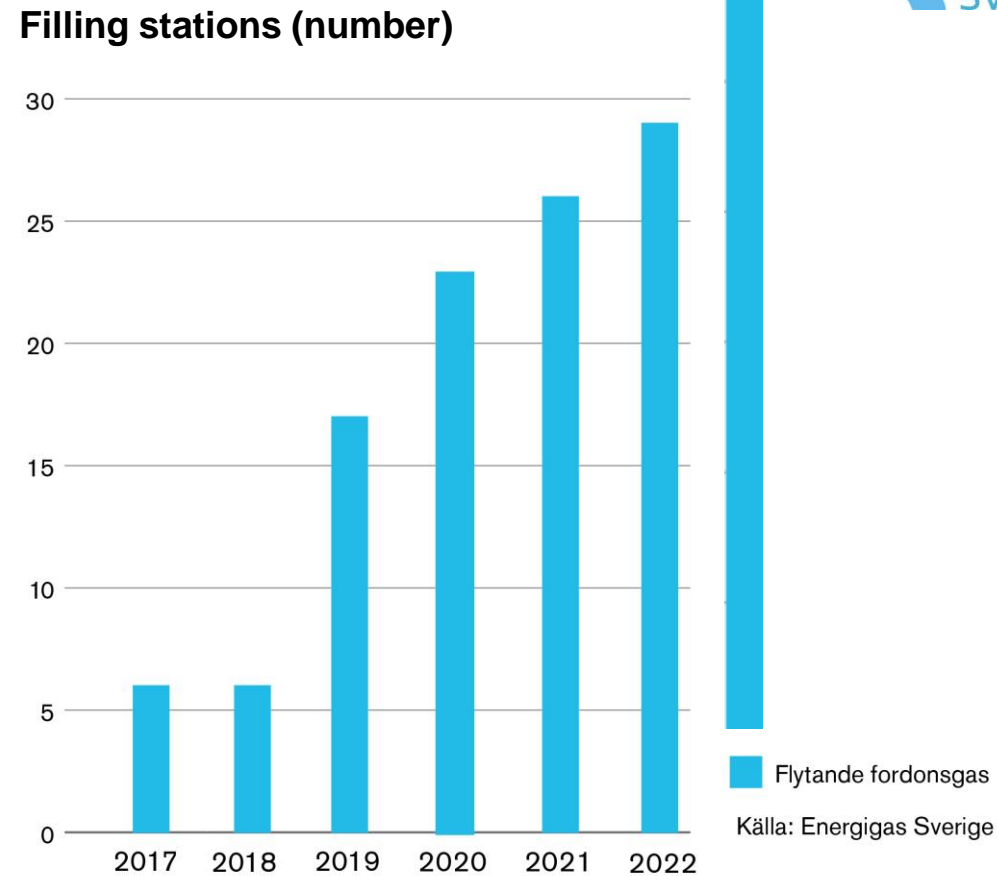
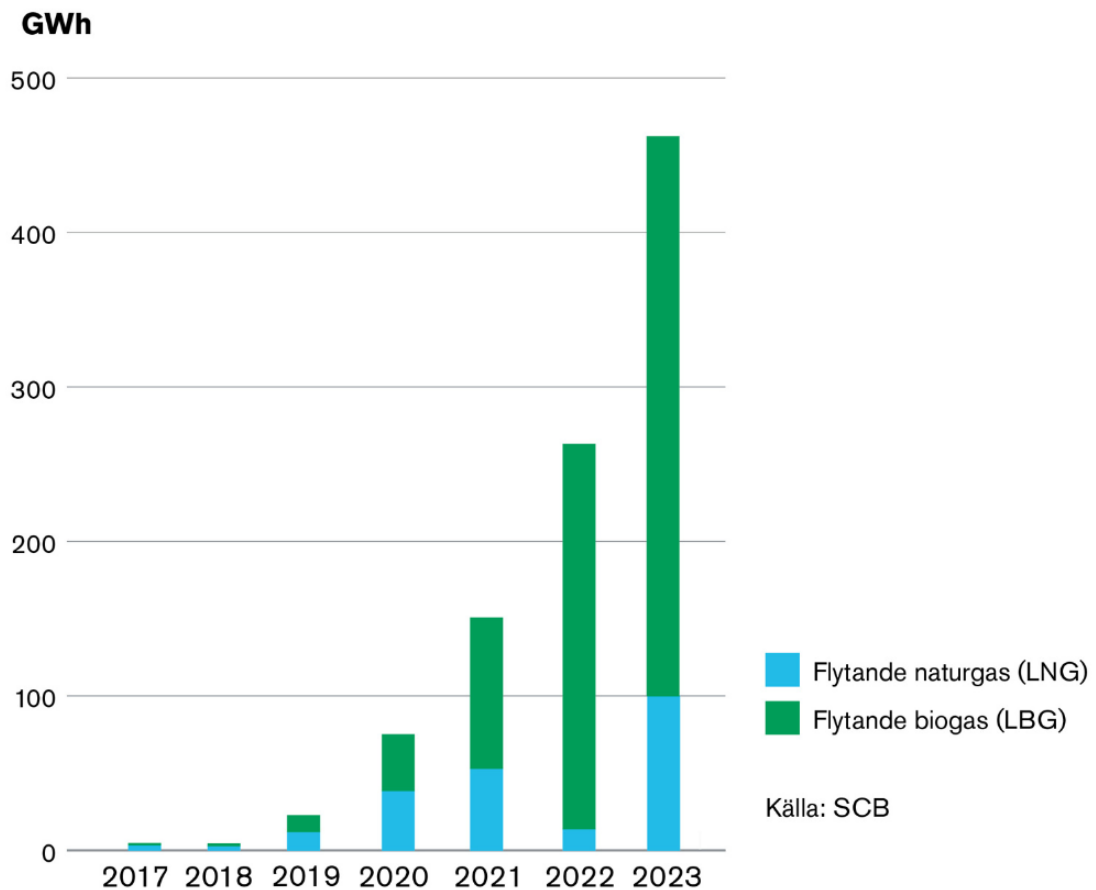
Biogas Roadshow – A success story!



- Cooperation with local organizations.
- Focus on economy, operation etc.
- Short & to the point!
- Ambassadors! -> An example...
- Demo to test-drive!

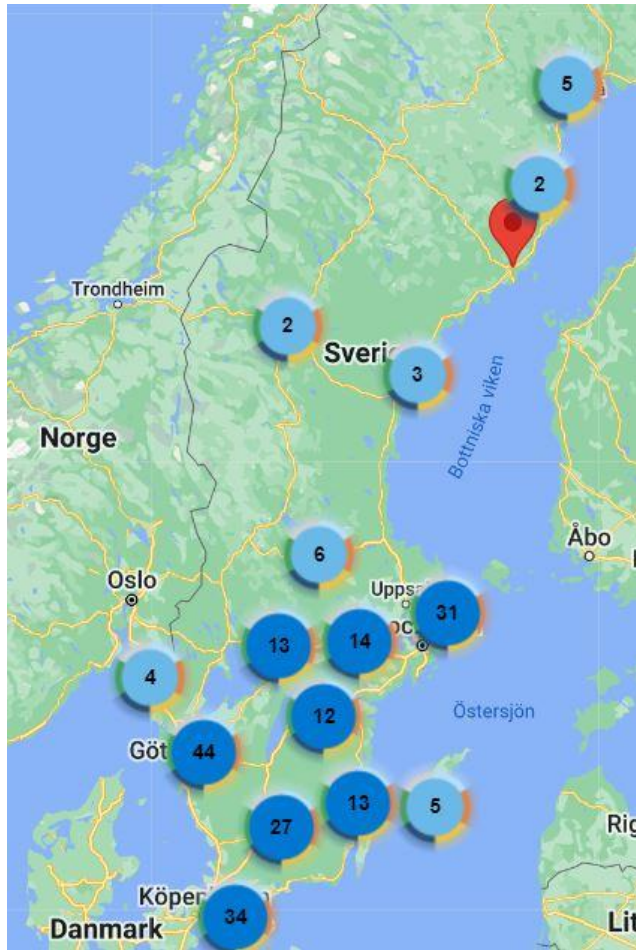


Liquified vehicle gas (LNG/LBG), Sweden

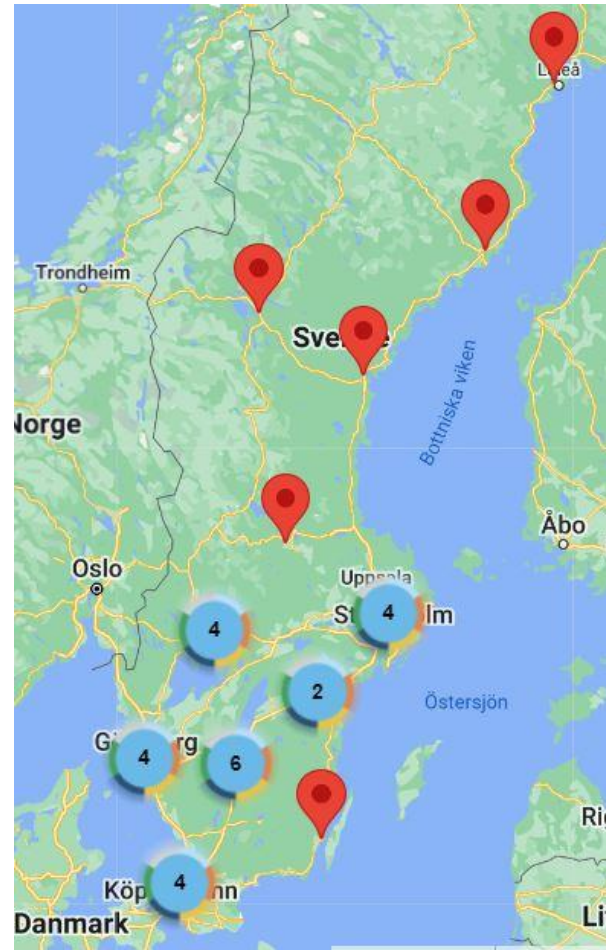


Appr. 1400 vehicles

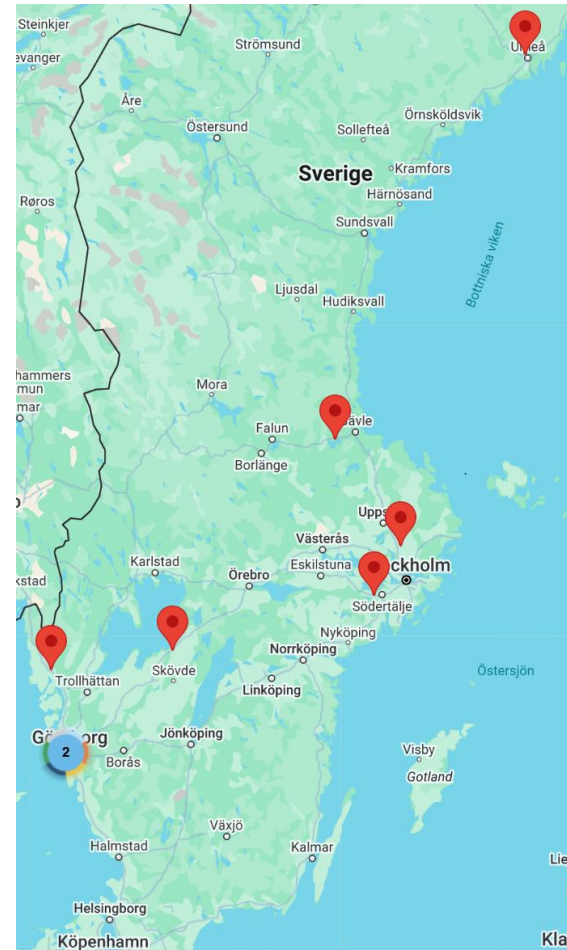
Filling stations vehicle gas in Sweden



CNG/CBG, tot appr. 260



LNG/LBG, tot 36 st



H2, tot 8 st



TCO – Diesel vs HVO vs LBG

Example:

- Göteborg – Sundsvall 72 mil (720 km)

TCO (excluding driver):

- Diesel: $72 \times 57,51 \text{ SEK} = 4141 \text{ SEK}$
- HVO: $72 \times 68,85 \text{ SEK} = 4957 \text{ SEK}$ (+816 SEK vs Diesel)
- LBG: $72 \times 65,09 \text{ SEK} = 4686 \text{ SEK}$ (+545 SEK vs Diesel)
- Cargo:
 - 33 000 pair of shoes $\rightarrow 545 \text{ SEK} / 33\ 000 = <0,02 \text{ SEK per pair!}$
 - 30 tonnes of food \rightarrow aprox. 0,15 SEK for a grocery bag (5 kg)!
- Total cost 720 km including driver approx. 40 000 SEK



USP: Resilience by Biogas!



” By 2030, at least 10 000 of Sweden's heavy duty trucks could be powered by biogas.”

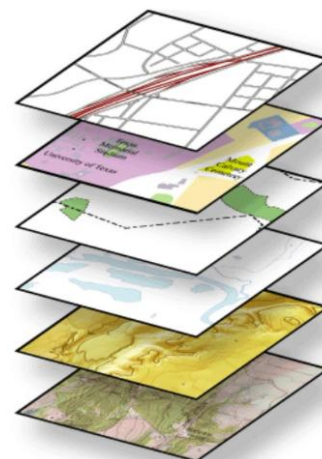
Today 85 500 HDT tot. In Sweden
 10 000 HDT = 12% -> appr. 5 TWh biogas

Would reduce CO2 with 50% for HDT-segment compared diesel!

3 steps missing in the energy debate today:

- Segmentation
- Geographic planning
- Timeline!

”We need to build a robust transport system using layers of different fuels” →



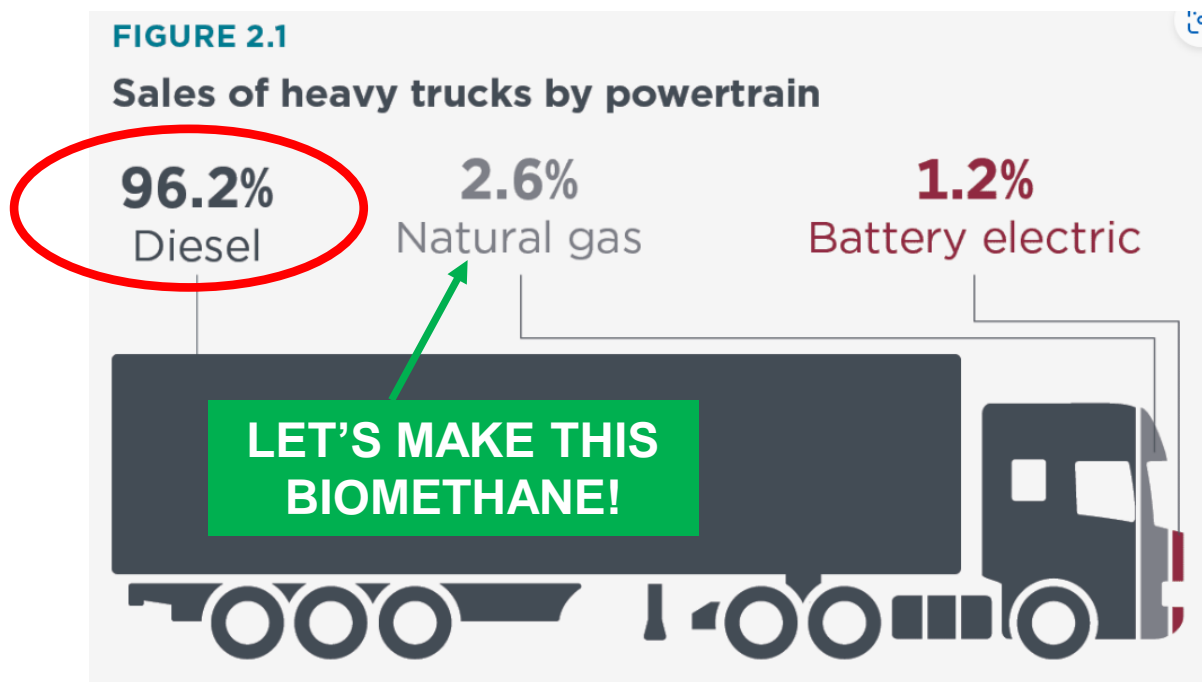
”Do not put all the eggs in one basket!”



USP = Unique Selling Point

European Heavy Duty Vehicle Market Development Quarterly

2024:



Source: [Race to Zero: European Heavy Duty Vehicle Market Development Quarterly \(January – June 2024\)](#) - International Council on Clean Transportation

Johan:

“If 600 000 long haul HDTs in Europe (<10%) would run on biomethane (600MWh/y/HDT) from waste and manure this allows 150 million cars to be electrified, almost 2/3 of all the cars in Europe, reducing annual CO₂-emissions from the HDT with 84 Mton (140 ton/HDT) and with 315 Mton for the cars (2,1 ton/car), a total of 400 Mton in CO₂ reduction per year.”*

*This estimated numbers are based on limited data from Sweden and may need to be confirmed and adjusted to fit European conditions.



widéns

SCANIA

ATZ 94A

widéns

"Biogas is a sustainable solution available today"

Thank you for your attention!



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