



Biomethane

a key NGV success factor in Sweden

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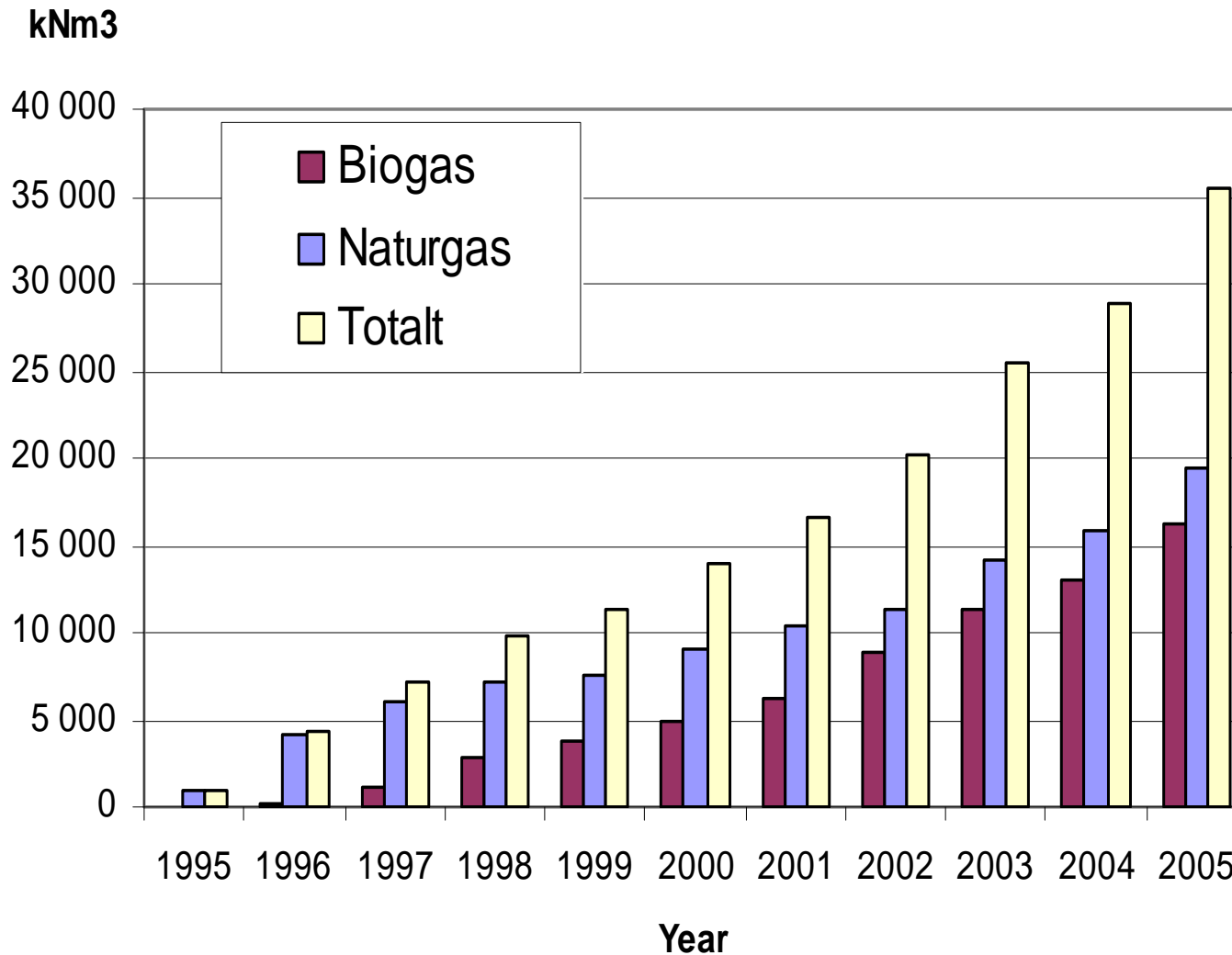
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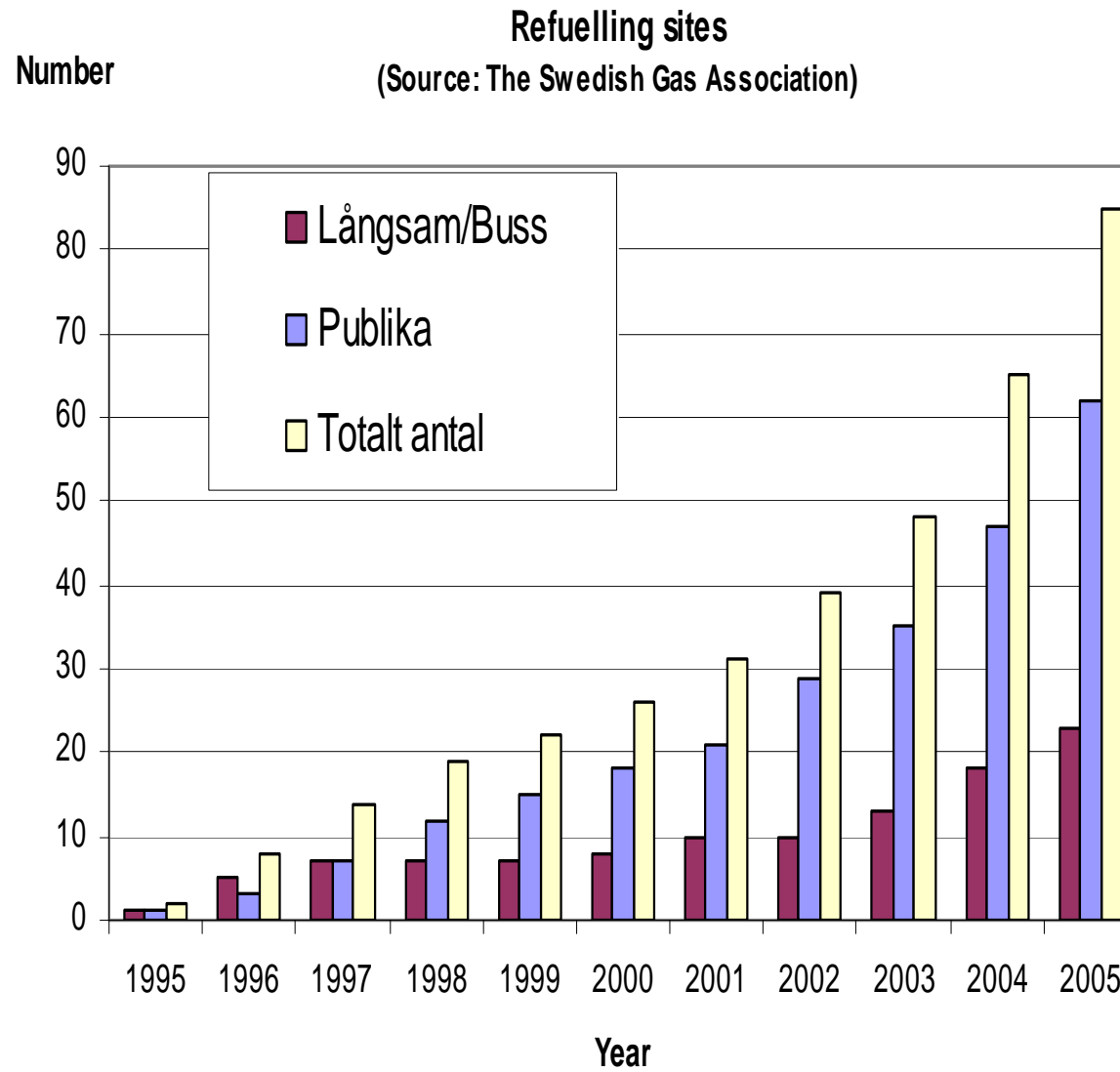


The Swedish market

- 9 million inhabitants (2 % of EU-25)
- As the bird flies 1574 km tall and 499km wide, totally 450,000 km²
- 4.1 million cars, 420,000 trucks, 14,000 buses
- Natural gas grid only in the southwest, total annual volume 11 TWh (1 billion nm³ Danish North Sea gas).
- NGV refuelling in other parts of Sweden currently only possible via supplies of locally produced biomethane.

Total methane gas used in vehicles (Source: The Swedish Gas Association)





Swedish NGV market at the end of 2005 (2004 numbers within brackets)

- 276 (225) trucks (+23 %)
- 656 (554) city buses (+18 %)
- 6948 (4519) cars (+54 %)
- 7880 (5298) total (+49 %)

- 19.3 million Nm³ natural gas (+20 %)
- 16.1 million Nm³ biomethane (+25 %)
- 35.4 million Nm³ methane (+22 %)



Swedish biogas cities (number of buses within brackets)

Linköping (64), Stockholm (30), Göteborg (95),
Uppsala (46), Kristianstad (25), Trollhättan
(17), Norrköping (18), Borås (17), Västerås (24),
Helsingborg (61), Eskilstuna (10), Eslöv (5),
Jönköping, Katrineholm, Lilla Edet, Skövde,
Kalmar, Mjölby, Örebro, Nyköping, Ulricehamn

21 cities totally whereof 12 with NG bus fleets



Swedish cities relying on natural gas (number of buses within brackets)

Malmö (240), Lund (4), Mölndal, Partille,
Stenungsund, Lerum, Ängelholm, Halmstad,
Kungälv, Laholm, Falkenberg, Kungsbacka,
Gislaved, Landskrona, Åstorp, Alingsås,
Uddevalla, Gnosjö

18 cities totally whereof 2 with NG bus fleets

Bus fleets expanding faster in biogas cities



Support of biomethane production

- Some 30 % national government funding of investments in production and refuelling facilities may be granted
- Municipalities often favour biogas production, and use of biomethane vehicles, improving waste treatment, air quality, noise and vibrations, and contributing to CO₂ targets (total value of new projects this year € 100 million)
- Tax payable if incinerating organic waste, landfill not allowed, no fuel tax on biomethane



Procurement

- Cities with methane gas availability step by step increase NGV bus fleets for environmental reasons
- National authorities required to have 75 % green vehicles share in new vehicle acquisitions
- Some regional or municipal authorities go for 100 % green vehicle share
- An increasing number of private companies use 'green' vehicle policies to boost their public image



Swedish NGV market support (approximate annual savings)

- No congestion charge Stockholm (€ 1200)
- 40 % reduction of income tax payable for free use of company car (€900)
- About 30 % lower fuel costs (€ 600)
- Free parking benefits in many cities (€400)
- Reduced annual road tax (€ 100)
- Cab priority lanes at railway stations and airports (very large income benefit for taxi owners)
- Many companies and public organisations prioritize 'green' cabs when ordering taxis



New developments

- Annual Swedish sales of NG cars will increase by some 200 % in 2006
- 'Green' vehicles now accounting for some 15 % of all new car sales in Sweden, most of them still flexfuel cars
- Ongoing prestudy concerning a wood based plant in 2010 with an annual capacity of 88 million Nm³ (twice the present total Swedish use)
- Ongoing prestudy of nationwide LCNG refuelling highway network able to supply HD dual fuel LNG vehicles, but also conventional CNG vehicles.
- Study also includes LNG supplies via local liquefaction of 60 bar grid gas (short term annual potential 240 million Nm³), or biomethane via cryogenic purification and condensation of raw biogas.
- CNG from Swedish LCNG stations supplied via local NG liquefaction likely to be cheaper than conventional CNG



Summary

- Incentives and infrastructure are required to build the market
- Biomethane from waste, crops, and wood dramatically increases net biofuel yields, and provides political support of NGVs
- LNG is a very profitable fuel alternative for HD trucks, and provides a decent operating range
- LCNG stations along all major highways will support both HD LNG vehicles and conventional CNG vehicles
- Coming new supercharged LD engines with improved performance and fuel economy will boost consumer interest in NGVs