

**Presentation before
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The Göteborg Case

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The Göteborg Case

- **District heating & cooling**
- **The first Eco-labelled car fuel**
- **Covenant of Mayors**
- **Path-2-RES; Intelligent Energy**

The City of Göteborg

- **Sweden's 2nd largest city.**
500.100 inhabitants
- **Northern Europe's biggest harbour.**
- **Logistic hub for the Scandinavian countries.**
- **Important industries:**
 - The Volvo Group (commercial vehicles)
 - Volvo Car Corporation (passenger cars)
 - SKF (ball bearings)
 - Astra Zeneca (pharmaceutical)
- **Chalmers University of Technology**

1985

 **Göteborg Energi**

Sulphur emissions have decreased by 98 % and emissions of nitrogen oxides by 86 % in 20 years.

Today

- In 2005, 90 % of all flats were connected to the district heating grid.
- Air quality has improved substantially.

District Heating in Göteborg

- **Initiated in 1950s.**

Major initiatives from 1980s, onwards.

- **Major heat sources:**

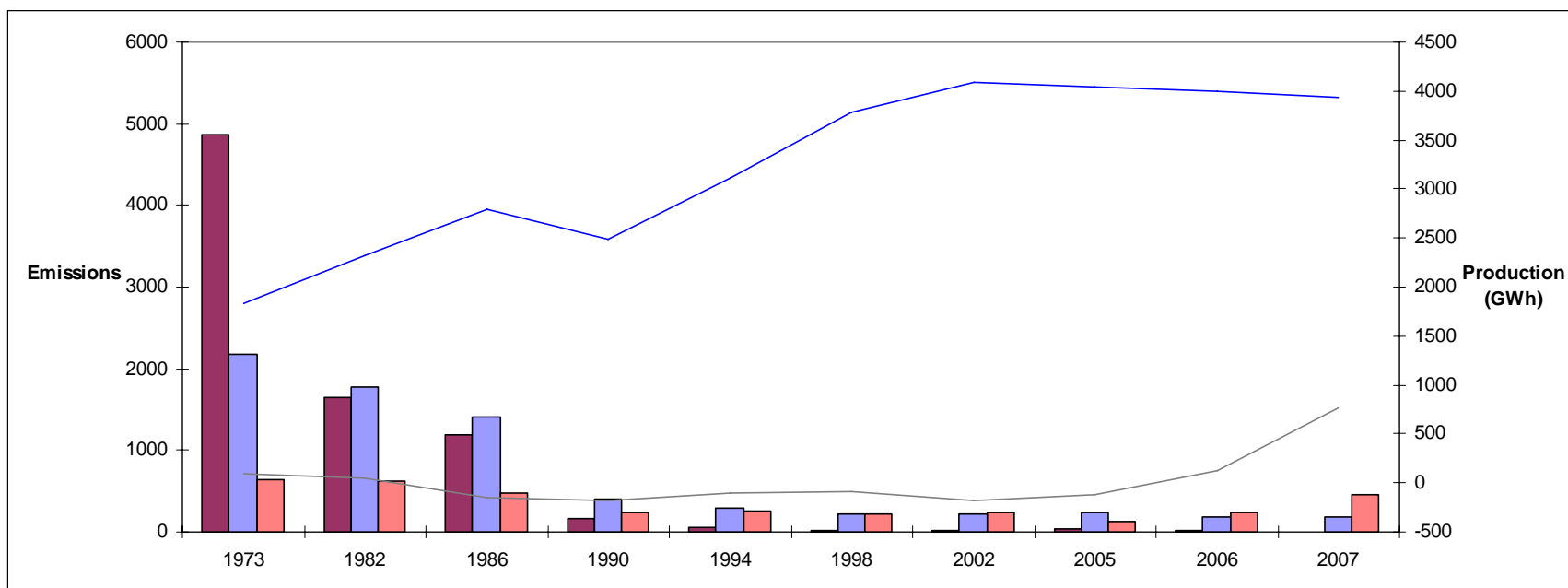
- Surplus heat from petroleum refineries.

- Surplus heat from waste incineration.

- Surplus heat from a power plant, run on natural gas.

- **Environmental achievements to-date:**

Environmental Achievements



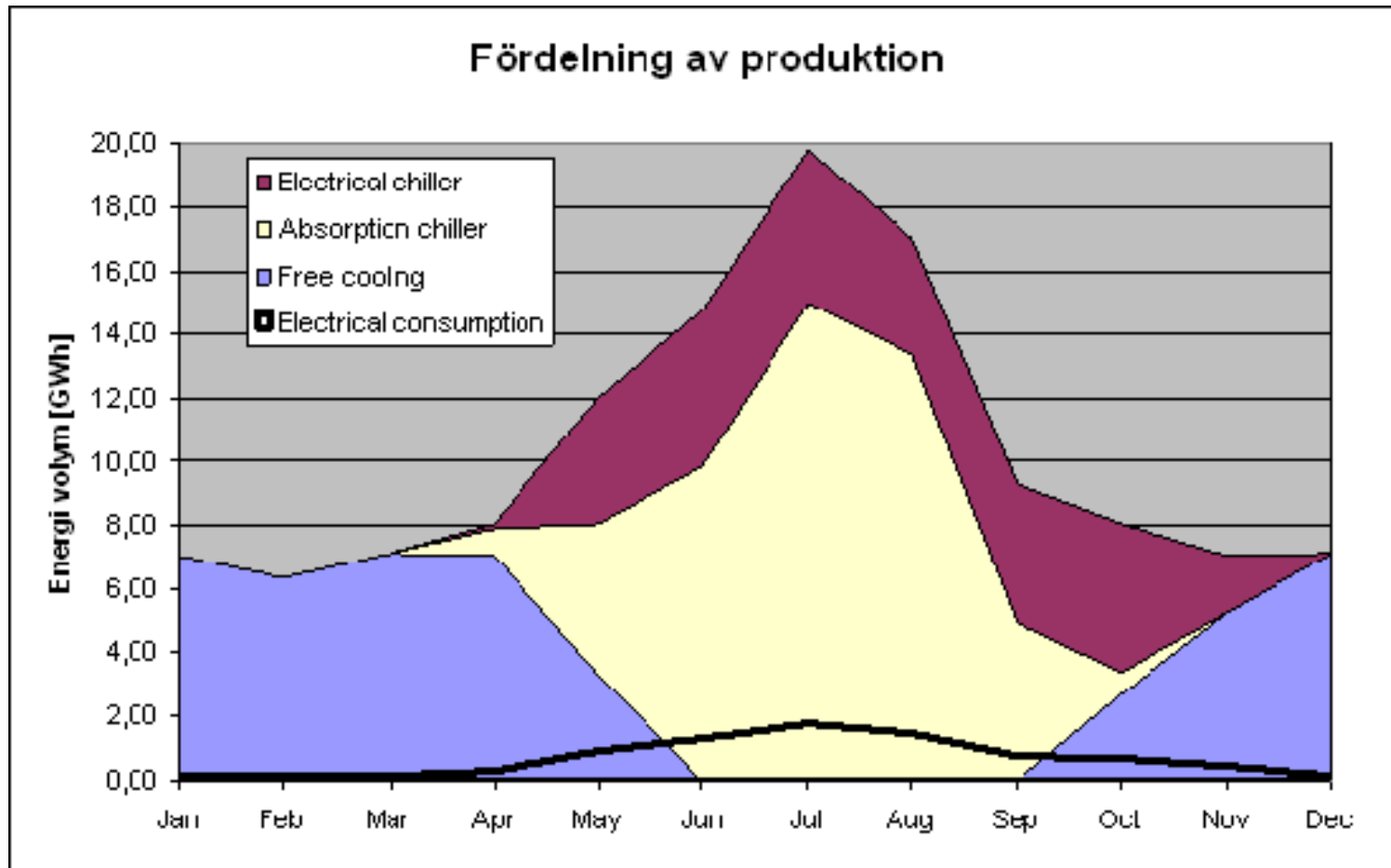
Emissions

Sulphur (tonnes)
 Nitrogen Oxides (tonnes)
 Carbon Dioxide (kilotonnes)

Production

District Heating
 Electricity

District Cooling Production



Conclusion

By smartly using surplus heat, Göteborg has established an efficient and environmentally friendly District Heating infrastructure.

The total heat demand is 4 TWh, whereof:

- 80% are surplus heat.**
- 17-18% are produced by bio fuels.**
- 2-3% are produced by fossil fuels.**

Issues to be addressed

- **District Heating is an environmentally friendly way to warm up (and cool) a city.**
- **Flexible heat supply.**
- **Surplus heat should be considered a positive, non-taxable asset.**
- **Theoretically, the entire EU could be warmed up using surplus heat only.**
- **Surplus heat normally is locally produced.**

Biogas

Energy from recycled products from the entire society

Cities



Sewage sludge
Household Waste
Industrial Waste
Landfill

Agriculture



Manure
Tops
Crops

Forests



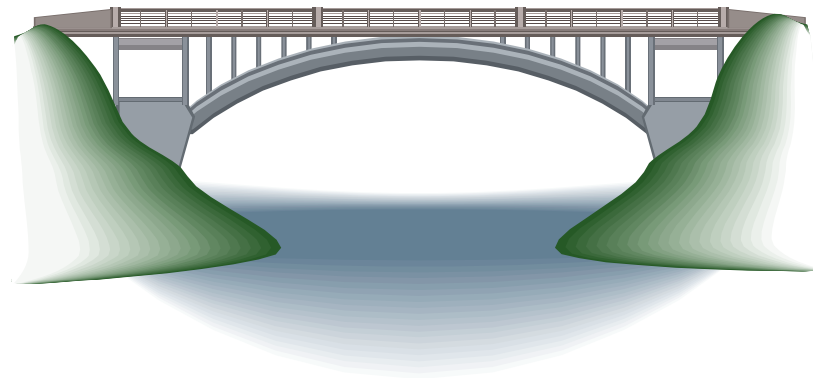
Wood waste

One million inhabitants produce household waste and sewage sludge for app. 1 TWh of biogas.

Natural gas the bridge to the future

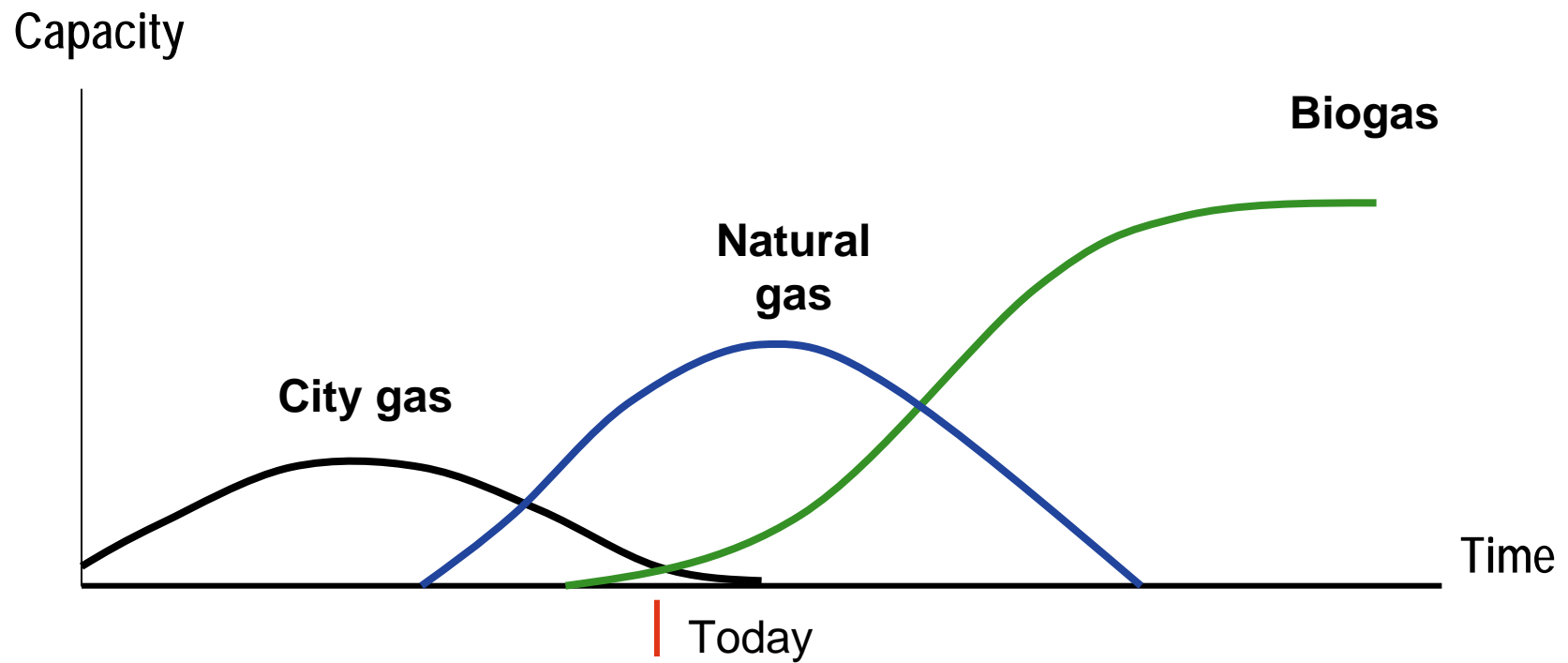
Natural gas

Fossil society
with crude oil
and coal.



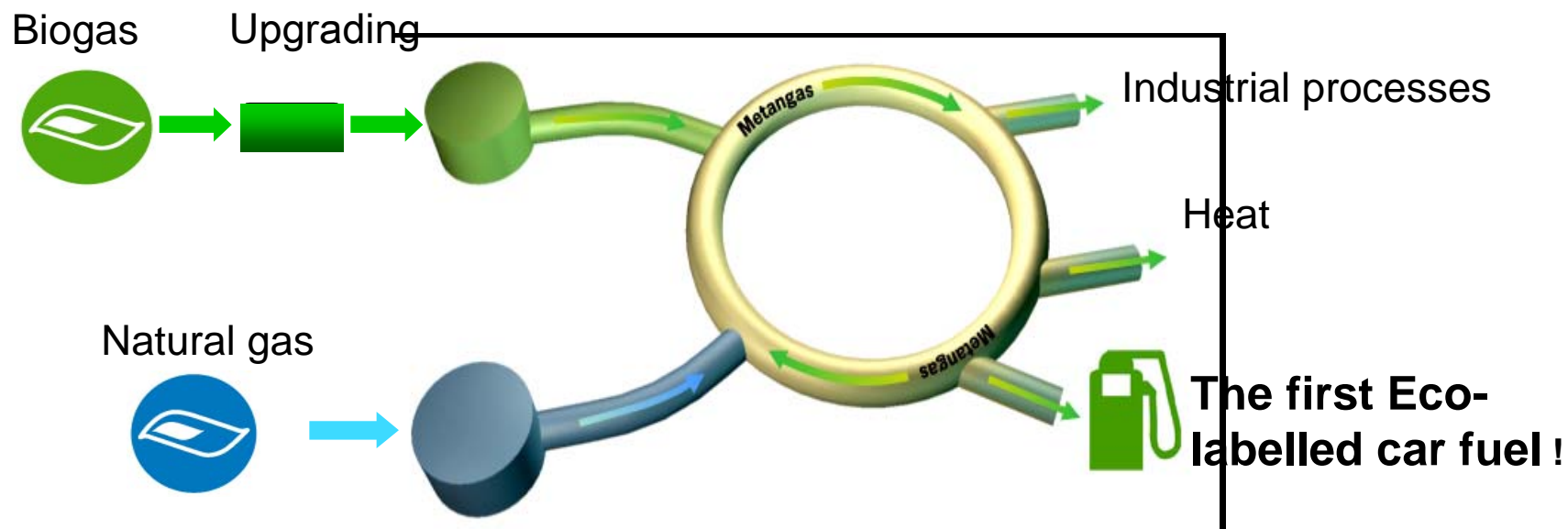
Sustainable
society with
biogas.

Our Gas Vision



The Green gas principle – a prerequisite

- A huge market is opened for biogas.
- The reliability of the biogas supply improves



GoBiGas – Gothenburg Biomass Gasification



GoBiGas – Gothenburg Biomass Gasification Project

Commercial scale – approx. 100 MW Bio-SNG ⇔ 80 MNm³/yr or 800 GWh/yr, operating period 8000 hr/year

Gasification of forest residues

Production of **high-calorific gas** (SNG) by methanation for distribution in the existing gas grid. Plant situated **in the harbor of Gothenburg**, fuel transport by ship or by train

Performance goals:

Biomass to gas – 65 - 70%

Energy efficiency - >90%

First phase, 20 MW generating 160 GWh/year in operation 2012.
2000 Nm³/hr or 16 MNm³/yr (equal to 15 000 vehicles/year)

Second phase, 80 MW generating 640 GWh/year in operation 2015.
8000 Nm³/hr or 64 MNm³/yr (equal to 75 000 vehicles/year)

Joint project Göteborg Energi and E.ON

 **Göteborg Energi**



Several various usage areas

Dwellings



Vehicles



Shipping



Restaurants



Power & heat production



Industry



Participation in EU-initiatives

- **Covenant of Mayors**
- **Path – 2 – RES: Göteborg is one of six case studies in this project, supported by Intelligent Energy**
(Path – 2 – RES = Pathway to Renewable Energy Systems)

How many banana skins do you need to drive a car 1 km ?



Thank you for the attention !



You need 10 banana skins to produce the amount of methane necessary for driving a car 1 km.