

STATUS and FUTURE of bioSNG in EUROPE

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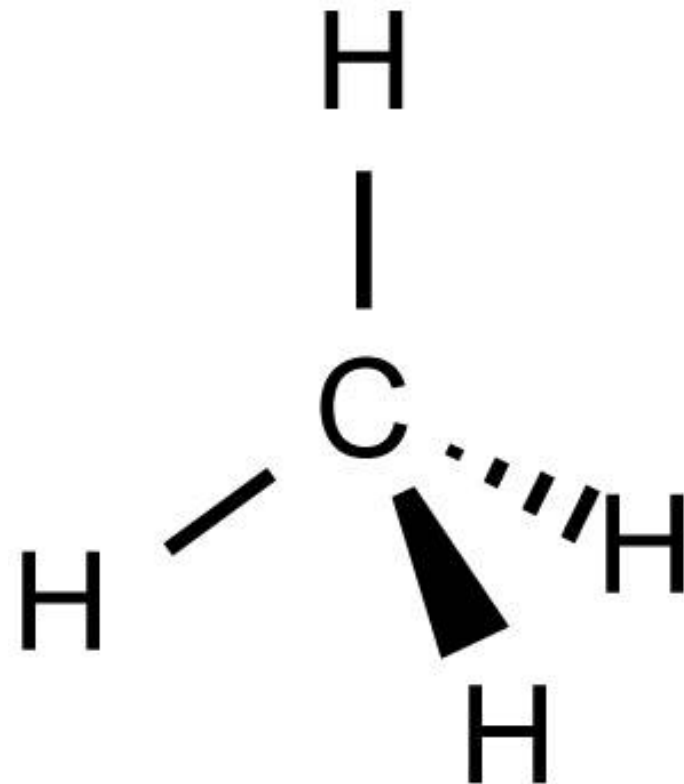
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IEA-Bioenergy conference, Vienna, November 2012

www.ecn.nl

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- What is it good for?
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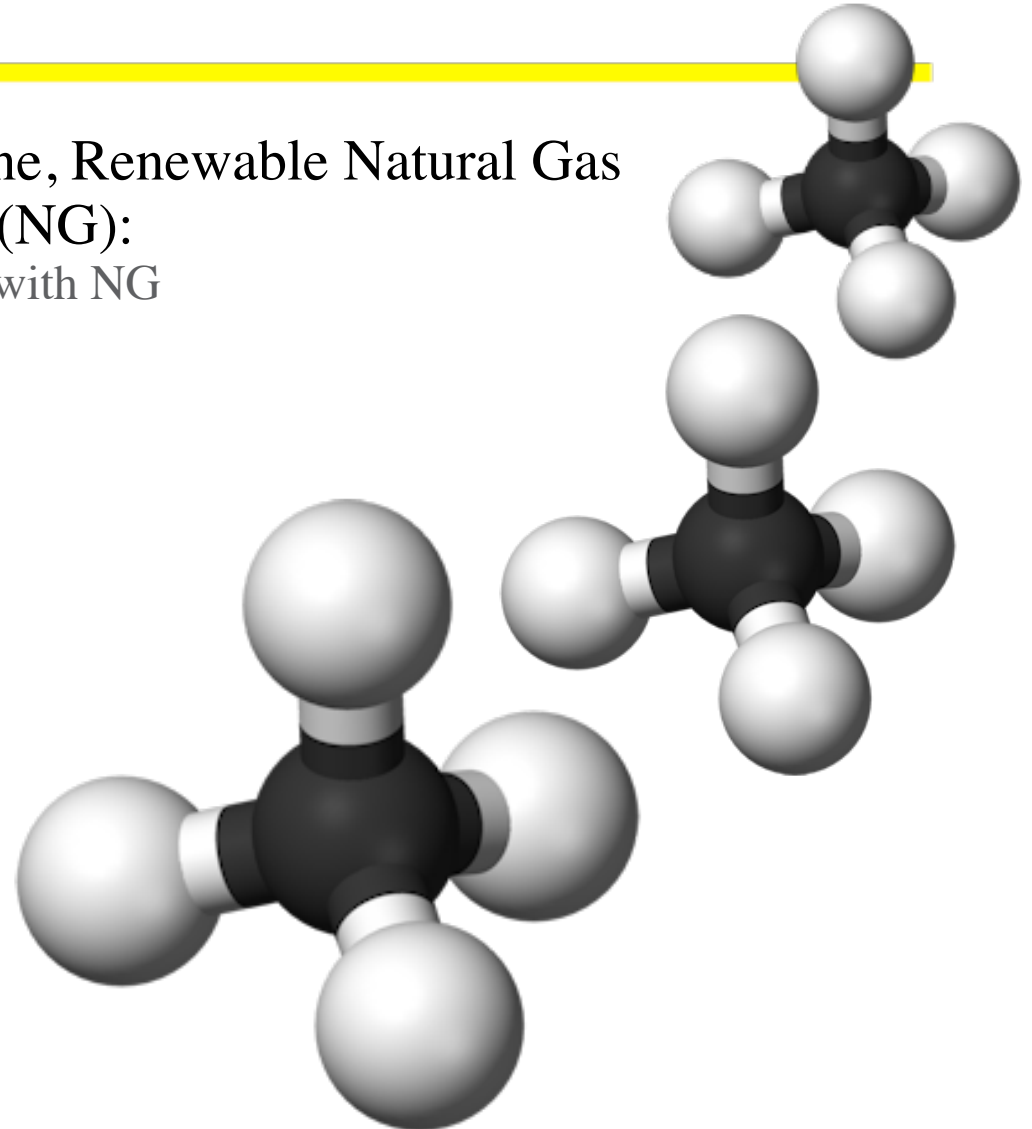


WHAT IS bioSNG?

- Other words: Green Gas, BioMethane, Renewable Natural Gas
- BioSNG is identical to Natural Gas (NG):
 - It is totally exchangeable and miscible with NG
 - It can be transported together with NG
 - It can be stored together with NG
 - It is used as NG
- It only is made from biomass

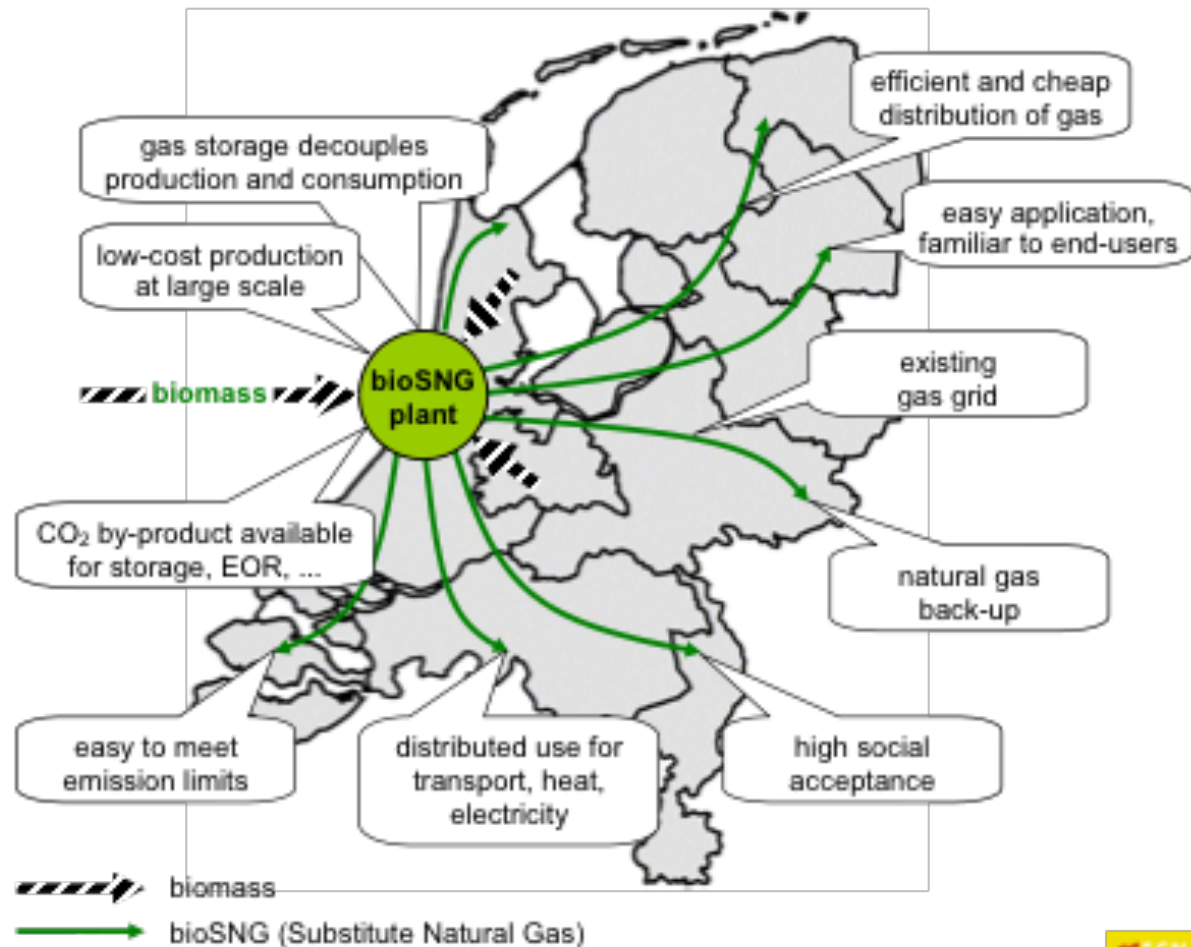
Other facts:

- Can be made with high efficiency
- Is ready to use
- Proven technology for coal



WHAT IS bioSNG GOOD FOR?

It makes things
 Easy
 Reliable
 Cheap
 Accepted



IN OTHER WORDS

what would you prefer?

biomass



biomass

bioSNG plant



CNG car



transport



car with wood gasifier

transport

IN OTHER WORDS

what would you prefer?



biomass



bioSNG plant



heater



heat



biomass

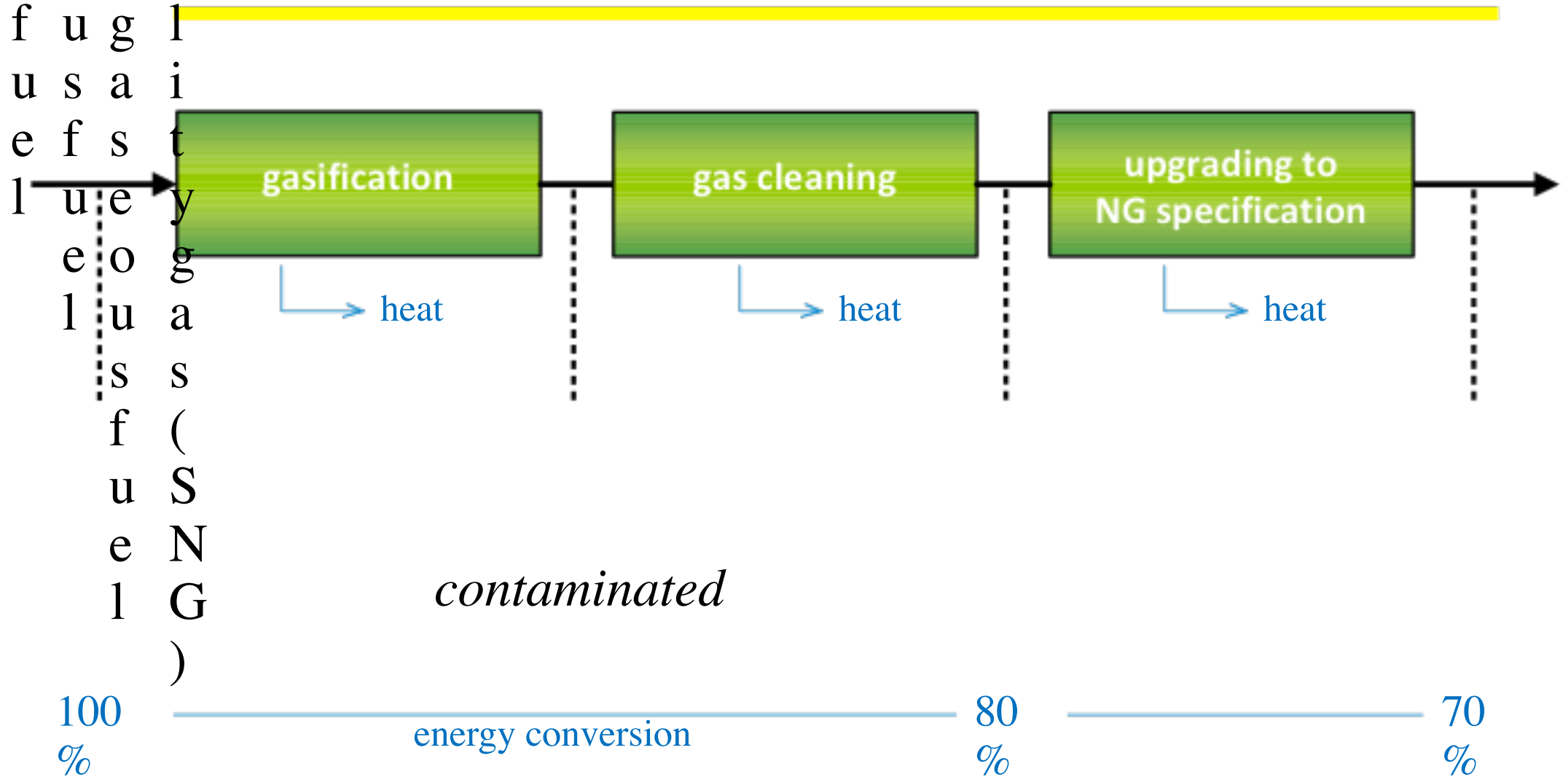


wood stove

heat

HOW IS IT PRODUCED?

do not confuse with biogas from digestion



NATURAL GAS

golden age of gas

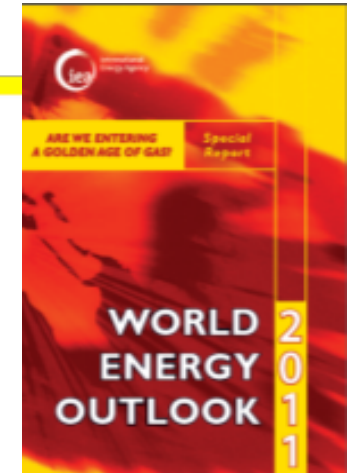
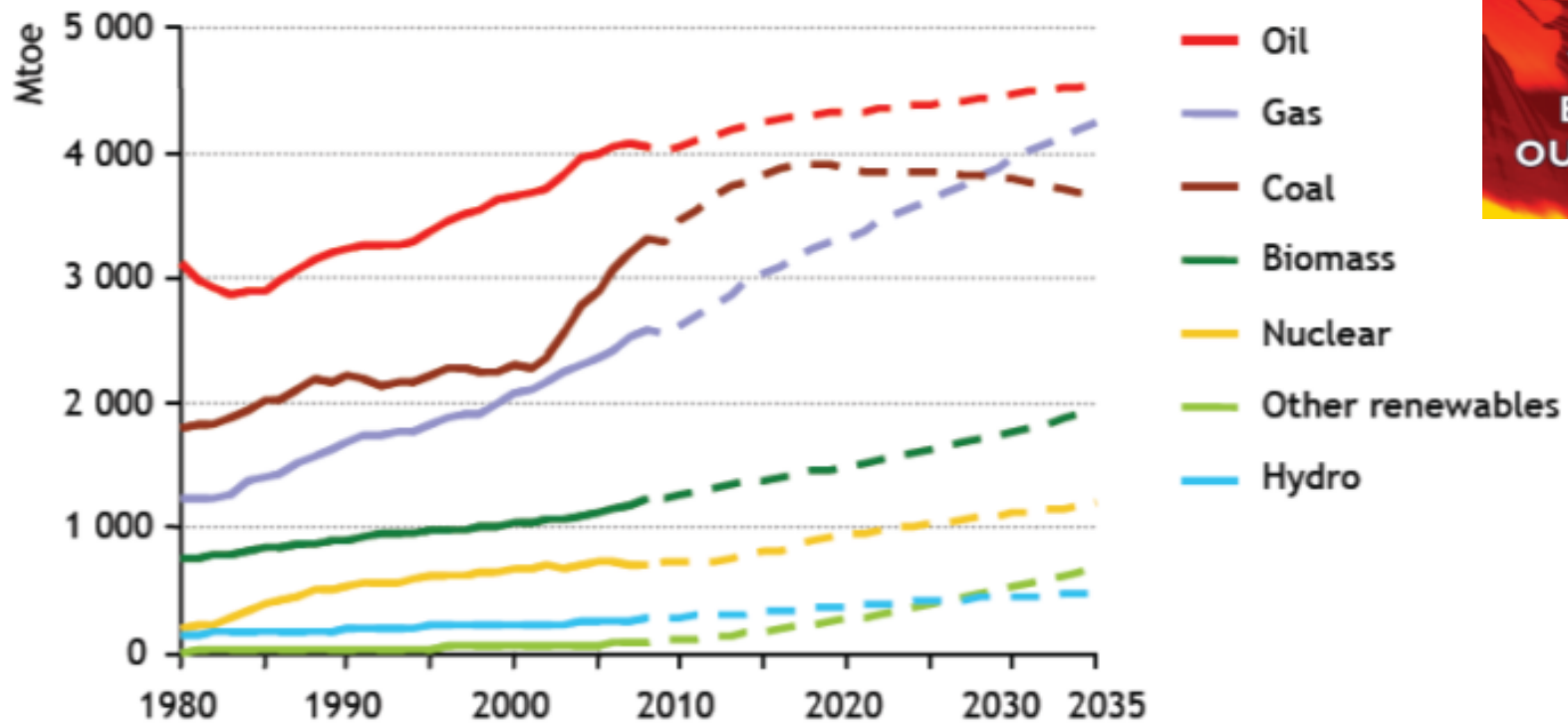


Figure 1.1 ▸ World primary energy demand by fuel in the GAS Scenario



Source: http://www.iea.org/weo/docs/weo2011/WEO2011_GoldenAgeofGasReport.pdf

United Kingdom
Netherlands
Switzerland
Sweden
Austria



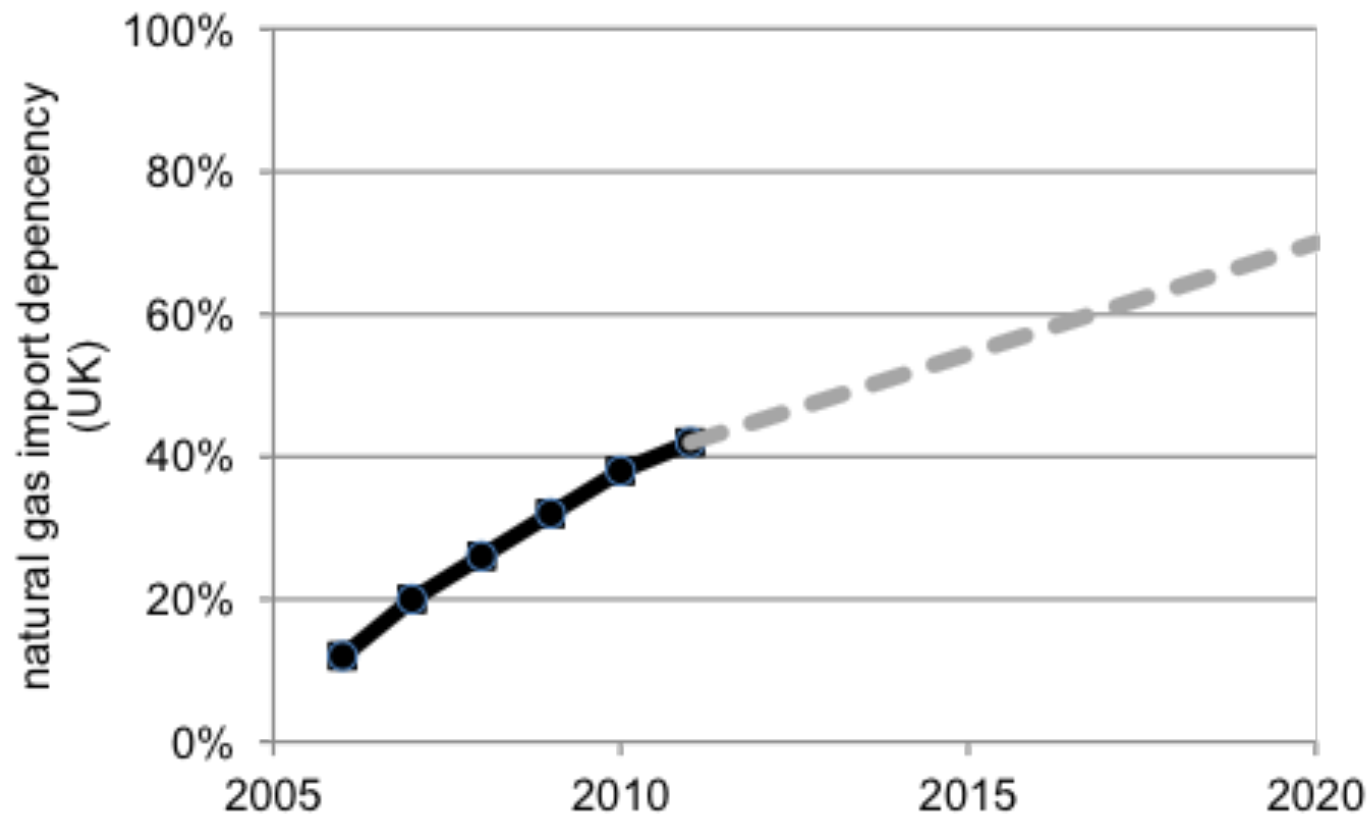
DIFFERENT COUNTRIES

	UK	Netherlands	Switzerland	Sweden	Austria
natural gas consumption [PJ/y]	3300	1430	115	65	290
natural gas as fraction of primary energy consumption [%]	38%	44%	10%	3%	22%
natural gas grid length [m/person]	4.5	9.0	2.3	0.1	4.3
natural gas import dependency: (import-export) / consumption	42%	0%	100%	100%	75%
biomass availability [% of primary energy consumption, 2020]	5%	5%	10%	20-25%	20%

Sources: <http://www.energydelta.org/mainmenu/energy-knowledge/country-gas-profiles>
<http://www.energie-nederland.nl/wp-content/uploads/2011/08/Energie-in-Nederland-2011.pdf>

UNITED KINGDOM (1)

running out of natural gas, soon



Sources: <http://www.energydelta.org/mainmenu/energy-knowledge/country-gas-profiles>
<http://www.nationalgrid.com/uk/GrainLNG/needs/>

UNITED KINGDOM (2)

- Strategy to keep using extensive gas network
- BioSNG for low-carbon heating is major driver, but suitable for all sectors
- Supported through Renewable Heat Incentive
- National Grid, Advanced Plasma Power (APP), Progressive Energy: developing pilot facility for bioSNG, start construction 2013

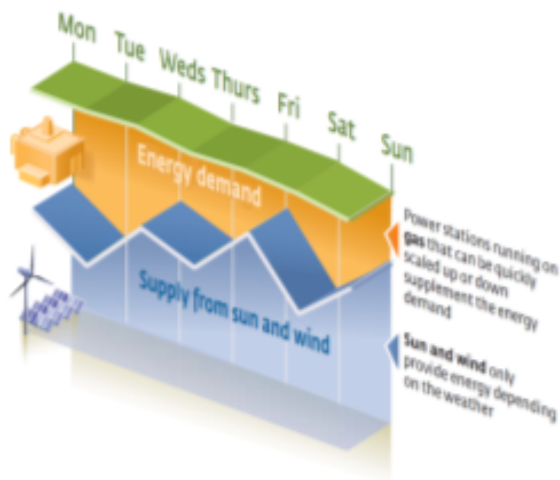
Future:

- 50-100 MW plants on waste / waste-derived fuels
- Up to 5% Green Gas in 2050 (according to National Grid 2050 Gone Green Scenario)
- Larger bioSNG plant start-up expected 2015/16



NETHERLANDS (1)

- Netherlands wishes to keep its position in (natural) gas; “round-about”
- (Natural) gas will be key in balancing power grid
- Feed-in tariff on bioSNG since 2011
- Waste company (HVC) and gas company (Gasunie) join forces
- SNG demo plant: 12 MW wood, start-up 2014
- Indirect gasification (MILENA), OLGA tar removal

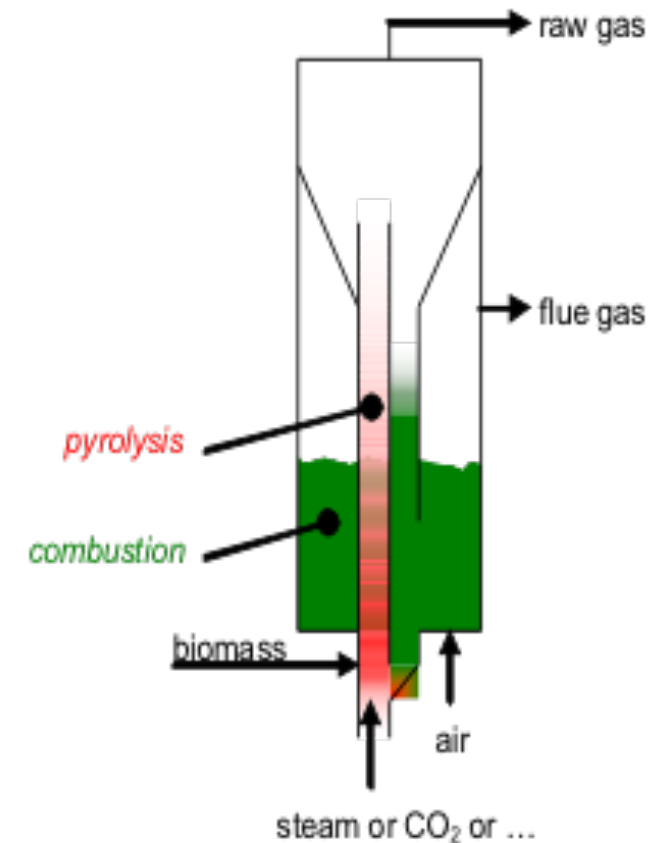


For a sustainable energy supply
The clear task of natural gas

NETHERLANDS (2)

Future:

- Large SNG-plants (100 MW+)
- 3 bcm/y in 2030 and 30 bcm/y in 2050
- CNG break-through?
- LNG for trucks, boats (and aircrafts?)
- Combination with (petro)chemical industry with ethylene, benzene, syngas co-products



SWITZERLAND

- Switzerland wants to keep the options open, bioSNG nicely links to biogas
- PSI and CTU develop methanation technology specifically for biomass, whereas state-of-the-art has its origin in coal-to-SNG

Future:

- 20-50 MW plants on local biomass
- Poly-generation concept for high efficiency (bioSNG, power, heat)
- No targets set for bioSNG



SWEDEN (1)

- Little gas yet
- Limited gas grid, but gas companies wish to expand the grid
- Biogas is gaining importance in transport, but is a limited amount; bioSNG can break the cap
- No specific bioSNG support scheme, but CO2 tax on natural gas ~2-8 \$/GJ for many users
- Göteborg Energi (GoBiGas): 32 MW wood, FICFB indirect gasifier, start-up 2013
- E.ON (Bio2G): aims at 350 MW plant, start-up planned 2016, probably CFB/O2 gasification



SWEDEN (2)

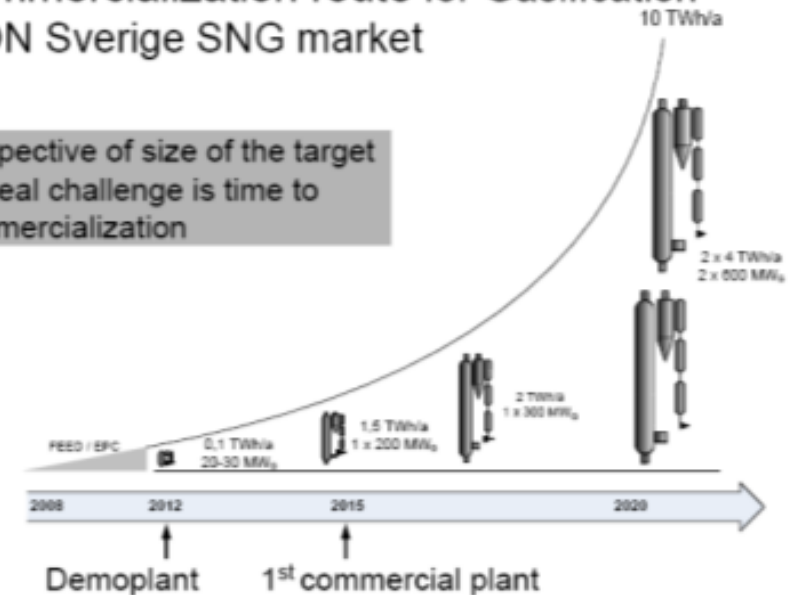
Future:

- No targets set for bioSNG
- Göteborg Energi plans to expand to 100 MW bioSNG (~150 MW wood), start-up 2017
- E.ON Sweden aims for large units of up to 700 MW input, also for outside Sweden



Commercialization route for Gasification
E.ON Sverige SNG market

Irrespective of size of the target
the real challenge is time to
commercialization



AUSTRIA

- Role in bioSNG is merely as technology exporter
- No support scheme, no targets for bioSNG
- Successful CHP-technology is the basis, developed by TU Vienna
- Operating plants in Güssing, Oberwart, Villach
- More to come in Klagenfurt (A), Ulm (D), and Göteborg (S)
- “Simple SNG” in co-generation concept
(http://www.sgc.se/gasification2011/Resources/Hermann_Hofbauer.pdf)

Future:

- Smaller-scale units with co-generation of heat/power



OTHER ISSUES



WHAT DOES IT COST?

- More than natural gas
- Although that may depend on the location (Qatar: 0.2 \$/GJ, US: 2 \$/GJ, NL: 7 \$/GJ, Japan: 15 \$/GJ)
- Production costs bioSNG can be decreased by:
 - Larger scale plants
 - Valuable co-products (heat, power, chemicals)
 - Lower price feedstock
- But not all combinations are realistic
- Estimate for large-scale, clean wood, no co-products, nth plant: 15 \$/GJ
(http://www.sgc.se/gasification2011/Resources/Bram_van_der_Drift.pdf)

CONCLUDING REMARKS

- BioSNG is a convenient renewable energy carrier: perfect fit and efficient
- BioSNG (bioCNG) for transport gives you the most km/ha
- Biogas (digestion of wet biomass) works, but is limited in PJ
- Transport (CNG) offers short-term incentives in Europe: biofuels obligation
- Two strategies to create business case for bioSNG:
 - Economy-of-scale: >>100 MW
 - Co-production: heat/power makes smaller scale acceptable, preferably on waste
- The country with the smallest gas grid and the smallest NG consumption is going strongest for bioSNG: Sweden
- Indirect gasification appeals

THANKS FOR THE ATTENTION

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