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Results on production of BioSNG from product gas of a dual fluidised bed gasifier

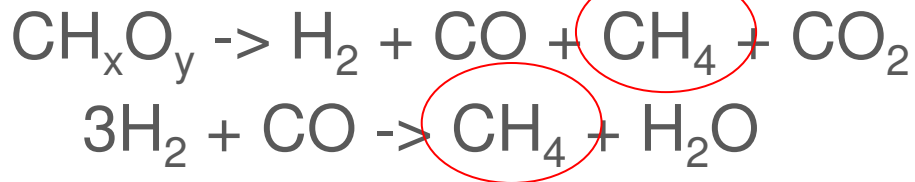
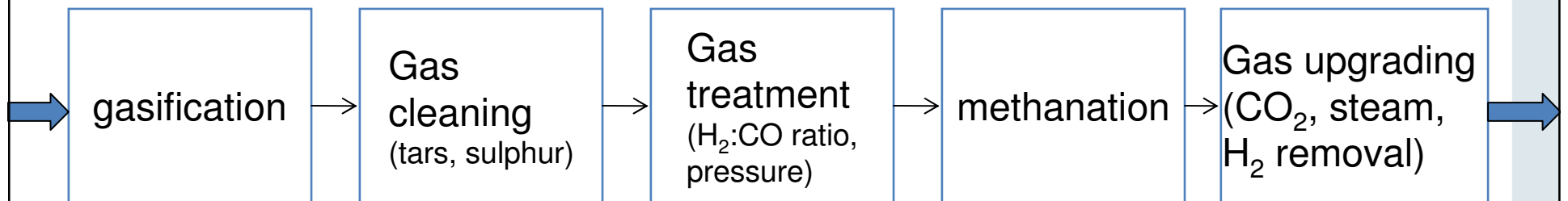
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Content

- Basics in SNG production
- Biomass CHP Güssing
- BioSNG demonstration plant
- Outlook

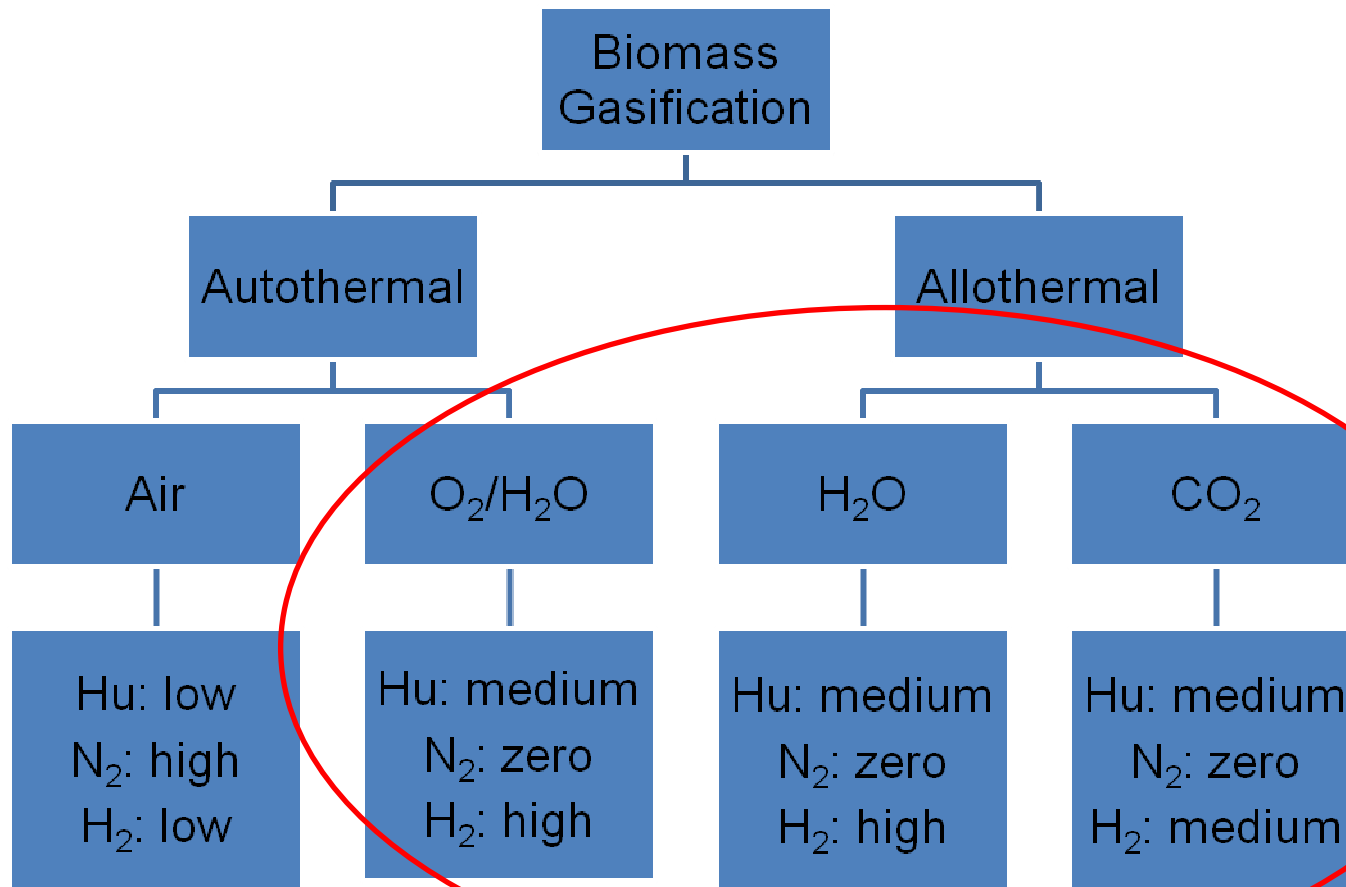
Basics of SNG from solid fuels



300-400 °C, Nickel catalyst
fluidised bed, fixed bed or slurry
reactor

- High Efficiency
- Usability of product
- Robust synthesis
- Know how available

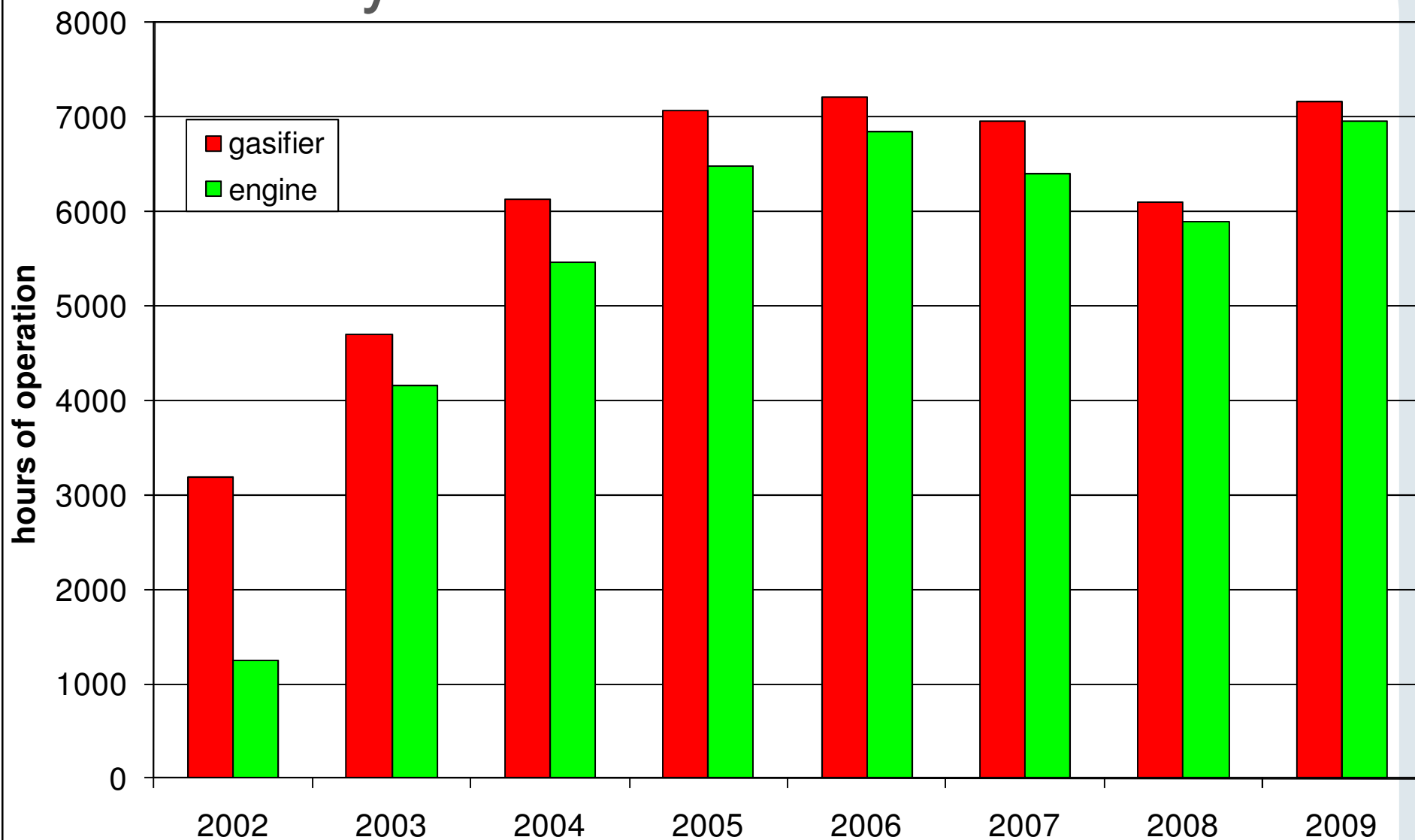
Gasifiers for BioSNG



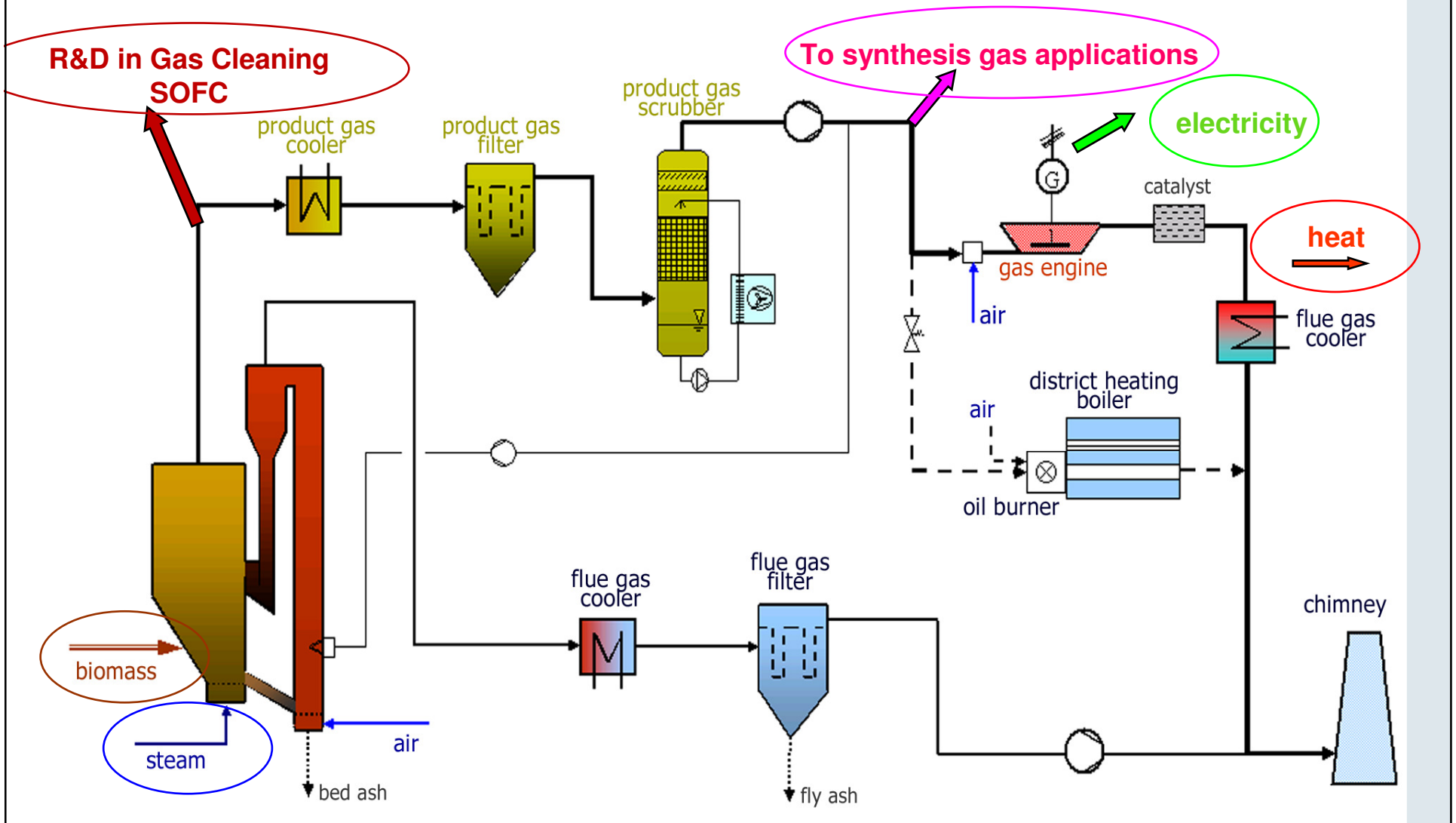
Biomass CHP Güssing design data

Start of construction	September 2000		
Start up	January 2002		
Fuel	2,2	to/h	(Wood chips)
Water content	15	%	(35 %)
Fuel power	8	MW	
Electrical power	2	MW	
Thermal power	4,5	MW	
Electrical efficiency	25	%	(20%)
Total efficiency	80	%	
Owner and operator	Biomass Power Station Güssing Association		

Availability of the Plant



CHP-PLANT GÜSSING

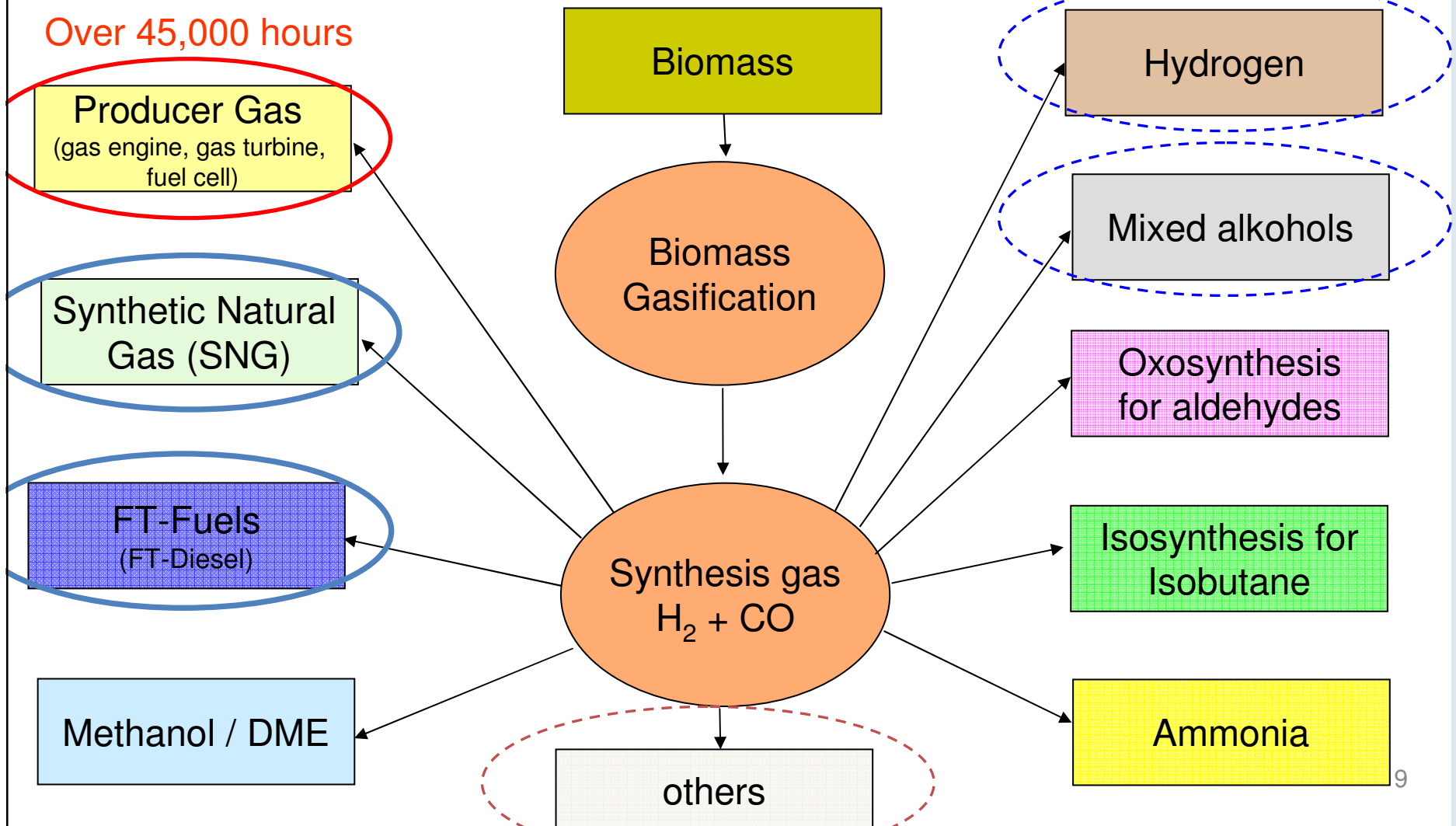


Commercial FICFB gasifiers

Location	Electricity production	Fuel / electr. MW, MWeI	Start up	Status
Güssing, AT	Gas engine	8.0 / 2.0	2002	Operational
Oberwart, AT	Gas engine / ORC	8.5 / 2.8	2008	Operational
Villach, AT	Gas engine	15 / 3.7	2010	Construction finished
Klagenfurt, AT	Gas engine	25 / 5.5	2011	Detailed engineering
Ulm, DE	Gas engine / ORC	15 / 5.3	2010	Under construction
Geislingen, DE	AER-process / Gas engine / ORC	10 / 3.3	2010	Detailed engineering

The basic concept – “Green Chemistry”

Over 45,000 hours



BioSNG activities

Gothenburg Biomass Gasification Plant	Sweden	Feasibility study
Dakota Gas	USA	Commercial plant (uses lignite, not biomass)
BioSNG	Güssing Austria	Demonstration
Milena Gasification	Netherlands	R&D
Heat Pipe Reformer Agnion	Germany, Austria	R&D
ArtFuel Cutec	Germany	R&D

BioSNG Demonstration Project

A 1 MW SNG Process Development Unit (PDU) is erected within the EU project BioSNG and allows the demonstration of the complete process chain from wood to SNG in half-commercial scale.

A consortium consisting of four partners is responsible for the PDU:

- CTU – Conzepte Technik Umwelt AG
- Repotec GmbH
- Paul Scherrer Institute
- Technical University Vienna

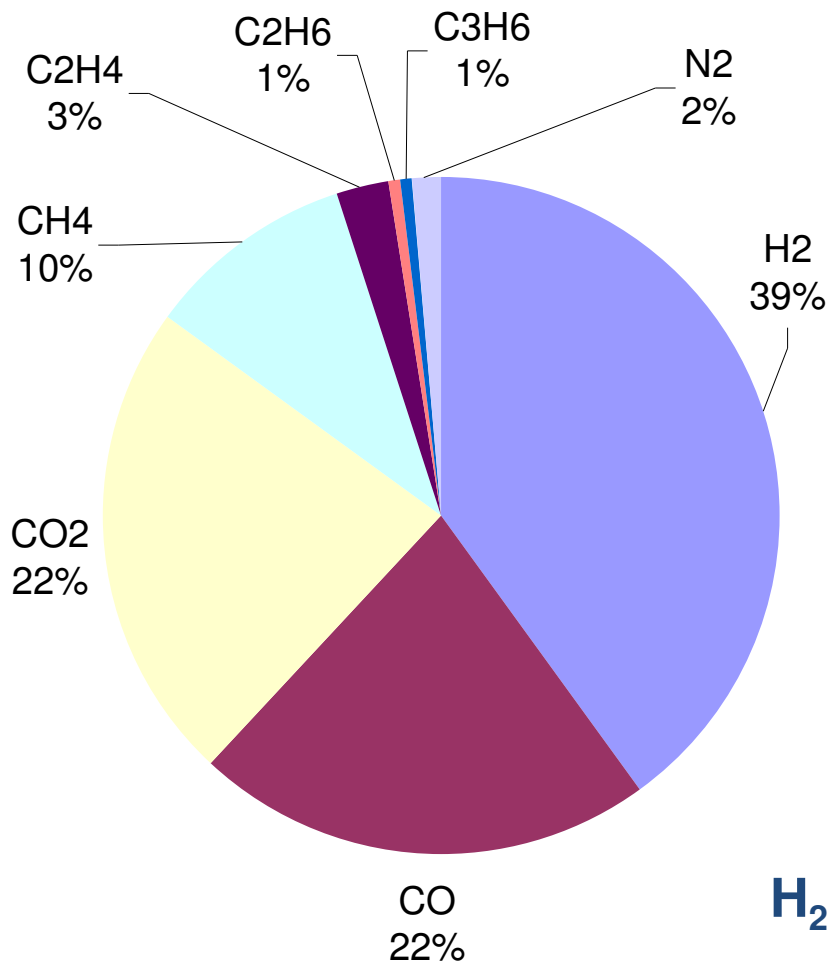
The project BioSNG is co-funded by

- the European Commission
- 6th Framework Programme
PrNo TREN/05/FP6EN/
S07.56632/019895
- Swiss electric research
- Bundesförderung Österreich
- WIBAG

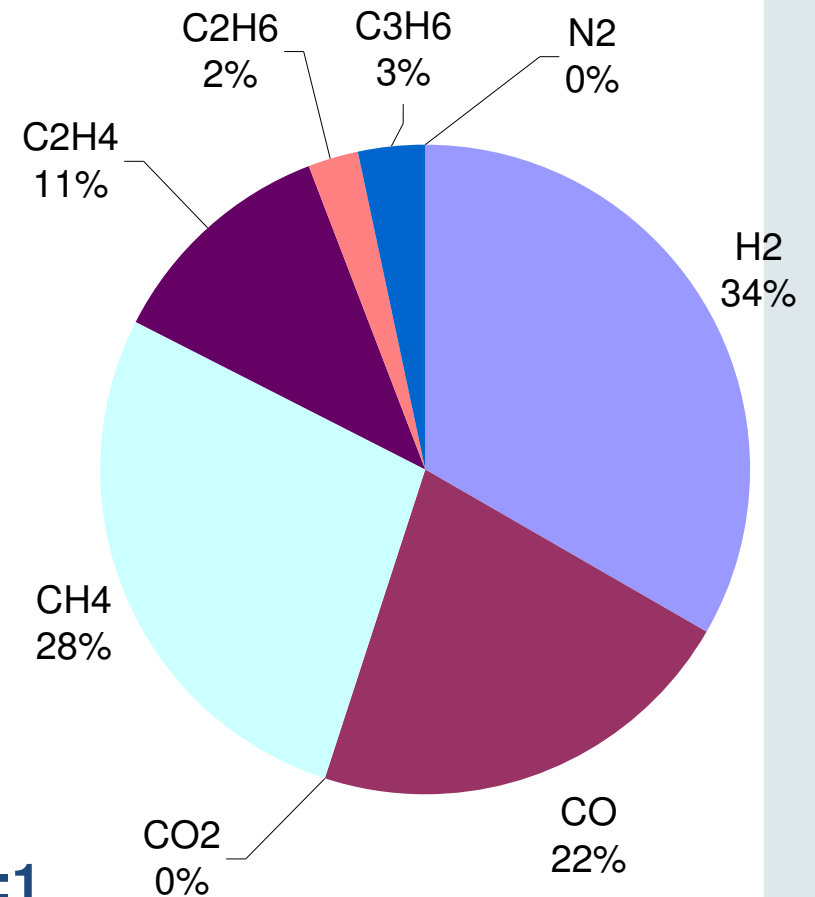


Gas composition at CHP Güssing

On volume basis

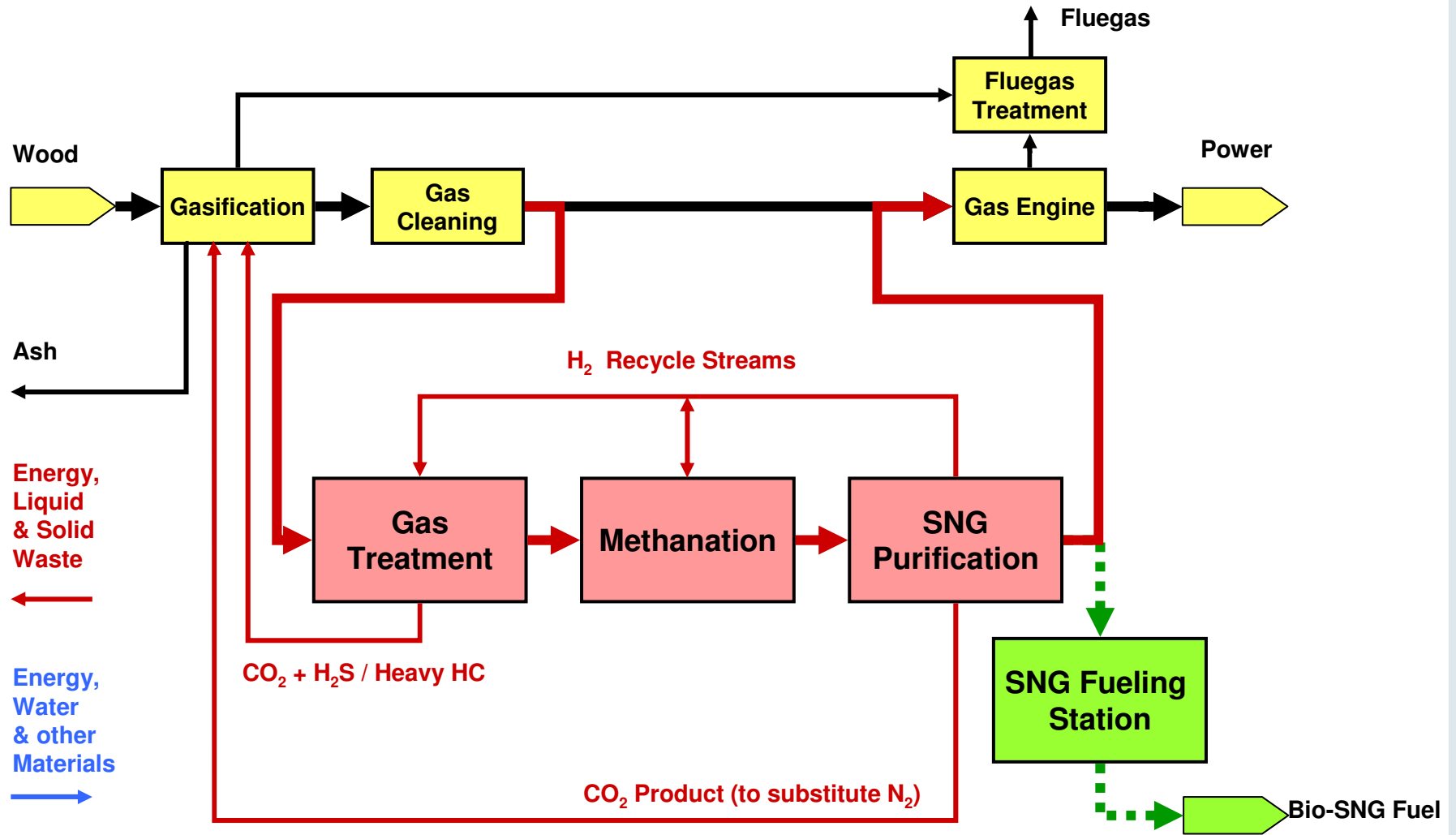


On energy basis



H₂:CO = 1.8:1

Integration into CHP Güssing



BioSNG demonstration plant



Gasifier

BioSNG PDU

Technikum

Fuelling Station

Results

- December 2008: First conversion of product gas into rawSNG
- June 2009: BioSNG at H-Gas quality produced
- June 24th : inauguration – CNG cars were fuelled using BioSNG from wood
- June 2009 CNG-car was successfully used for 1000km with BioSNG



Quality BioSNG

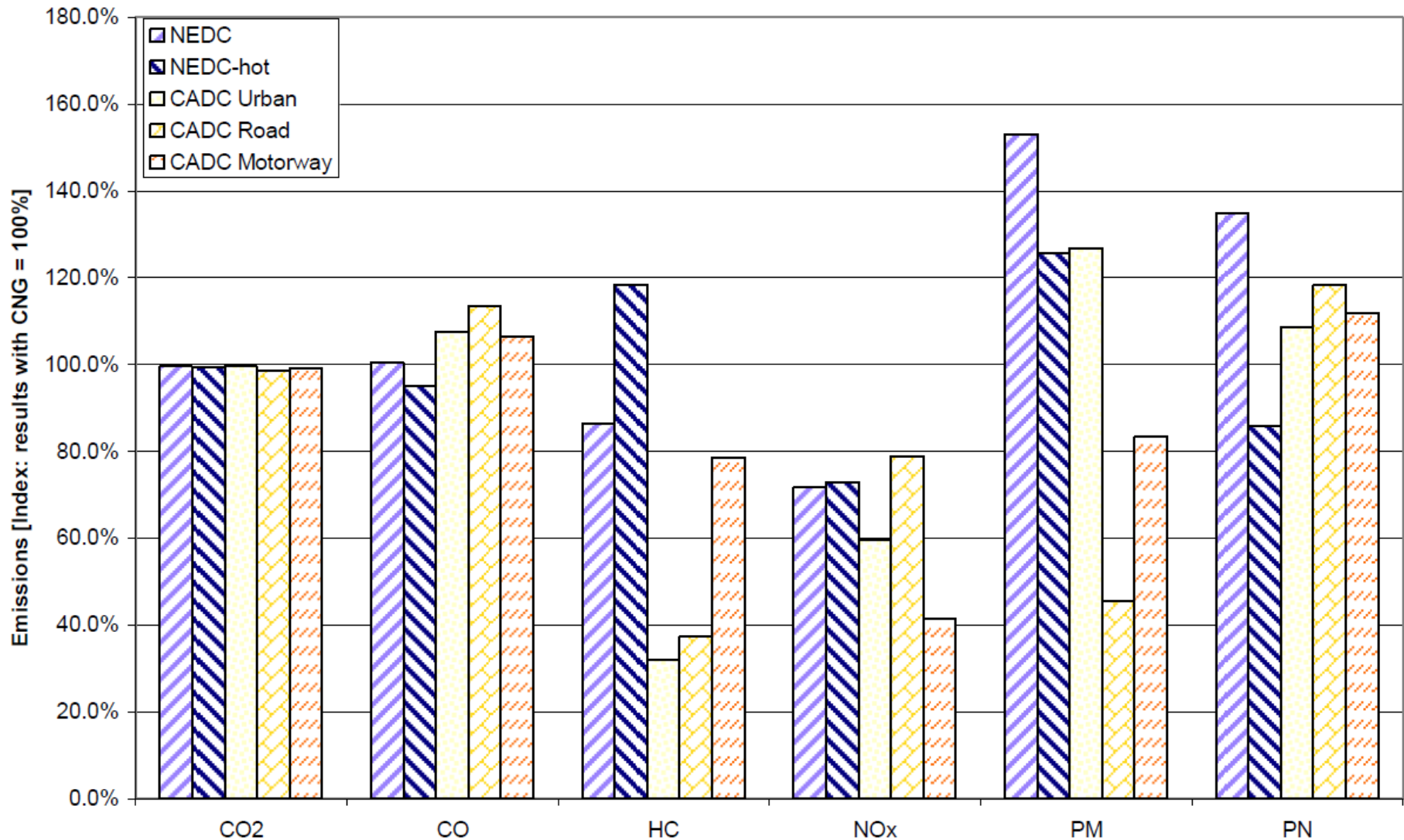
	unit	Germany DVGW regulation G260	Austria ÖVGW regulation G31	BioSNG
Wobbe Index	[kWh/m ³]	12,8-15,7	13,3-15,7	14,15
Relative density	[-]	0,55-0,75	0,55-0,65	0,56
Higher heating value	[kWh/m ³]	8,4-13,1	10,7-12,8	10,7

Results CNG car tests



- To assess the effects of Bio-SNG on the emission levels of modern CNG cars measurements on the chassis dynamometer of the Institute for Internal Combustion Engines and Thermodynamic at the University of Technology Graz were performed.
- A car was measured before and after the field trial with the Bio-SNG in the type approval test cycle as well as in real world test cycles.
- As car a VW Touran EcoFuel was used. The kilometrage of the vehicle was 14 000km at the start of the tests and 15 200km at the end of the tests.

Comparison BioSNG to CNG



GoBiGas

- Gasification of biomass and production of biomethane
- Commercial scale – approximately 100 MW gas - with the potential of producing 800 biomethane GWh per year
- High-calorific gas (SNG) by methanation for distribution in the existing gas grid
- Also possible to use the gas as fuel in Rya CHP-plant
- Situated in the harbour of Gothenburg with the potential to transport fuel by boat or train

Phase 1

- 20 MW generating 160 GWh/yr in operation 2012
- Allothermal gasification
- 2000 Nm³/hr or 16 MNm³/yr (equal to 15 000 vehicles/yr)

Phase 2

- 80 MW generating 640 GWh/yr in operation 2015/2016
- Technology not yet chosen
- 8000 Nm³/hr or 64 MNm³/yr (equal to 75 000 vehicles/yr)

Summary

- R&D on BioSNG is going on worldwide, but especially in Europe
- BioSNG has a very high efficiency (60-70% from biomass to SNG)
- One possibility for the transport sector (CNG cars)
- Method to use biomass also in large cities

More info at
<http://www.bio-sng.com/>



Figure from Agnion