Gasification based co-generation

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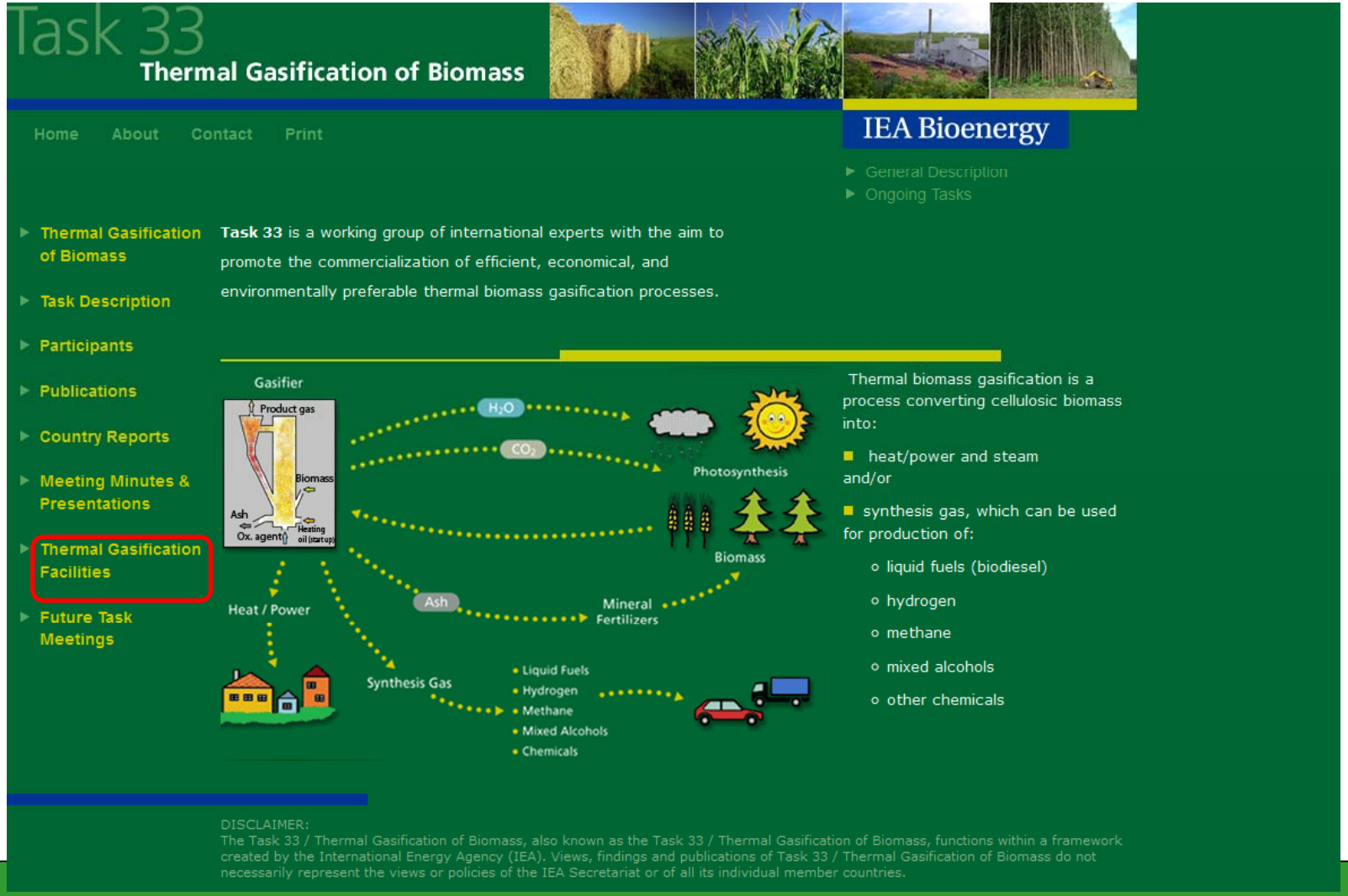
Bioenergy 2020+

Homepage – www.ieatask33.org



Thermal gasification facilities - database

Technology	Type	Status
co-firing	pilot	planned
CHP	demo	announced
synthesis	commercial	under construction
other innovative		under commissioning
		operational
		on hold

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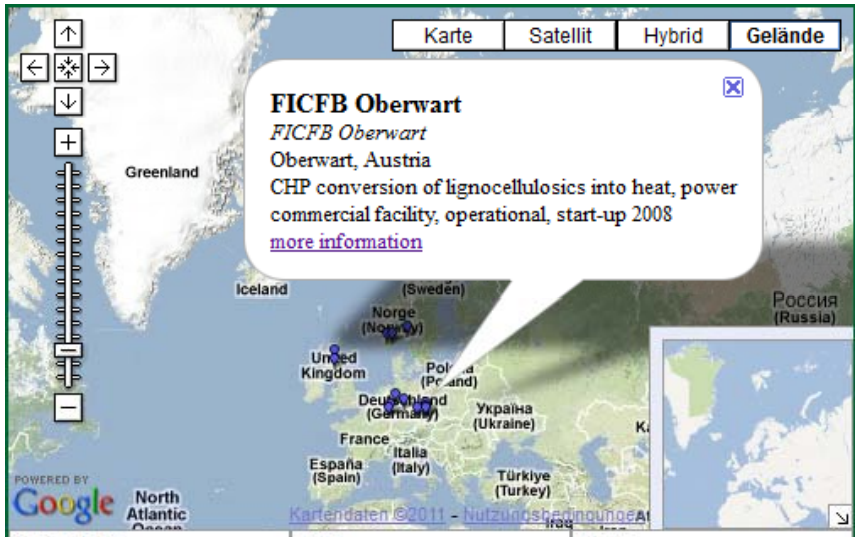
Gasification unit - example



Technology	Type	Status
☐ co-firing	☐ pilot	☐ planned
☑ CHP	☐ demo	☐ announced
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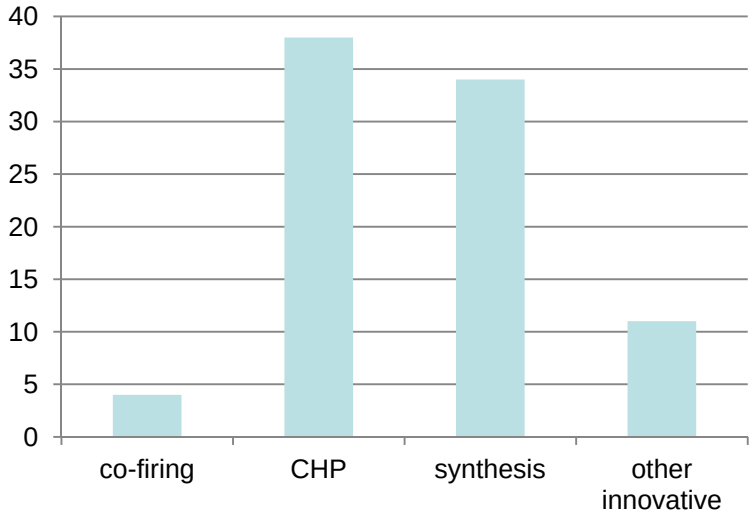
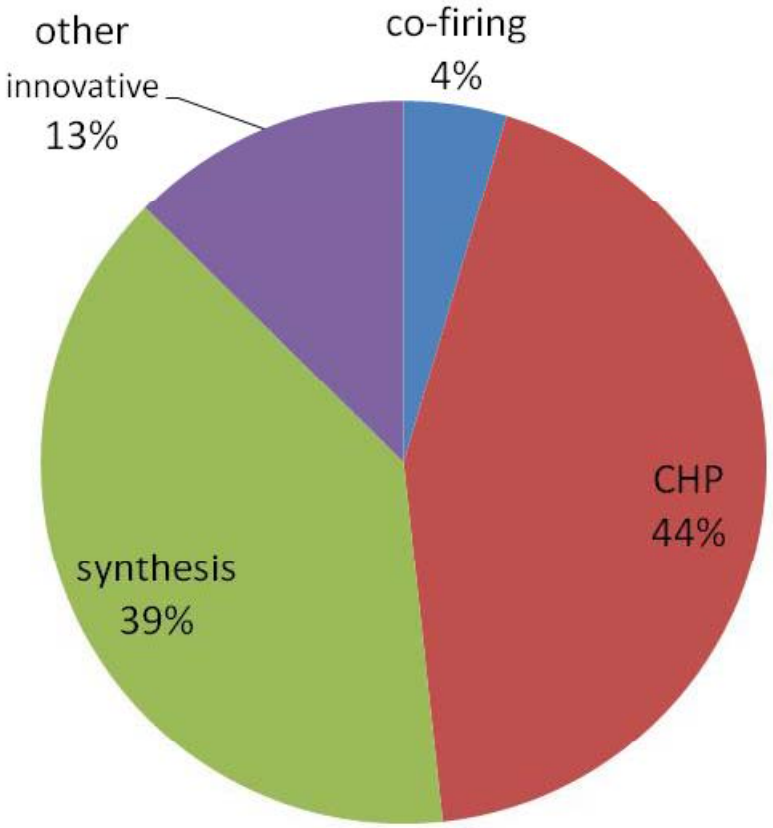
		☑ operational
		☐ on hold

Data sheet:	
Coordinating Organisation/Company	FICFB Oberwart
Project Name	FICFB Oberwart
Location	Oberwart, 7400, Austria
Technology	CHP conversion
Raw Material	lignocellulosics; wood chips
Input	8,7 MWfuel
Product	heat; power;
Output	1-6 MWth; 2,7 MWel
Facility Type	commercial
Partners	Ortner Anlagenbau
Total Investment	16 M Euro
Status	operational
Start-Up	2008
Technology Brief	FICFB, steam as oxidizing agent in gasification zone, air in combustion zone In Oberwart the second Biomass CHP with the concept of the FICFB gasification system was realised. It consists similar to the biomass CHP Güssing of gas generation in a DFB system, gas cooling and gas clean-up in a bag filter followed by a tar scrubber. The cooled and cleaned producer gas is fed into two gas engines for power generation. In addition there is an biomass drying unit and an organic rankine cycle (ORC) integrated, to have a higher electric efficiency. For the ORC all heat at the biomass CHP is collected by thermo-oil and transferred in the ORC in electricity.
Contact Person	Ing. DI (FH) Dr. Klaus Bosch ; Tel.: +43 (0) 26829015-752
Picture	

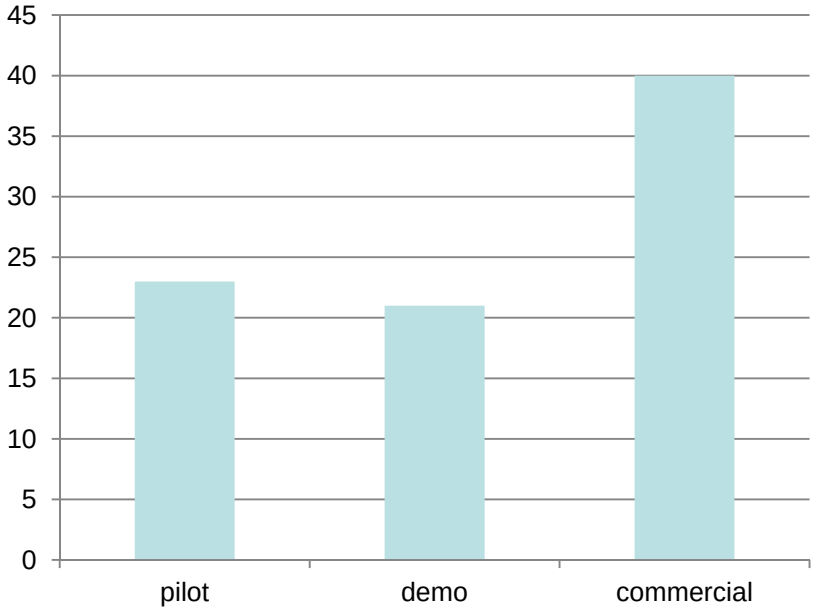
Technology

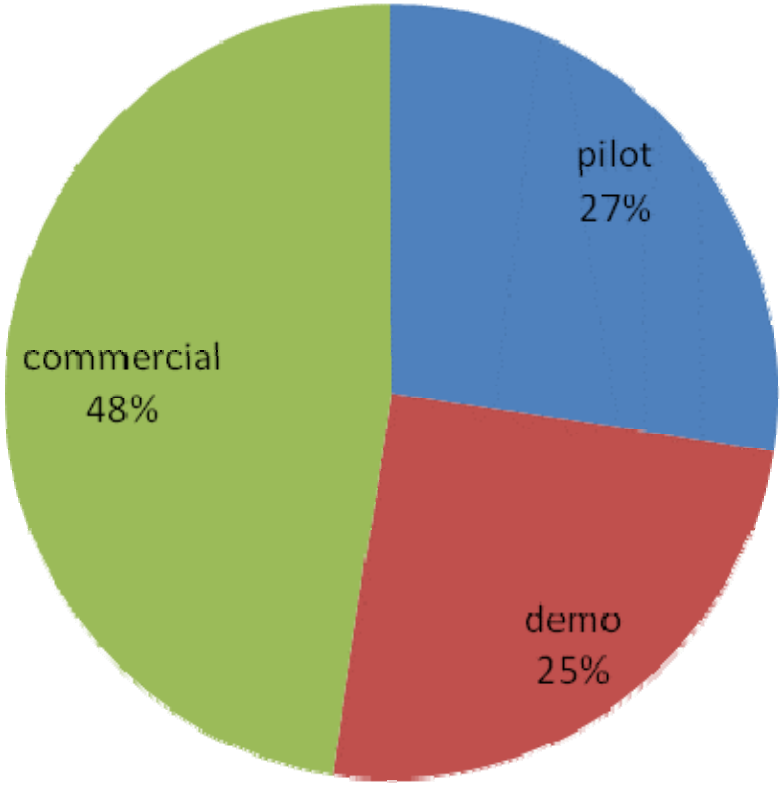


co-firing	4
CHP	38
synthesis	34
other innovative	11



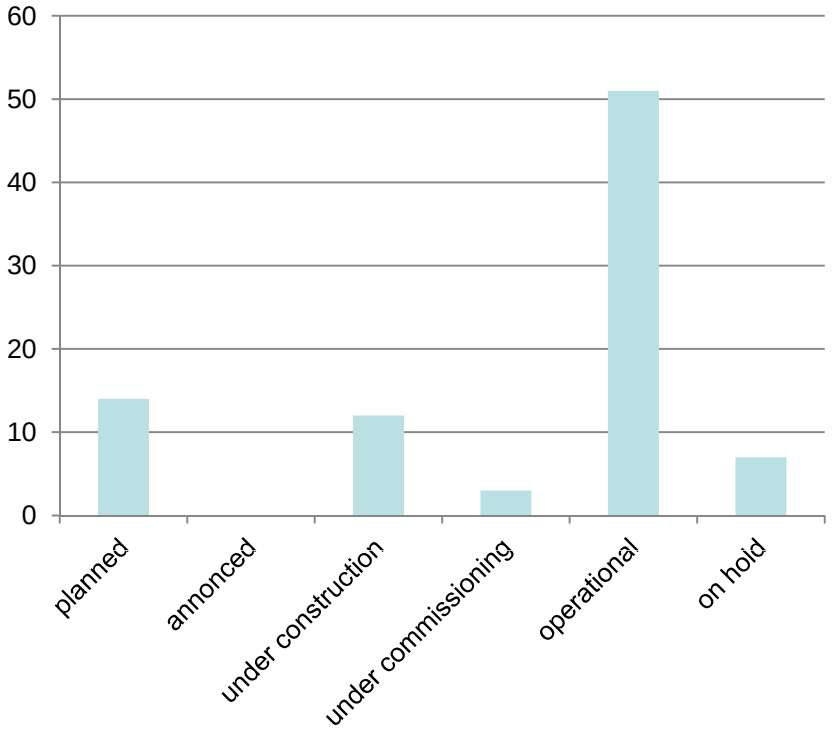
Scale

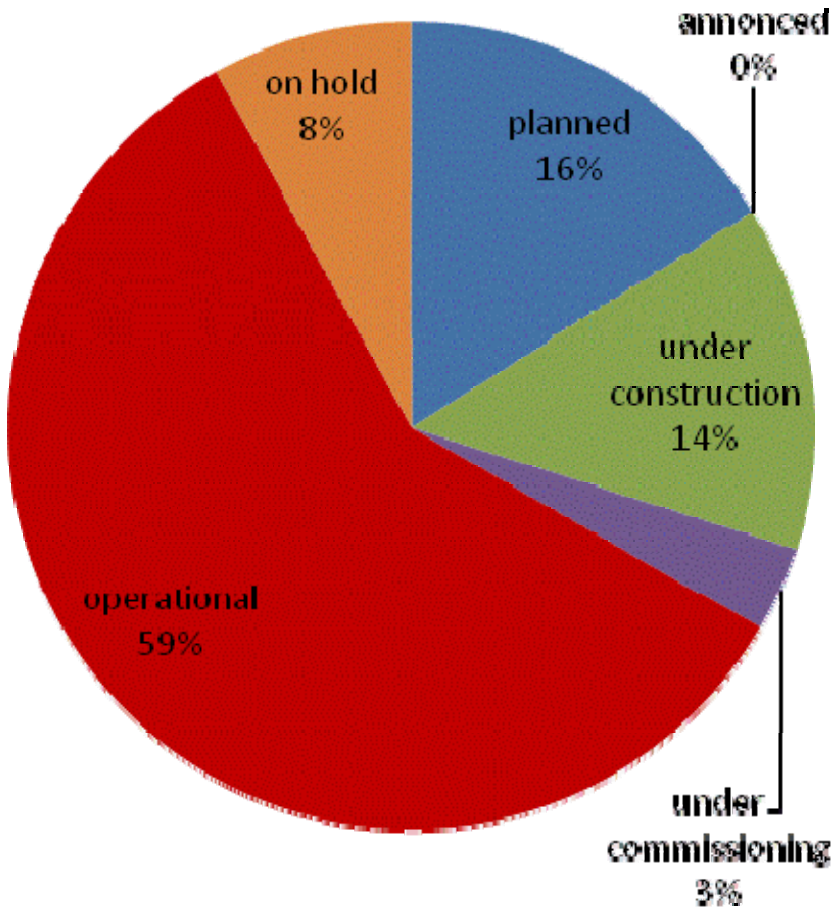




pilot	23
demo	21
commercial	40

Status

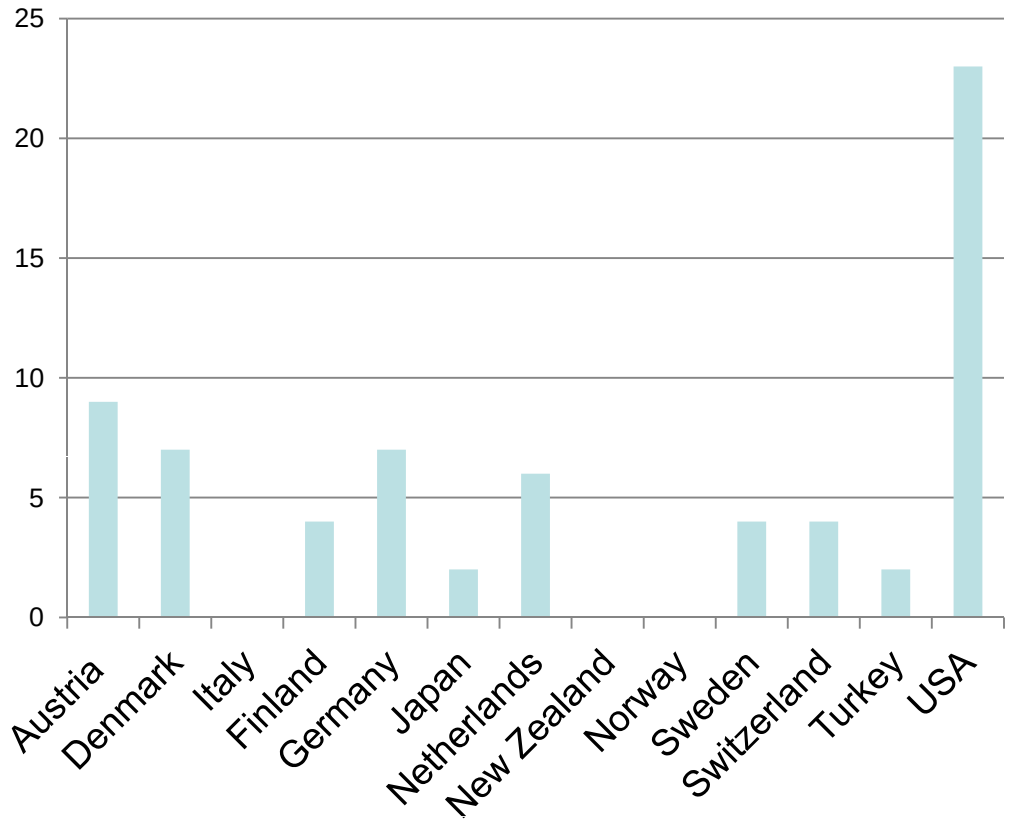


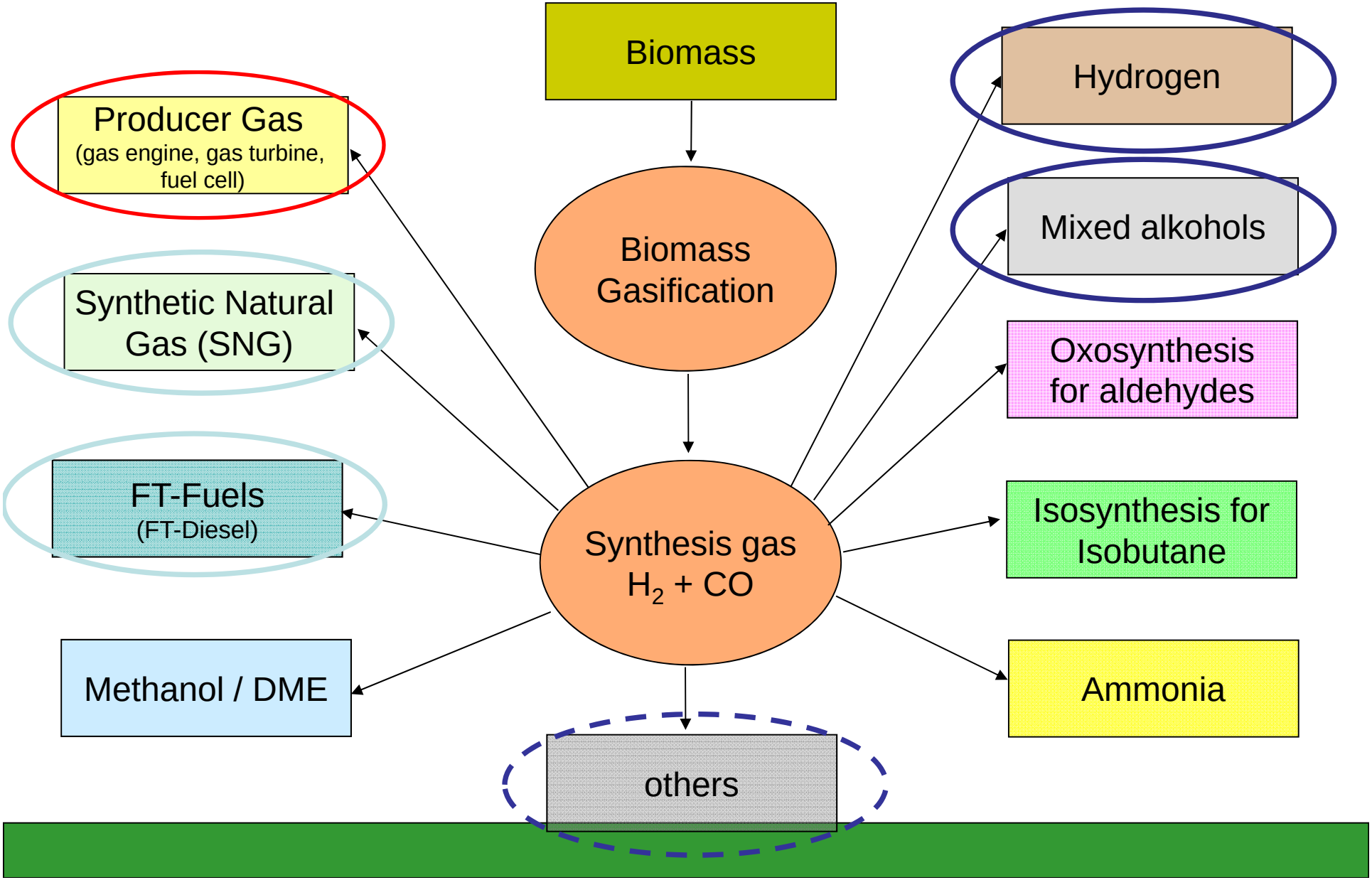


planned	14
annonced	0
under construction	12
under commissioning	3
operational	51
on hold	7

Active gasifiers as in the database

Austria	9
Denmark	7
Italy	0
Finland	4
Germany	7
Japan	2
Netherlands	6
New Zealand	0
Norway	0
Sweden	4
Switzerland	4
Turkey	2
USA	23




Biomass
Producer Gas
(gas engine, gas turbine, fuel cell)
Biomass Gasification
Hydrogen
Mixed alkohols
Synthetic Natural Gas (SNG)
Oxosynthesis for aldehydes
FT-Fuels
(FT-Diesel)
Synthesis gas
H_2 + CO
Isosynthesis for Isobutane
Methanol / DME
Ammonia
others

Economic frame conditions in Austria

- Biomass costs: 1.8-1.9 c€/kWh (80-90 €/t_{dry})
- Feed in rate for electricity (not valid anymore): 16 c€/kWh for electricity from forest wood chips, <2MW_{el}, independent on technology
- Price of heat: 2.0-4.0 c€/kWh, depends on average biomass price and light heating oil price
- No funding of investment costs, except if a demonstration plant

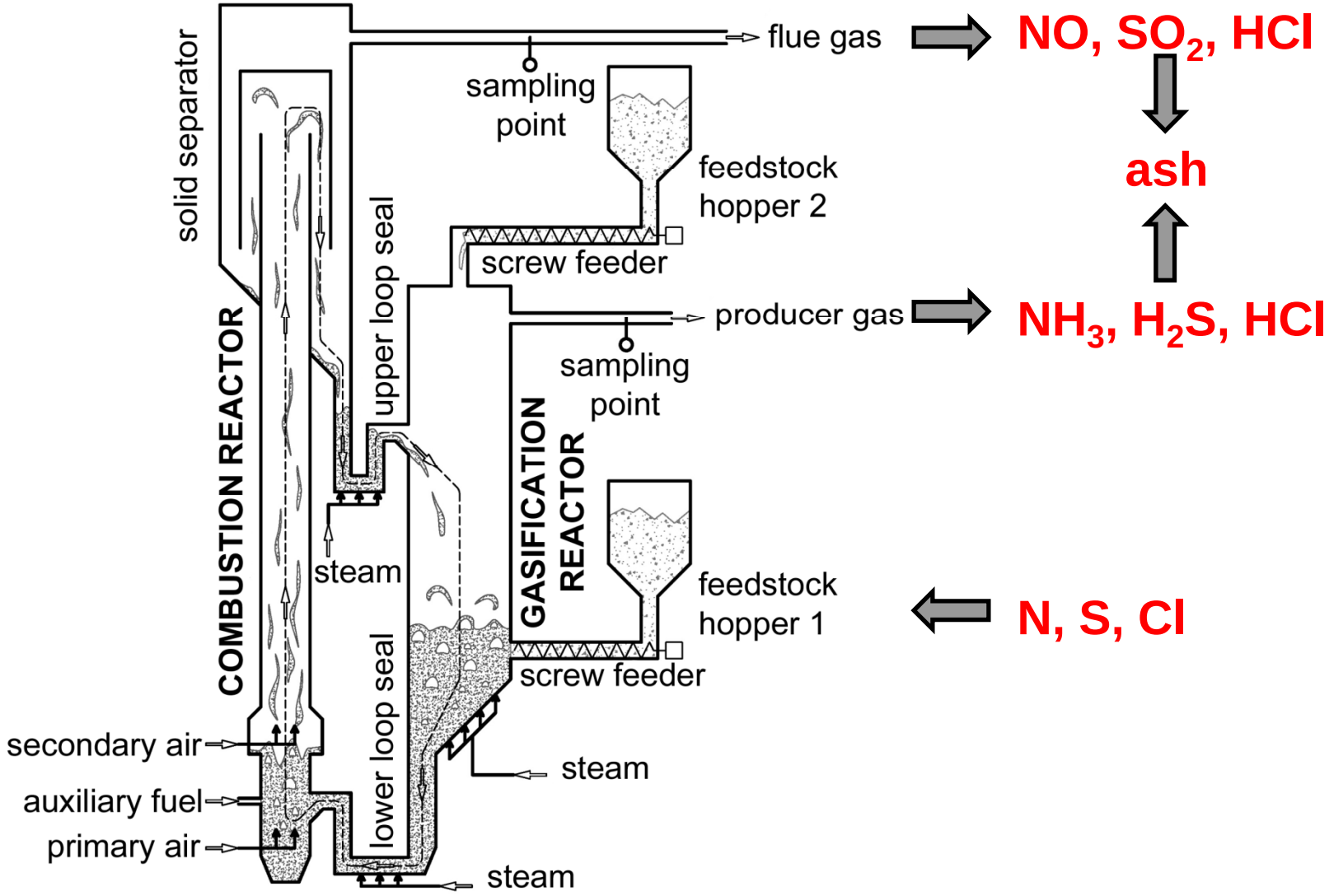
Team of R&D

- Scientific partners

- Engineering (as example)

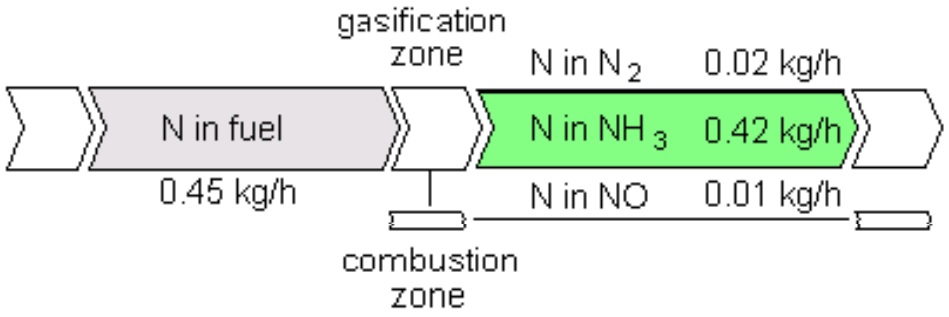
- Operators (as example)

Distribution of elements in the DFB gasifier

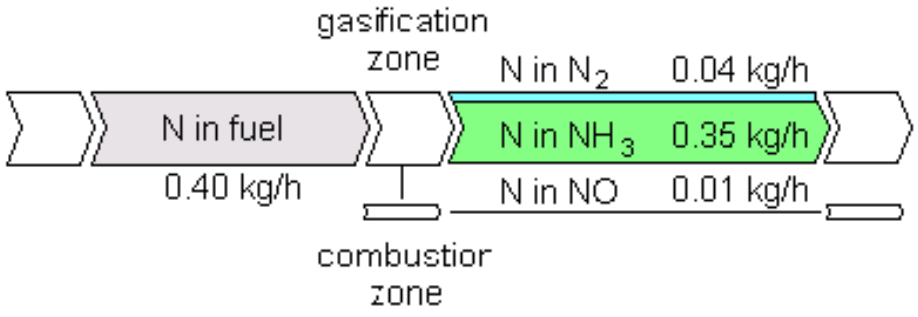


Distribution of nitrogen

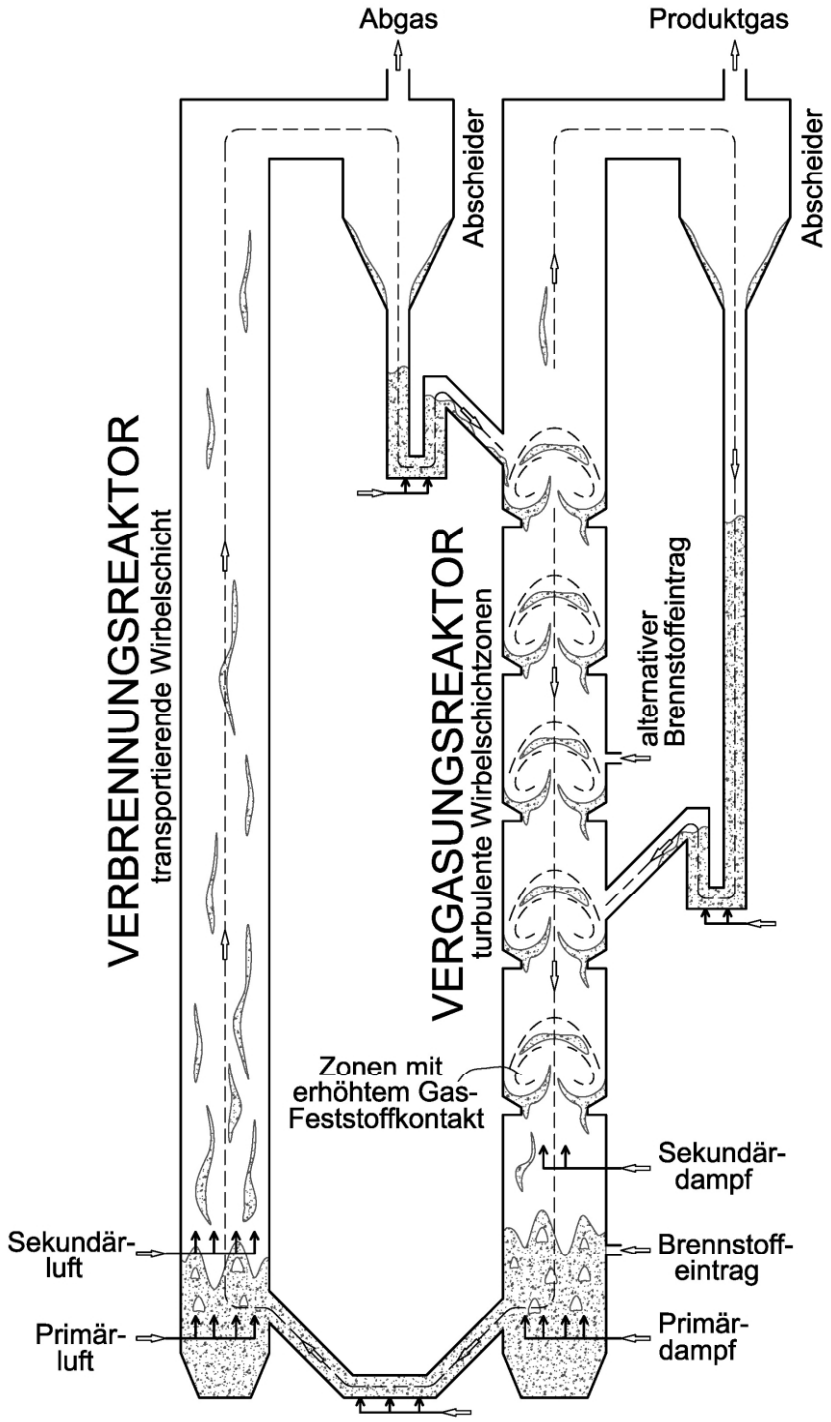
Waste wood A



Waste wood B



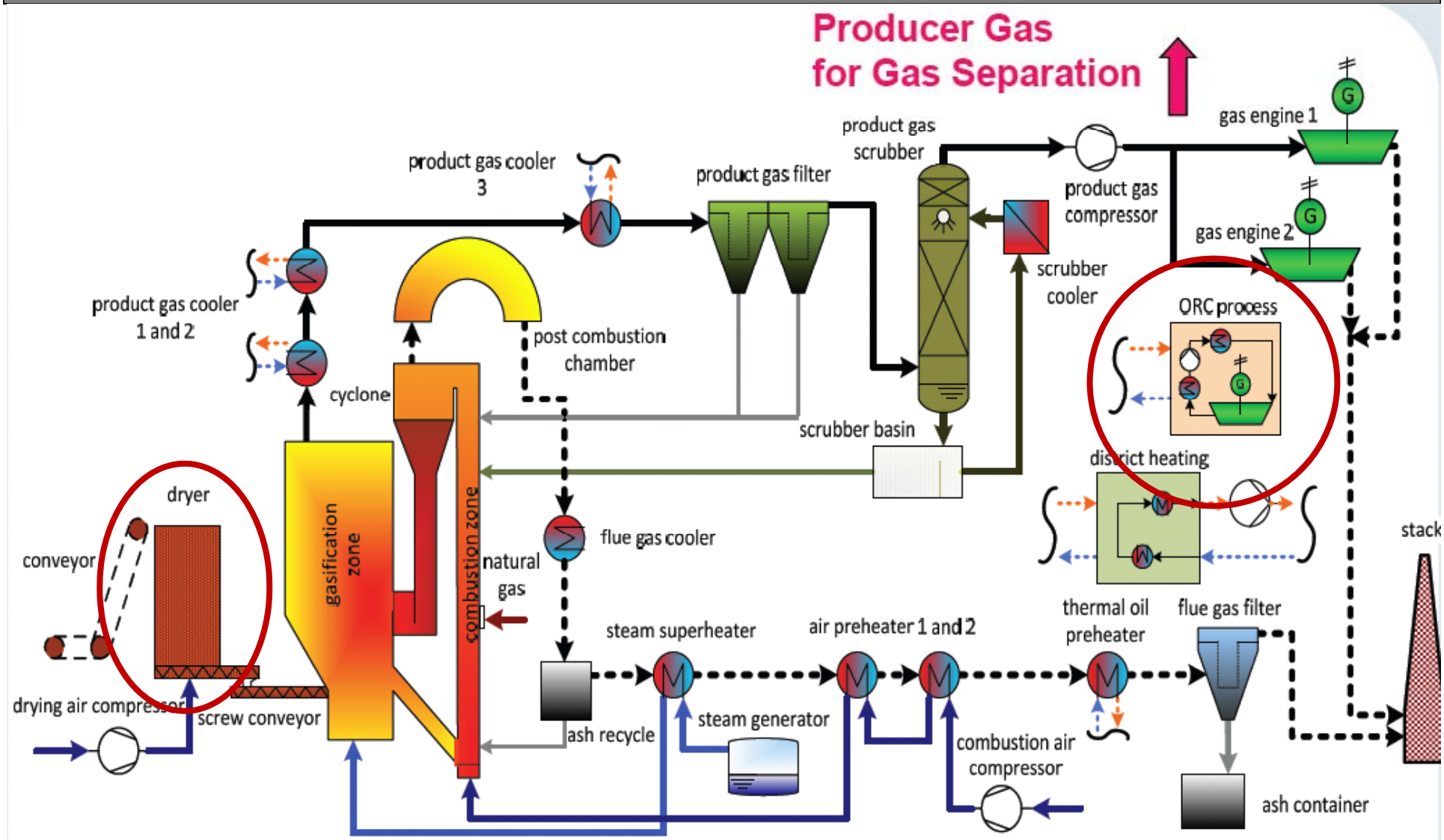
G-volution System



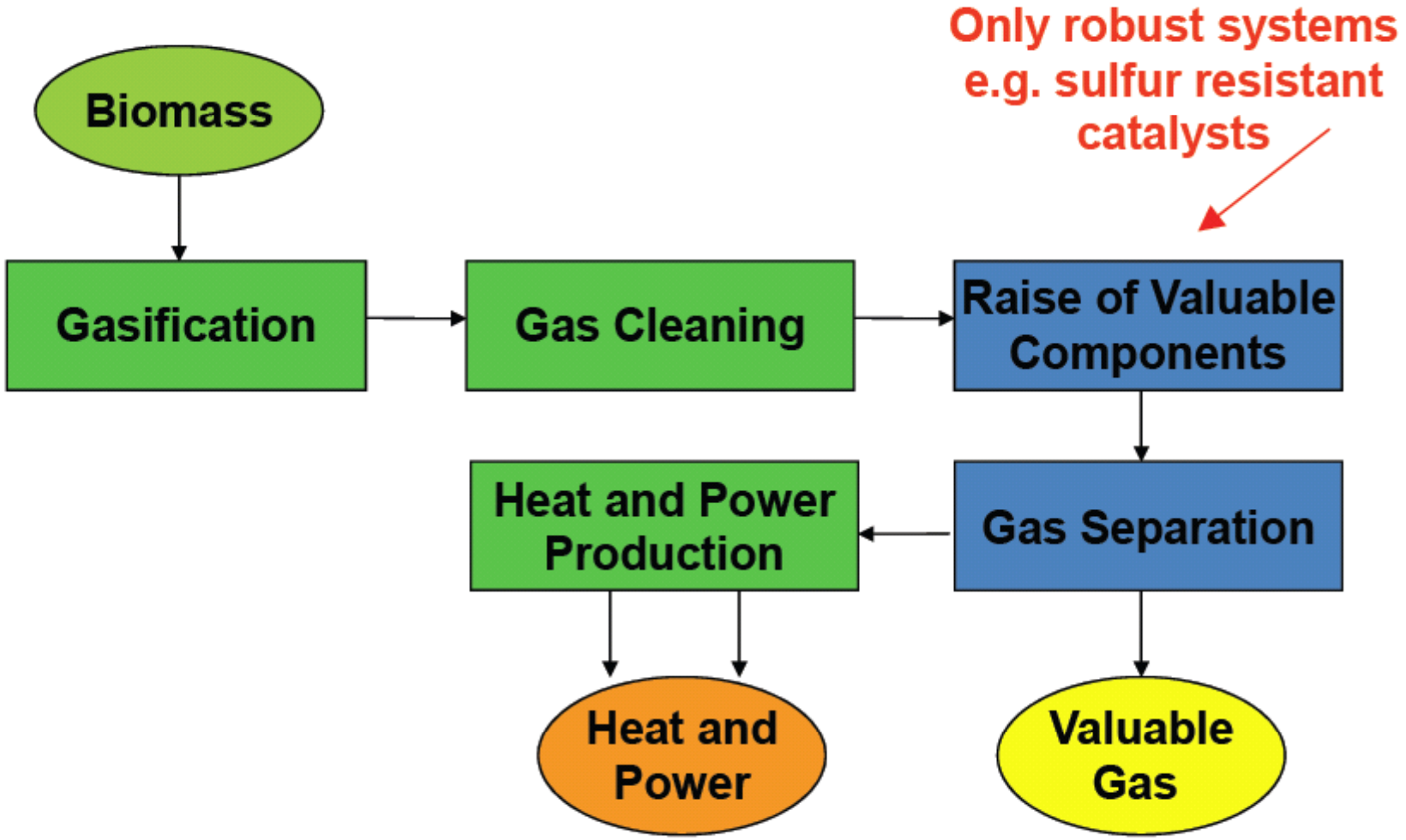
Commercial FICFB gasifiers

Location	Product	Fuel / Product MW, MW	Start up	Supplier	Status
Güssing, AT	Gas engine	8.0_{fuel} / 2.0_{el}	2002	AE&E / Repotec	Operational
Oberwart, AT	Gas engine / ORC	8.5_{fuel} / 2.8_{el}	2008	Ortner	Operational
Villach, AT	Gas engine	15_{fuel} / 3.7_{el}	2010	Ortner	Commissioning
Klagenfurt, AT	Gas engine	25_{fuel} / 5.5_{el}	?	Ortner	planing
Ulm, DE	Gas engine / ORC	14_{fuel} / 5_{el}	2011	Repotec	Under construction
Göteborg, Sweden	BioSNG	32_{fuel}/20_{BioSNG}	2012	Repotec	planing
Vienna, OMV	Hydrogen	50_{fuel}/$30_{hydrogen}$	2015	Repotec	planing

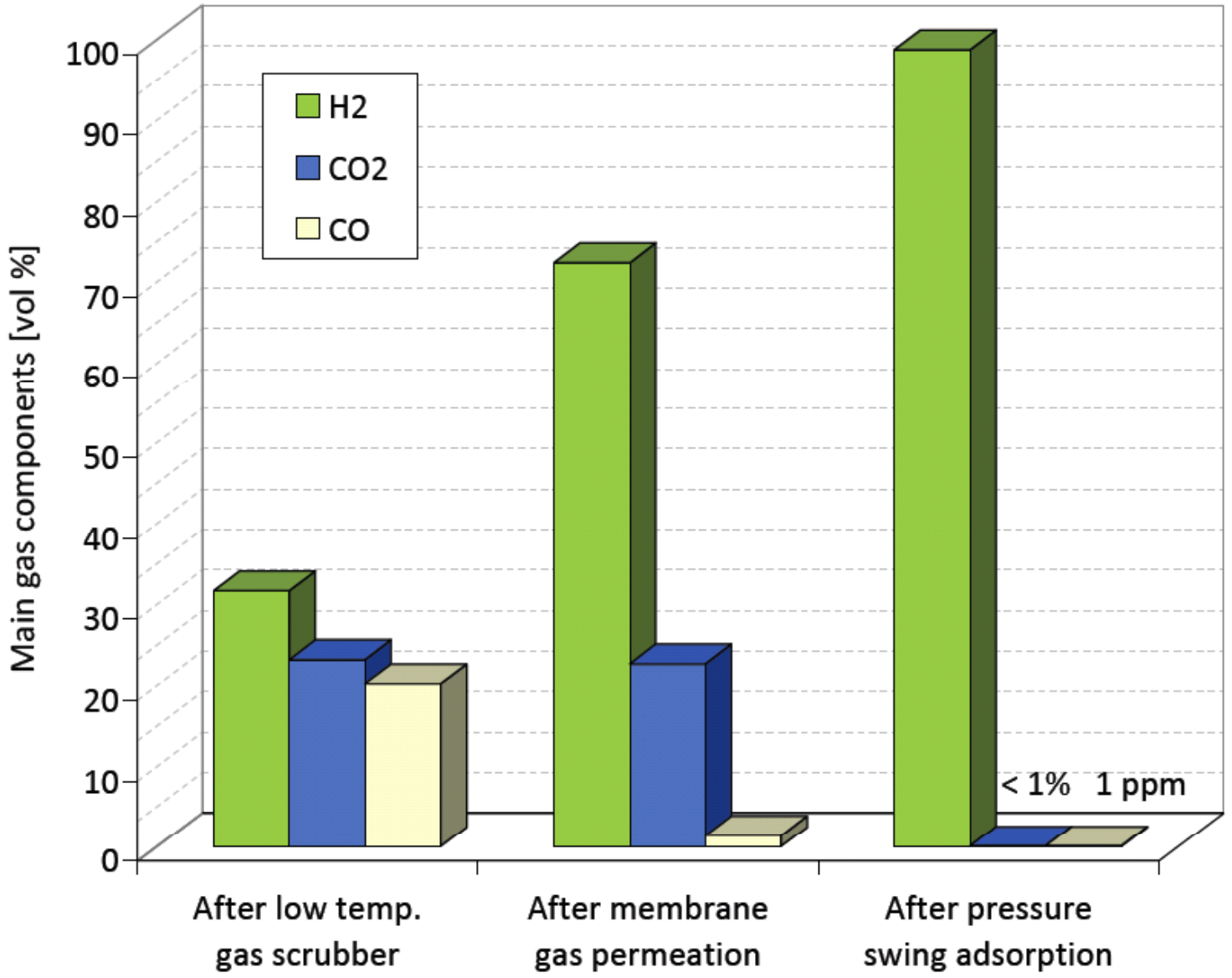
Schema Oberwart



Generalized Flow Sheet of a Polygeneration Process - Advanced Case



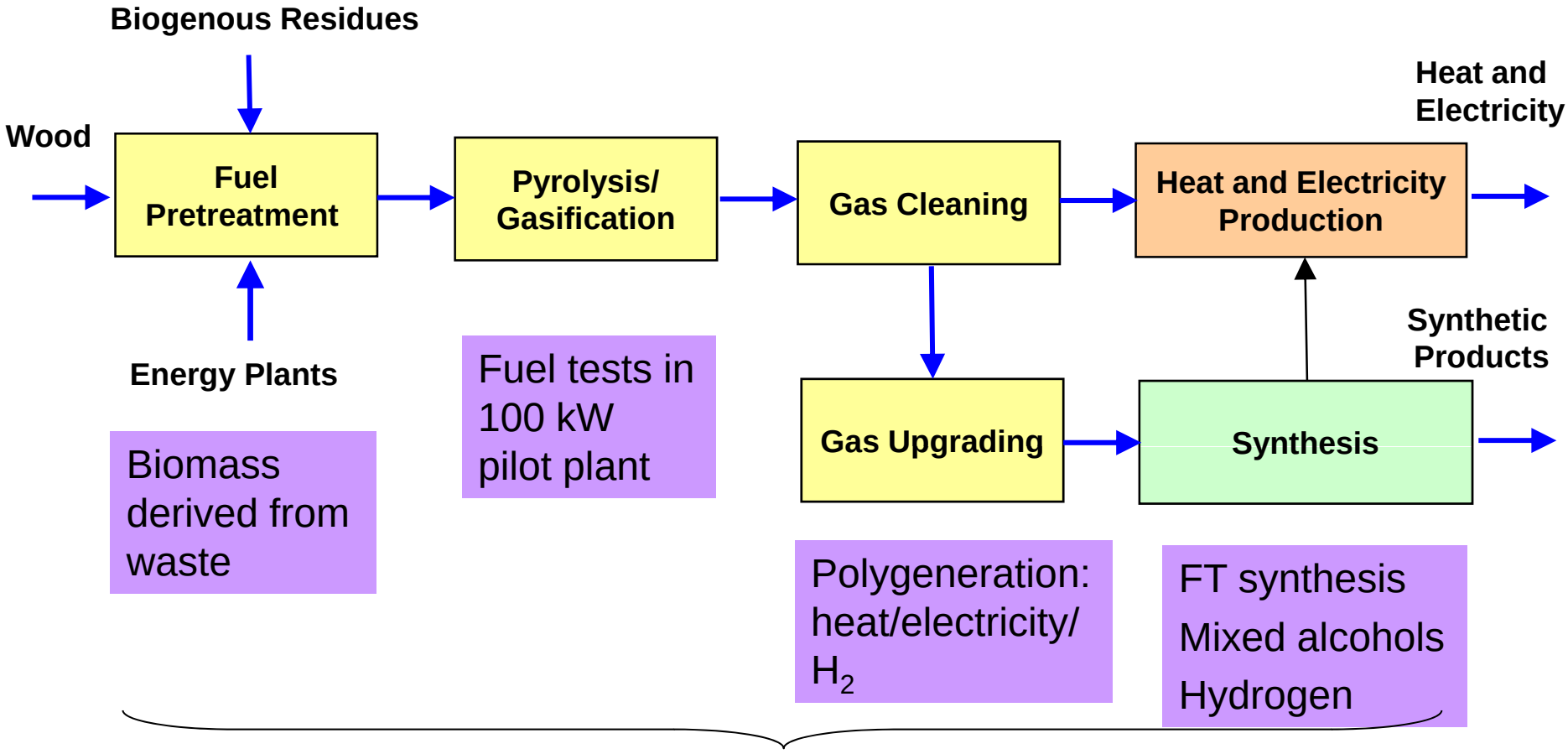
Results simple H_2



Bioenergy 2020+:

Gasification and synthetic biofuels

Research along the process chain



Mixed alcohols

- Funded by „Klima und Energiefonds“ and Bioenergy 2020+
- Aim is to get fundamental know how in the synthesis of mixed alcohols from biomass
- Main advantage is very simple gas cleaning, due to sulphur resistant catalyst

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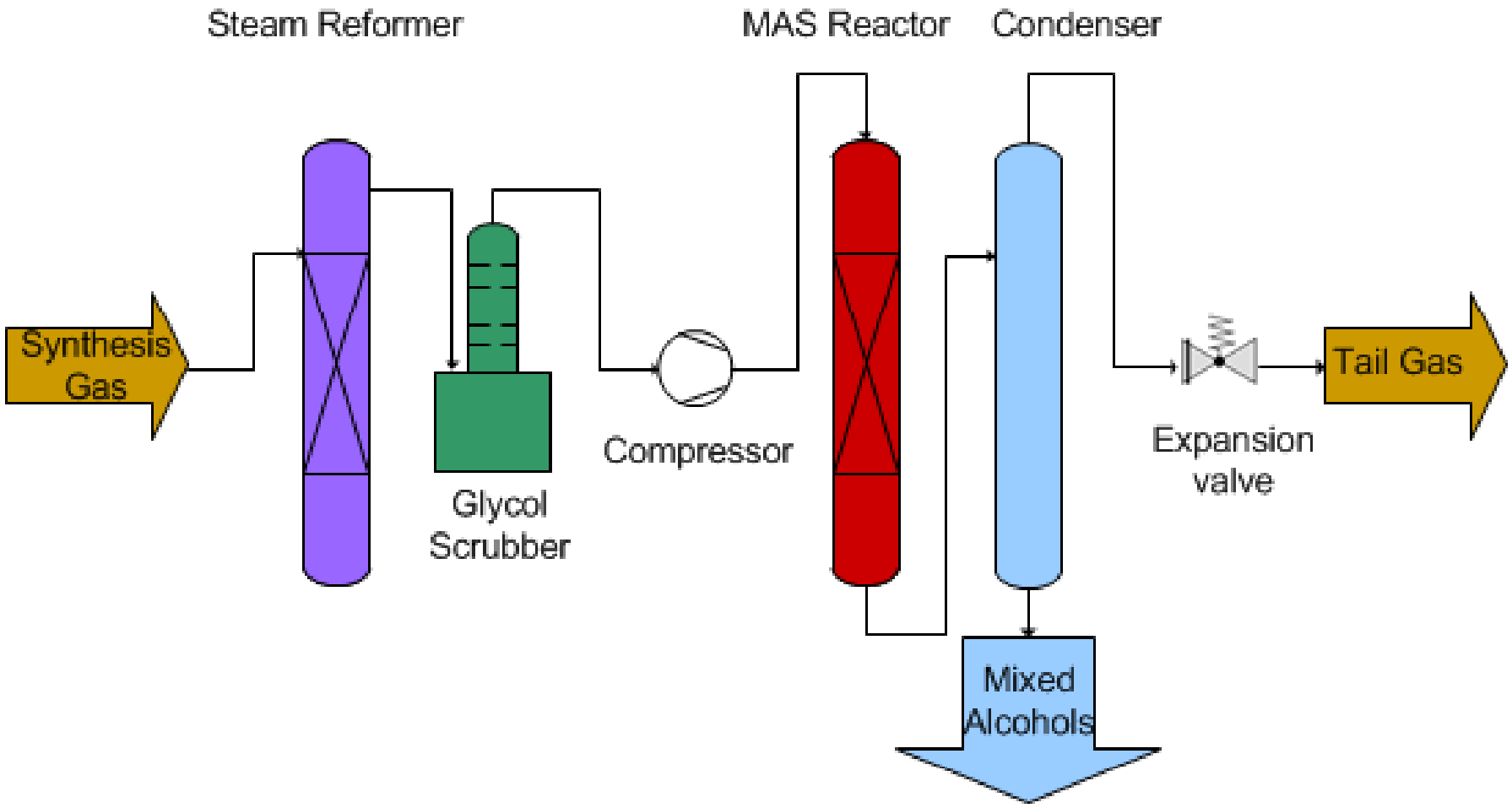
Mixed Alcohols Synthesis



Actual status: first experiments are done

Reformer

Drying (glycol-scrubber)

Compressor (5-7 Nm³/h; 90-300 bar)

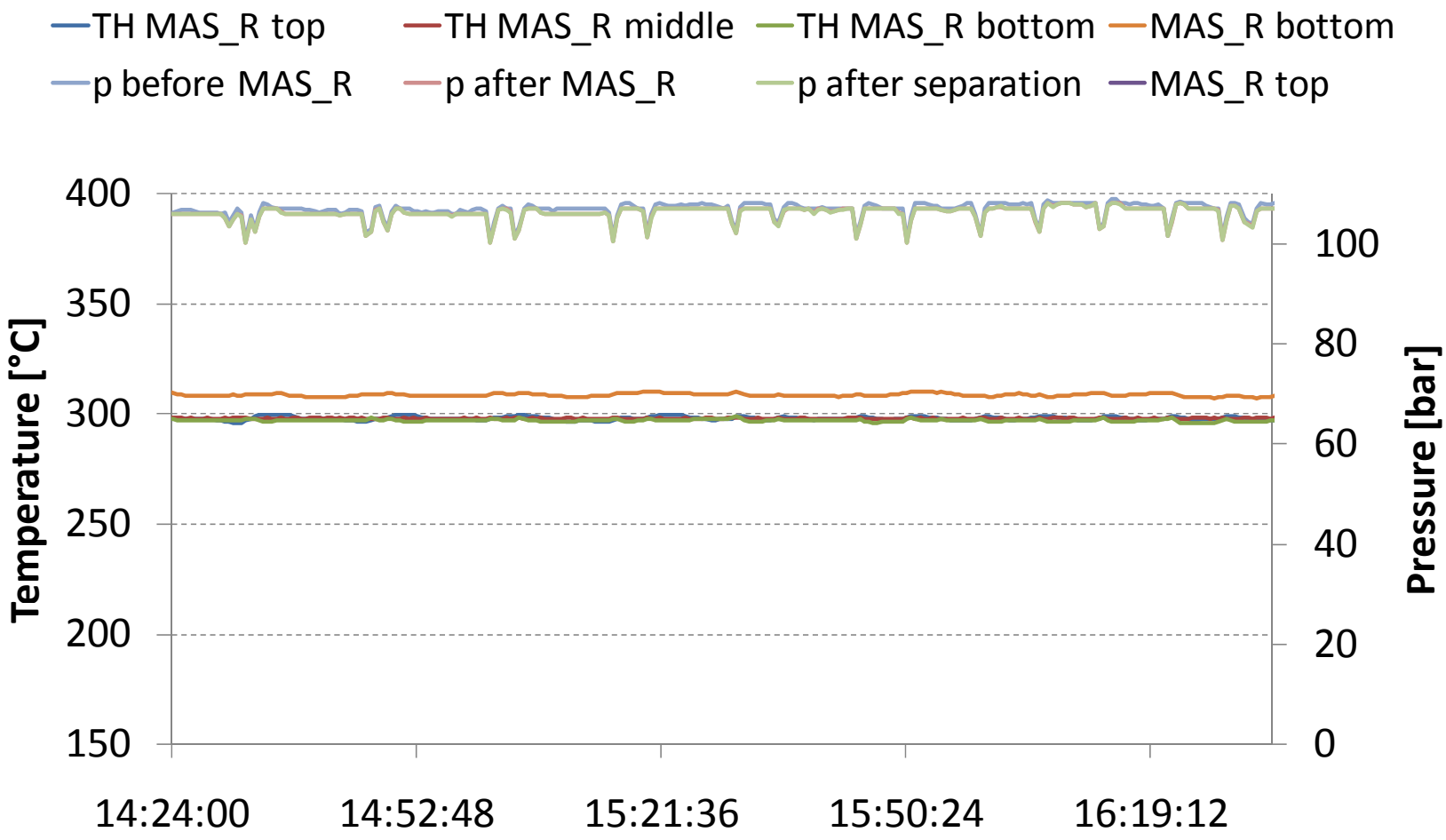
Reactor

Alcohols separation

Gas expansion

Temperatures and Pressures

MAS - Reactor



Summary

- Biomass CHP Güssing has excellent frame conditions for R&D on synthesis gas applications
- Focus of R&D is on small CHP and on synthesis gas applications (BioSNG, Fischer Tropsch, Mixed Alcohols, Hydrogen)
- Gasification enables the conversion of biomass to many useful products

More info at
http://www.ieatask33.org
http://www.ficfb.at
http://www.vt.tuwien.ac.at
http://www.bioenergy2020.eu