TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

Country Report Austria

IEA Bioenergy Task33 Meeting
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Content

- Policy
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Policy Targets

- ↓ Green house gas reduction of 16% by 2020
- ↑ Efficiency increase of 9% by 2016
- ↑ Increase of Renewables from 23% to 34% by 2020 (30.9% in 2009)
- ↑ Increase use of Biofuels for Transportation to 10% by 2020 (7.2% in 2009)
- ↑ Research expenditure increase to 3% of GDP

Targets of the Energy Strategy

Main target

- Security of energy supply – environmental friendly – cost effective
- Innovation oriented modification of the energy system

Additional target

- Attractive research- and technology location
- Market leadership and employment through research and technology development

Conflict of aims and win-win situation

Austrian Research Organisations

Graz University of Technology – Institute of Thermal Engineering

- Heat pipe reformer (former Technical University Munich, **actual transferred to University of Erlangen, Germany**)
- Distributed SNG production
- Health, Safety and environmental issues for gasification systems

Joanneum Research Graz - Department of Energy Research

- Life Cycle Assessment
- Microchannel FT technology

MCI – University of Applied Sciences for Environmental-, Process- and Biotechnology, Innsbruck

- Multi-staged fixed bed gasification systems

FJ-BLT Wieselburg (HBLFA)

- 1st and 2nd generation biofuels
- Representative of Austria in IEA Bioenergy Task 39 liquid biofuels

Austrian Research Organisatons

Bioenergy 2020+ (in cooperation with Vienna University of Technology)

- Pressurised gasification
- Usage of product gas from biomass CHP Güssing in a SOFC
- Production of FT liquids
- **Production of Hydrogen**
- **Waste gasification in FICFB gasifier (a 1MW gasifier is designed at the moment)**

Vienna University of Technology, Institute of Chemical Engineering

- R&D in dual fluidised bed steam gasification **(G-volution)**
- Production of Fischer Tropsch fuels
- Production of BioSNG
- Production of mixed alcohols
- Production of hydrogen for refineries
- Scientific Partner in Bioenergy 2020+
- Representative of Austria in IEA Bioenergy Task 33 Thermal gasification of biomass

Austrian companies

- **Andritz (former Austrian Energy & Environment)**
  - Activities with FICFB unclear, has still patent
  - Involved in Skive (over Carbona)
  - http://www.aee-austria.at/
- AGT Agency for Green Technology
  - Low Temperature Conversion (LTC) is a thermo catalytic decomposition process operating without air supply
  - http://www.agt-world.com/
- Austrian Enviro Technologies
  - http://www.austrian-enviro.com
- GE Jenbacher
- Ortner Anlagenbau
  - builds FICFB gasifiers for CHP applications

Austrian companies

- Repotec
  - builds FICFB gasifiers for CHP, BioSNG and other synthesis
  - http://www.repotec.at
- SynCraft Engineering GmbH
  - http://www.syncraft.at
- Urbas
  - fixed bed gasification (2 units in Upper Austria)
  - http://www.urbas.at
- Xylogas
  - fixed bed gasification
  - http://www.xylogas.com/

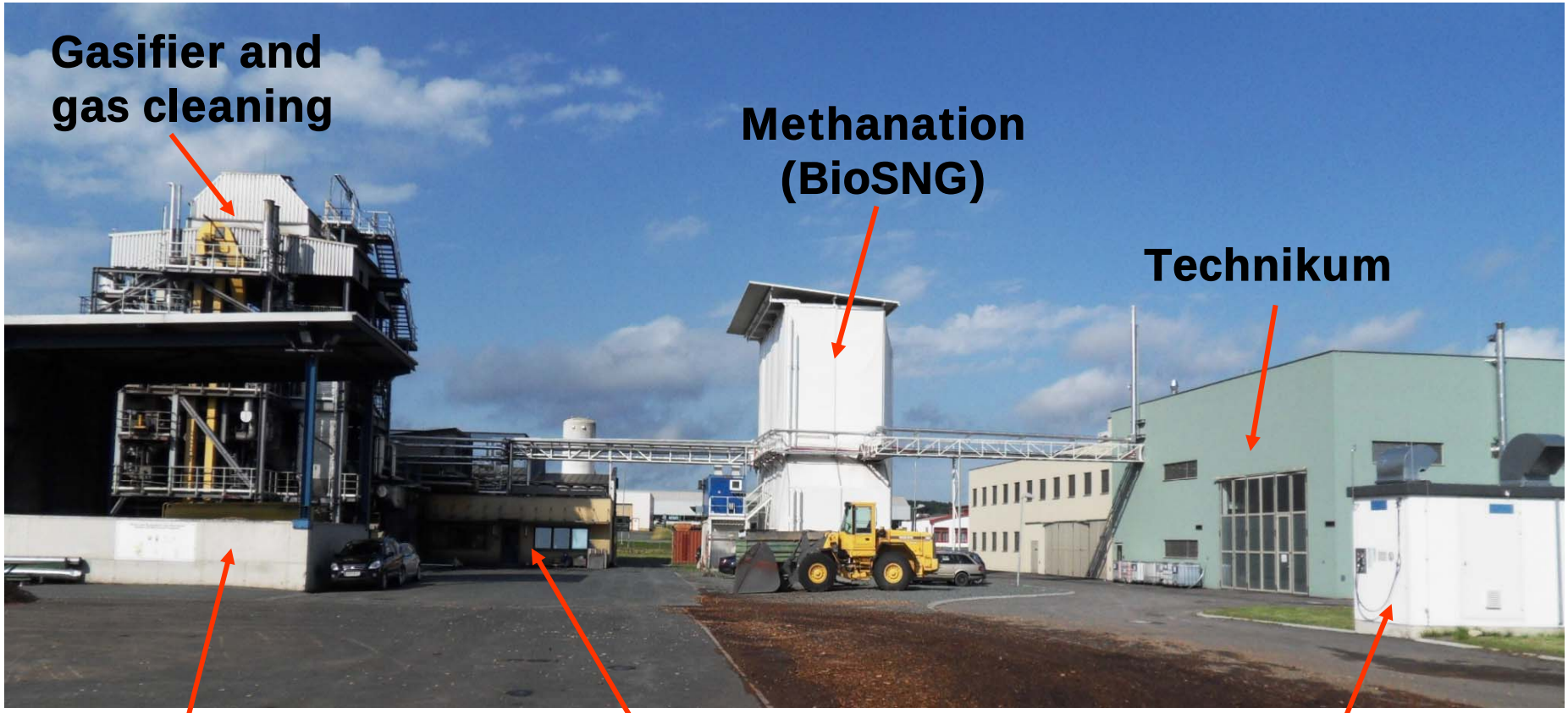
Commercial FICFB gasifiers

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

OBERWART (AT):

VILLACH (AT):

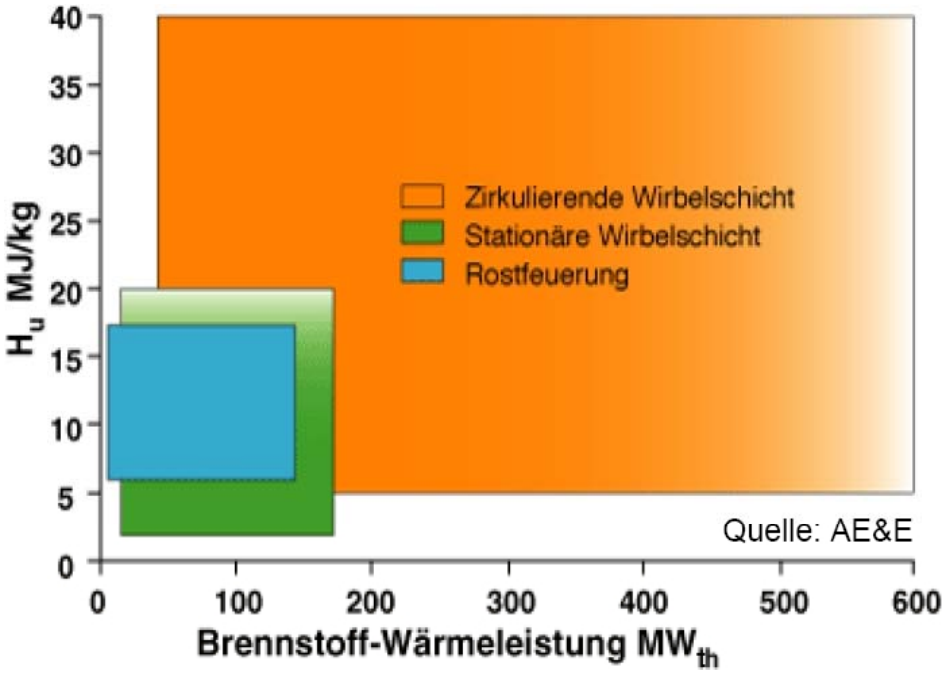
GÜSSING (AT):


Gasifier and gas cleaning
Methanation (BioSNG)
Technikum
Fuel bunker
Control room
BioSNG filling station

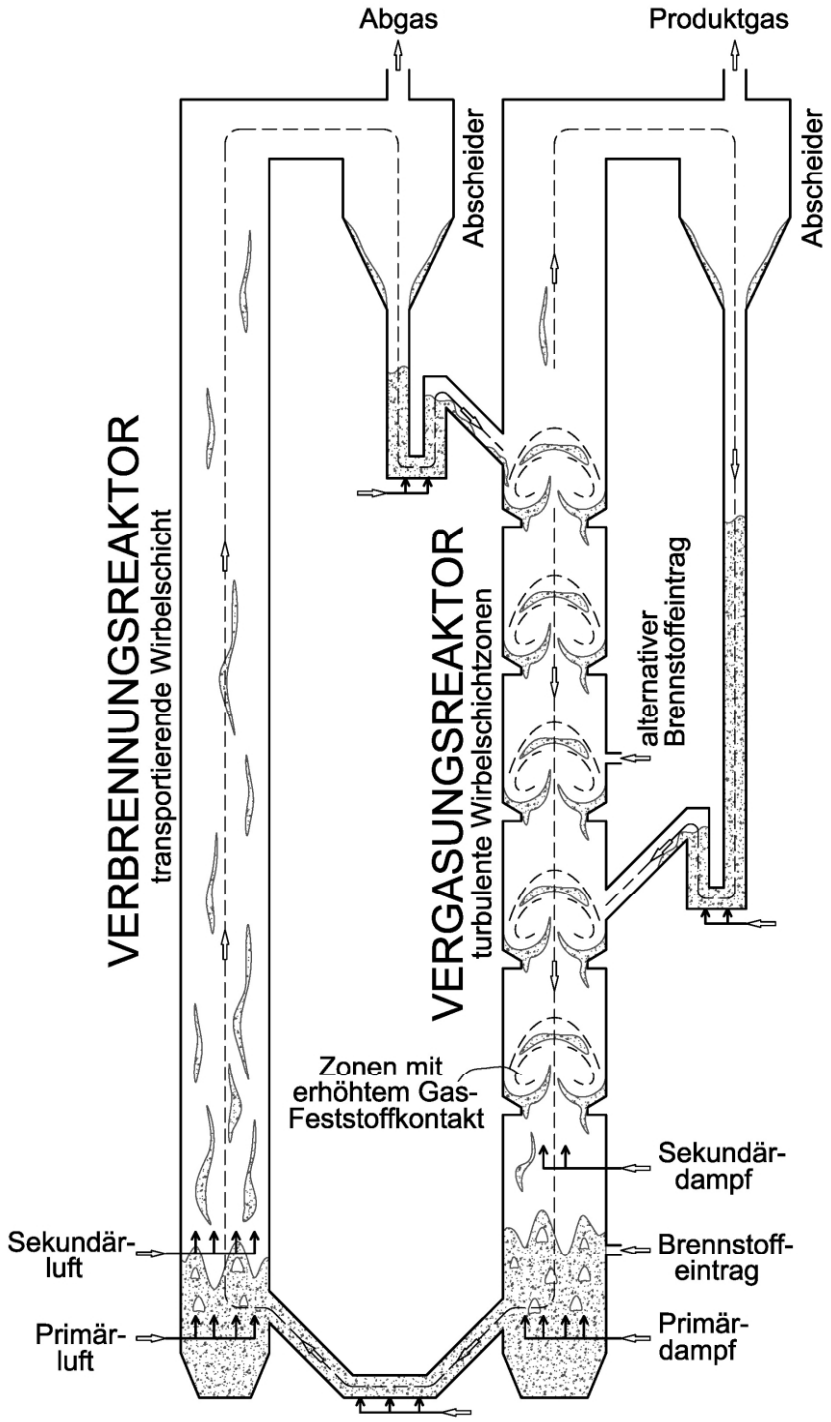
Limits of the actual FICFB gasifier and aims for the new development

- fuels: varitiy & quality

  biogen wastes, particle size, amount of fines, ash content, solid, liquid, water content, volatiles, heating value
- Gas/solid contact (bubbling FB with Freeboard)
- residence time of intermediates in FB
- tar content (always important)
- loss of fly coke (is recycled, but can be avoided)
- fuel feeding point (residence time)
- overal efficiency
- fuel throughput (bubbling FB)



G-volution System

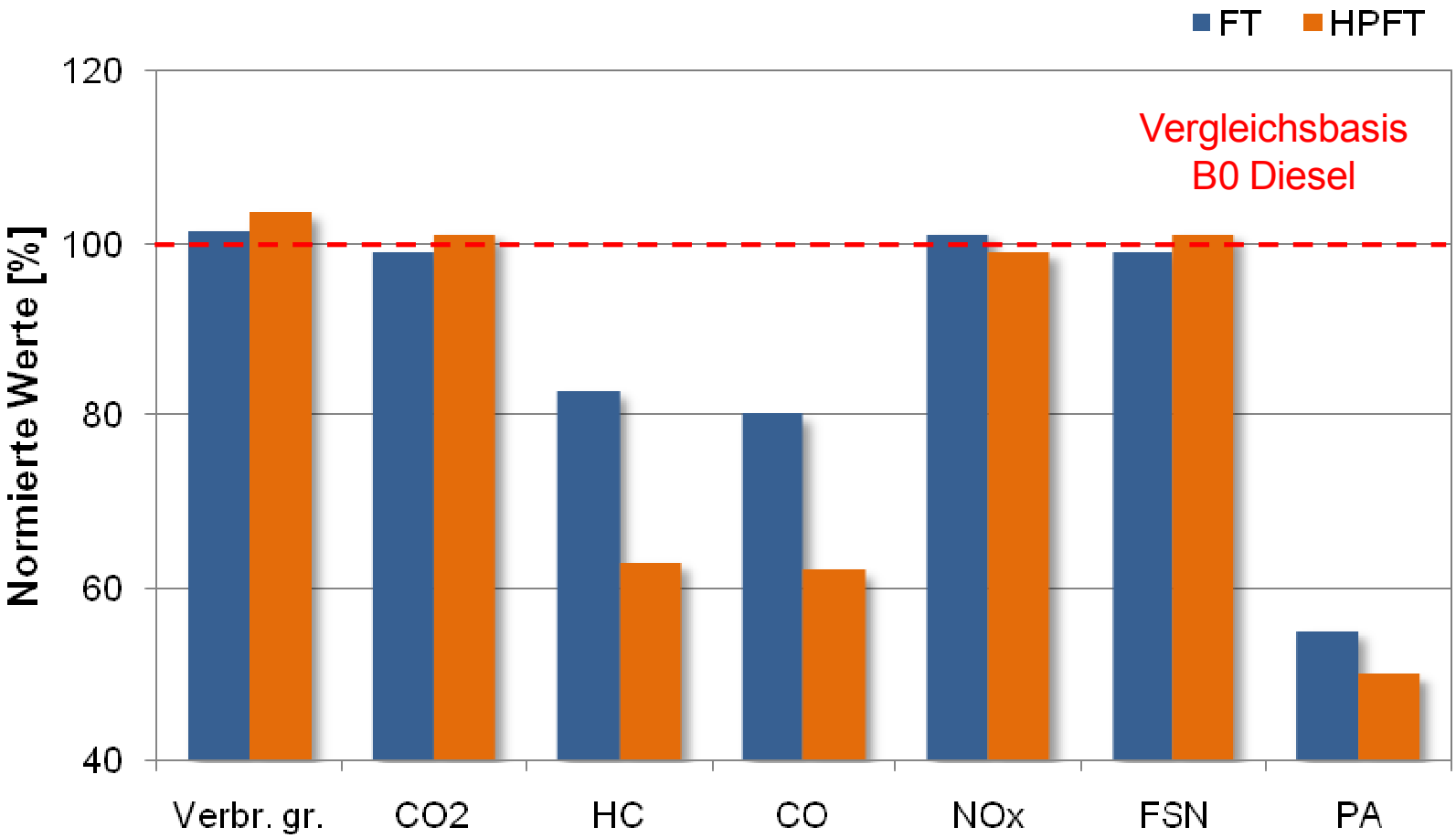


FT synthesis

2 FT synthesis are in operation at biomass CHP Güssing:

- 5kg/day lab scale based on slurry FT (by Vienna, University of Technology and Bioenergy 2020+)
- 1bpd pilot scale based on microchannel technology (by SGC Energia)

Results on engine tests with 20% blends



Press release from Velocys (16 August 2010)

Biofuels: FT microchannel demonstration project now up and running

The biomass-to-liquids (BTL) demonstration plant, jointly operated by the Oxford Catalysts Group and the Portuguese incorporated holding company SGC Energia (SGCE), at the biomass gasification facility in Güssing, Austria, is now up and running. The plant is designed for the small scale distributed production of biofuels via the Fischer-Tropsch (FT) reaction.

The demonstration plant, which is being managed by SGCE, has been fully operational for over a month. Initial results indicate that the equipment – including the Güssing gasifier, a gas conditioning unit supplied by SGCE and an FT microchannel reactor skid developed by the US-based member of the Oxford Catalysts Group, Velocys, Inc. – is operating smoothly.

The FT microchannel reactor, comprised of over 900 microchannels, is working effectively. It is proving to be very efficient at controlling temperatures in highly exothermic (heat-generating) FT reaction and at maintaining isothermal conditions throughout the reactor. The demonstration plant is already producing over 0.75 kg of high quality FT liquids per litre of catalyst per hour – 4 to 8 times greater productivity than conventional systems. The unit is also demonstrating robust responsiveness to shutdowns and start ups.

These results confirm the significant process intensification potential of the FT technology. Performance will improve further after the steam superheating section of the plant is debottlenecked at the next scheduled shutdown. Going forward, the demonstration plant will be operated over a wide range of conditions to establish and confirm its performance. It also will be further tested in an extended 3-month steady state run.

SGCE has already secured the host site and initiated engineering activities for its first commercial synthetic fuels facility. Following successful demonstration at Güssing and completion of the technical milestones, SGCE intends to place its first commercial order with the Group. www.sgc.pt

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

BioH2-4Refineries

Economic evaluation of production of hydrogen for a refinery

- Coordination by OMV
- 50 MW fuel plant to replace fossil hydrogen
- Evaluation of the biomass resources available for such a plant
- Basic - engineering of the gasifier as well as of all other sub units, including pipelines, utility systems, logistic needs
- Optimal use of by-products
- Economic evaluation

Summary

- Work is going on
- Research centre Bioenergy 2020+ is working on many different projects (hydrogen, waste)
- Political frame conditions are good, but there is the trend to electric cars
- Biomass CHP Güssing is on the way to a biosyngas platform
- At CHP Oberwart first R&D projects come into operation (e.g. hydrogen separation)