TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

IEA FORSCHUNGS KOOPERATION

Country Report Austria

IEA Bioenergy Task33 Meeting

November 2013

Gothenburg, Sweden

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Institute of Chemical Engineering

Working Group Zero Emission Technology

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FFG FORSCHUNG WIRKT.

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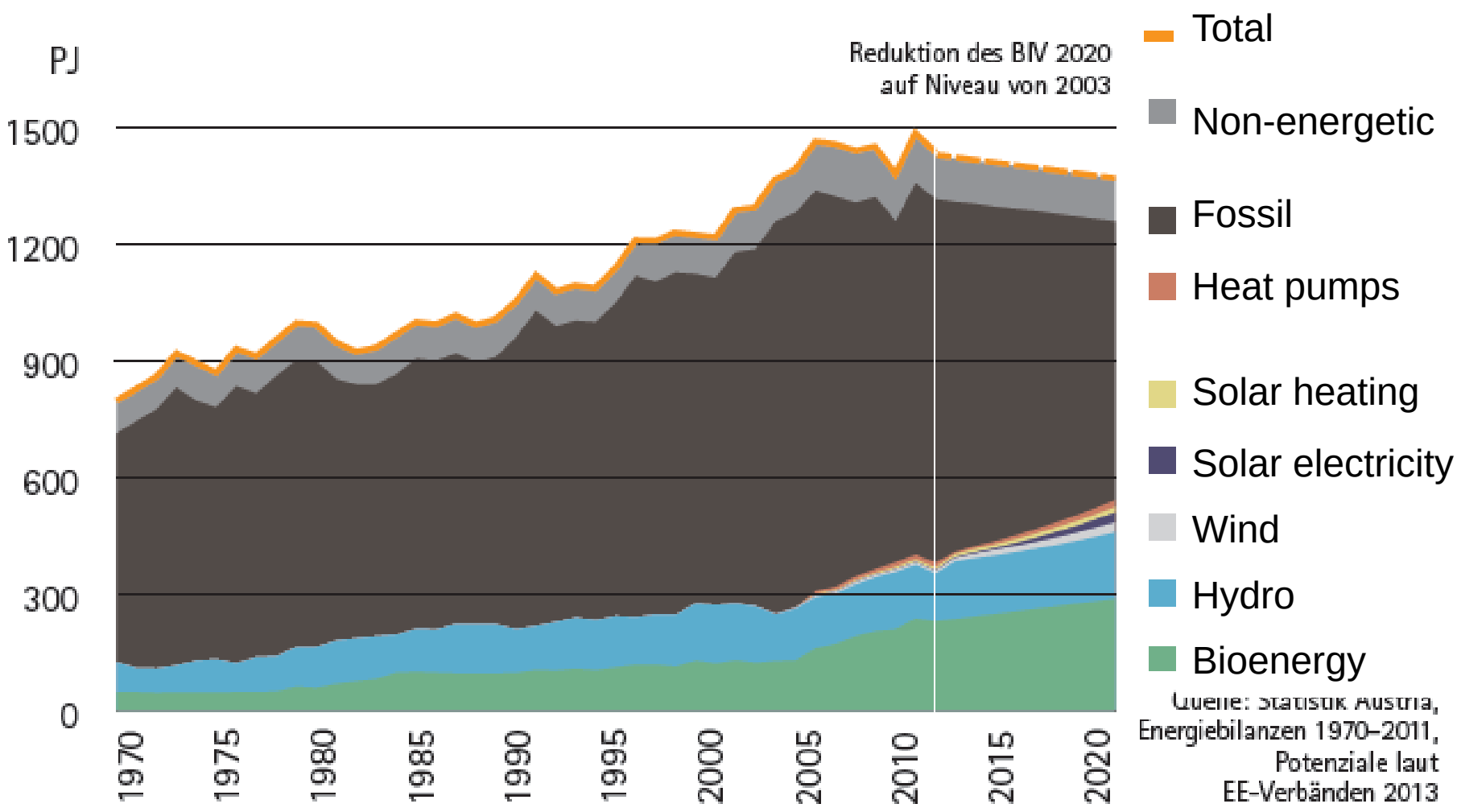
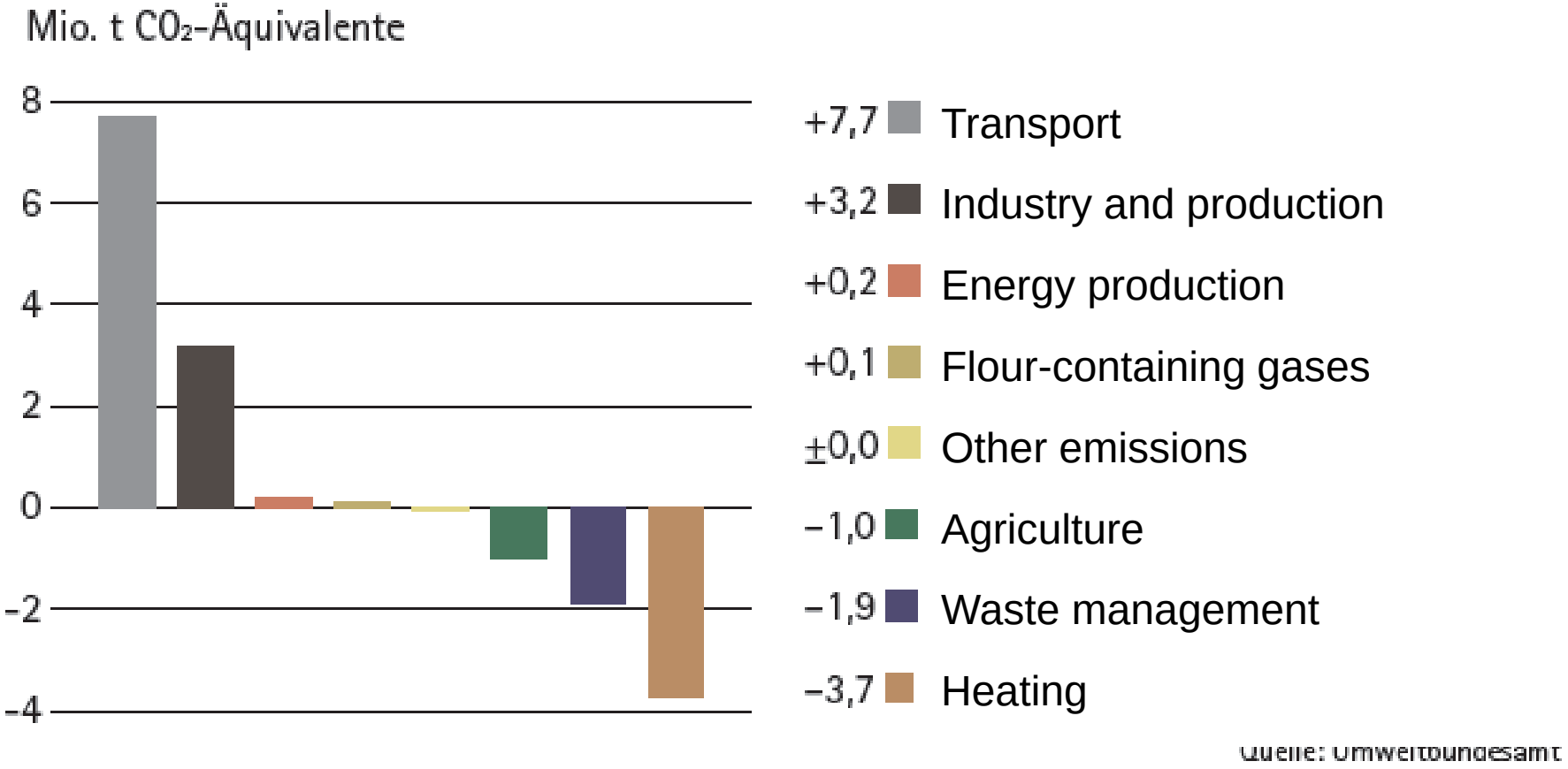
Energy consumption in Austria



Change in CO_2-äquivalents from 1990 to 2011



Austrian Research Organisations

Graz University of Technology – Institute of Thermal Engineering

- Heat pipe reformer (former Technical University Munich, Prof. Jürgen Karl changed to University of Erlangen, Germany, work is still going on in Graz)
- Small scale CHP with heat pipe reformer
- 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

Bioenergy 2020+ (location Wieselburg)

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

Austrian Research Organisations

Bioenergy 2020+ (location Güssing) together with TU Vienna

- ~~Pressurised gasification~~
- ~~Usage of product gas from biomass CHP Güssing in a SOFC~~
- Production of FT liquids
- Production of Hydrogen (as polygeneration in Oberwart and full conversion in Güssing)
- Mixed alcohols
- BioSNG
- Waste gasification in FICFB gasifier

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 hydrogen for refineries
- Scientific Partner in Bioenergy 2020+
- Representative of Austria in IEA Bioenergy Task 33 Thermal Gasification of Biomass

Austrian companies

- **Andritz including AE&E** (Andritz Energy & Environment)
  - Activities with FICFB unclear, has still patent
  - Involved in Skive (over Carbona)
  - **www.andritz.com**

- **AGT Agency for Green Technology**
  - Low Temperature Conversion (LTC) is a thermo catalytic decomposition process operating without air supply
  - **http://www.agt-international.eu/**

- **Austrian Enviro Technologies**
  - **http://www.austrian-enviro.com**

- **Cleanstgas** (Clean staged gasification)
  - joint venture between EBNER Industrieofenbau and KWB Biomasseheizungen
  - affordable, decentralized, efficient power plants to supply the base load of heat and power
  - **www.cleanstgas.com**

- **GE Jenbacher**
  - **http://www.jenbacher.com**

- **Güssing Renewable Energy (GREG)**
  - **http://www.gussingrenewable.com/**

Austrian companies

- **Ortner Anlagenbau**
  - builds FICFB gasifiers for CHP applications (Oberwart, Villach), future involvment in gasification unclear
  - **http://www.ortner-anlagen.at**
- **Repotec**
  - Engineering of FICFB gasifiers for CHP, BioSNG and other synthesis (Güssing, Ulm, Göteborg)
  - **http://www.repotec.at**
- **SynCraft Engineering GmbH**
  - **http://www.syncraft.at**
- **Urbas**
  - fixed bed gasification
  - **http://www.urbas.at**
- **Xylogas**
  - fixed bed gasification
  - **http://www.xylogas.com**
- **ZT Lettner**
  - **http://www.zt-lettner.at**

Commercial FICFB gasifiers

Location	Usage / 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 Anlagenbau	Operational
Villach, AT	Gas engine	15_{fuel} / 3.7_{el}	2010	Ortner Anlagenbau	On hold/ insolvent
Senden/Ulm DE	Gas engine / ORC	14_{fuel} / 5_{el}	2011	Repotec	Operational
Burgeis, IT	Gas engine	2_{fuel}/ 0.5_{el}	2012	Repotec	Commissioning
Göteborg, Sweden	BioSNG	32_{fuel}/20_{BioSNG}	2013	Metso/Repotec	Commissioning

Güssing – financial difficulties

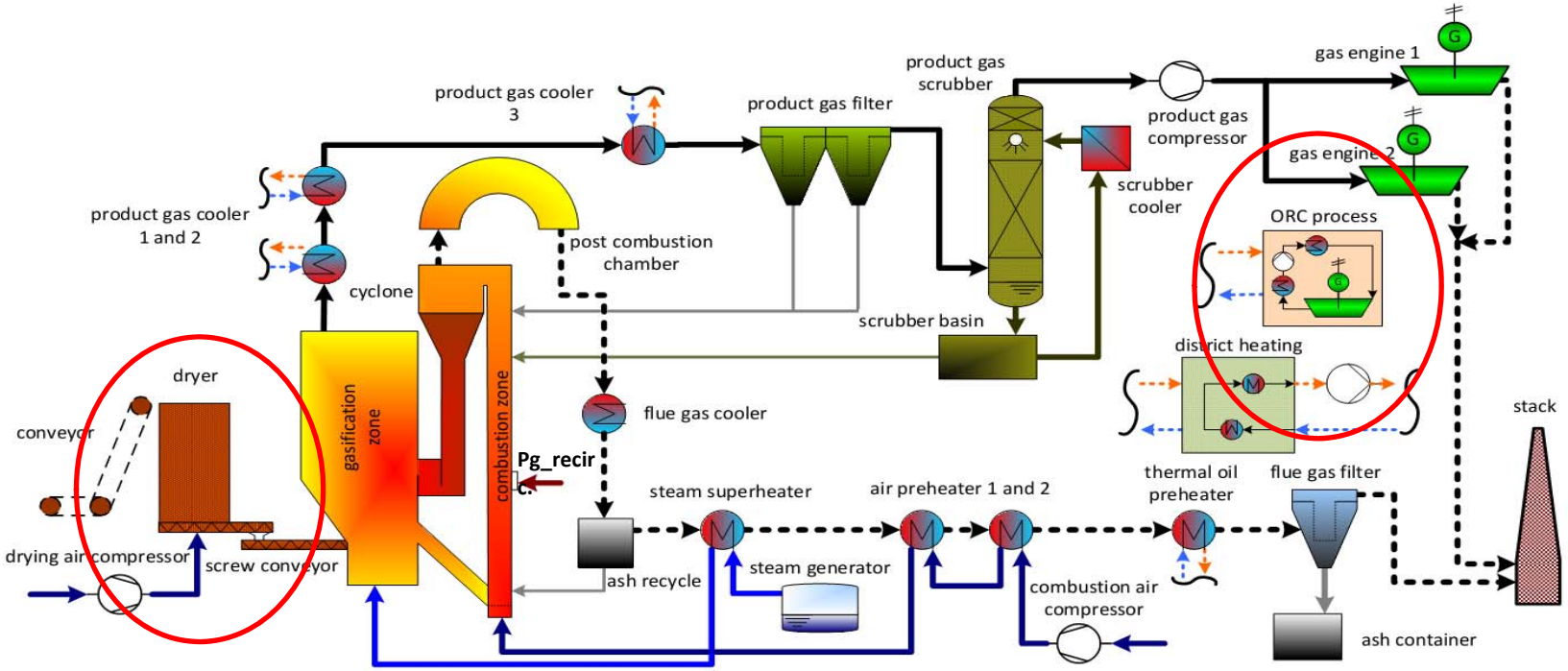
- Due to insolvency the gasification plant in Güssing was on hold between July and October 2013
- Now again in operation

FICFB Oberwart

Institute of Chemical Engineering
Working Group Zero Emission Technology

- FICFB, gas engine, ORC
- 8.5 MW_{fuel}, 2.8 MW_{el}
- 17.000 t wood chips/year
- District heating distance 5.2 km

Product gas composition	
H_2	35 - 42 vol. %
CO	18 – 22 vol. %
CO_2	20 – 24 vol. %
CH_4	7 – 10 vol. %
C_xH_y	1-3 vol. %



Polygeneration for CHP + hydrogen

In Oberwart high purity hydrogen produced

- 3 purification stages
- Purity of hydrogen 99,95 vol.%
- Usage of hydrogen in PEM fuel cell

Further aim is to increase the efficiency of the gasification plant (eg. power production from methane from the process)

Commercial CHP gasifiers

XYLO GAS

urbas energietechnik

CLEANSTGAS®
Clean Staged Gasification Systems

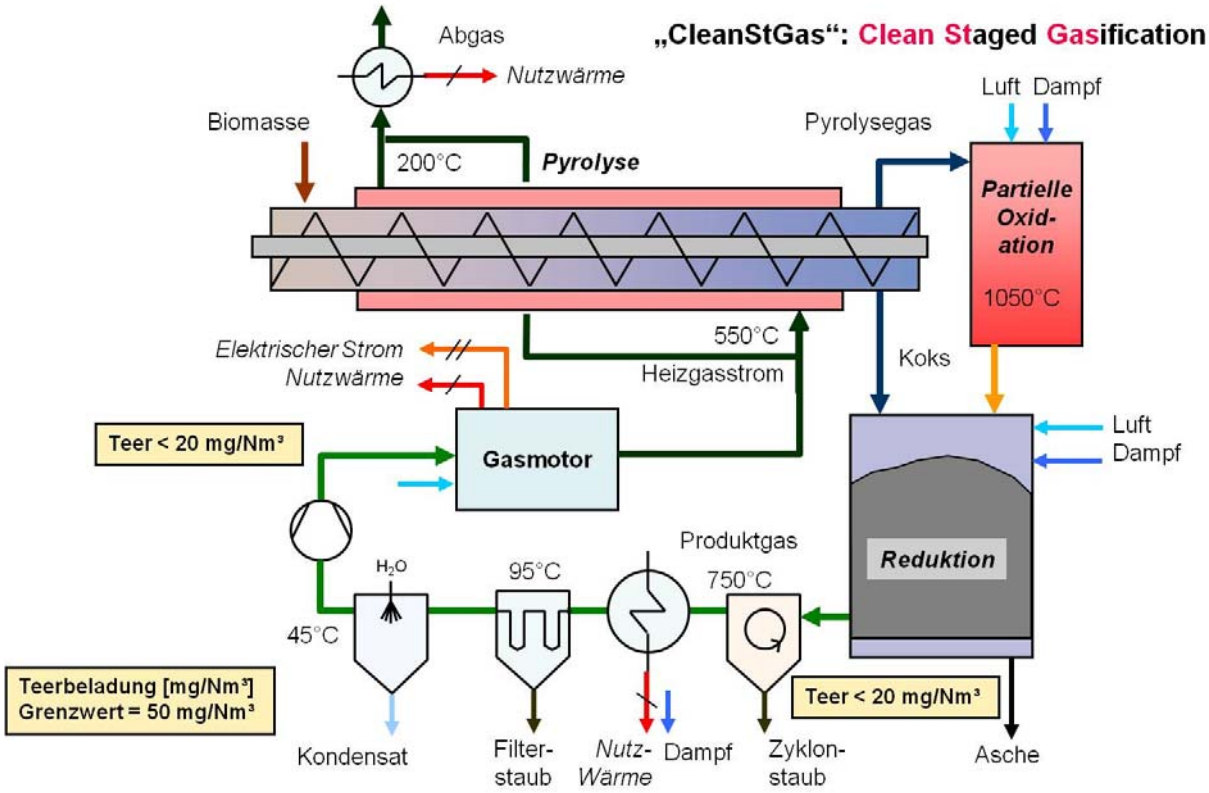
SYNCRAFT ENGINEERING

Commercial CHP gasifiers

urbas energietechnik

Location	Product kW	Start up
Ruden, AT	150el./300th. 70el./150th.	Development since 2001
Eberndorf, AT	2x120el + 70el./650th.	2006-2008
Neumarkt, AT	2x120el./580th.	2008
Sulzbach-Laufen, DE	130el./280th.	2009
Neukirchen, AT	2x150el./300th.	2011
Konstanz, DE	150el./300th.	End of 2011
Cogen Srl., Terni, IT	5x 220 kWel + 2000 kWth	Under construction

Biomass gasification plant **St. Margaretten/Raab**



Current projects:

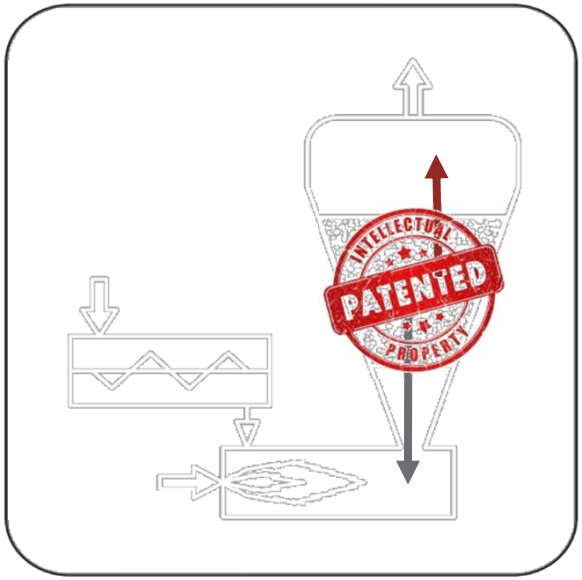
Project Name	Demo – CLEANSTGAS 150	Demo – CLEANSTGAS 250	CLEANSTGAS CSG 250	CLEANSTGAS CSG 250
Location	St. Margarethen/Raab, Steiermark	Perg, Oberösterreich	Kaindorf/Hartberg, Steiermark	Reg. Südoststeiermark, Steiermark
Technology Raw Material	CHP Wood Chips, G30/G50 up to W30	CHP Wood Chips, G30/G50 up to W30	CHP Wood Chips, G30/G50 up to W30	CHP Wood Chips &ash-rich fuels , G30/G50, up to W30
Product Output	CLEANSTGAS 125 125kW$_{el}$/210kW$_{th}$	CLEANSTGAS 250 250 kW$_{el}$/430 kW$_{th}$	CLEANSTGAS 250 250 kW$_{el}$/430 kW$_{th}$	CLEANSTGAS 250 250 kW$_{el}$/430 kW$_{th}$
Facitlity Type	Demonstration plant	Demonstration plant	Customer installation	Customer installation incl. demonstration phase
Status Partners	Permanent operation KWB Biomasseheizungen GmbH, EBNER Industrieofenbau GmbH	pretest in St. Margarethen/Raab KWB Biomasseheizungen GmbH, EBNER Industrieofenbau GmbH	under comissioning CLEANSTGAS GmbH	contract conclusion CLEANSTGAS GmbH
Start up Technology brief	November 2012 Staged Biomass gasification	January 2013 Staged Biomass gasification	February 2015 Staged Biomass gasification	September 2015 Staged Biomass gasification
Contact person Web	DI Dr. Helmut Timmerer Industriestraße 12 8321 St. Margarethen www.cleanstgas.com	DI Dr. Helmut Timmerer Industriestraße 12 8321 St. Margarethen www.cleanstgas.com	DI Dr. Helmut Timmerer Industriestraße 12 8321 St. Margarethen www.cleanstgas.com	DI Dr. Helmut Timmerer Industriestraße 12 8321 St. Margarethen www.cleanstgas.com

About the company

- Founded in 2007
- Development, Planning and Realization of biomass gasification plants called CraftWERK
- Spin-off MCI / tyrolean university of applied sciences

Co-current updraft floating fixed bed gasifier

Force bulk weight – Force gasflow



Advantages from fluidized-bed and staged co-current fixed-bed gasification systems lead to a system with low tar (< 10mg/m³) combining a broad scalability (100 – 500+ kW electric)