TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

IEA FORSCHUNGS KOOPERATION

Country Report Austria

IEA Bioenergy Task33 Meeting

23.10.2017

Skive, Denmark

Dr. Jitka Hrbek, Prof. Reinhard Rauch

Institute of Chemical Engineering
Working Group Zero Emission Technology
Prof. Hermann Hofbauer

Participation in IEA Bioenergy Task 33 is financed by

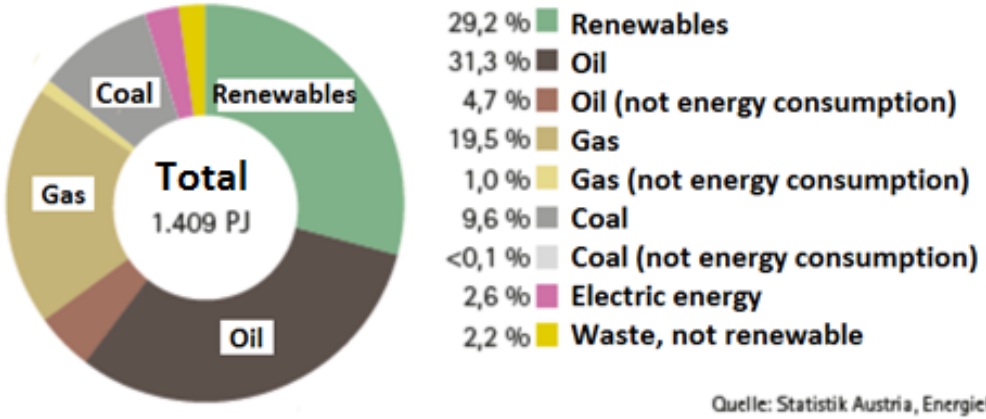
bmvit Bundesministerium für Verkehr, Innovation und Technologie

FFG FORSCHUNG WIRKT.

Content

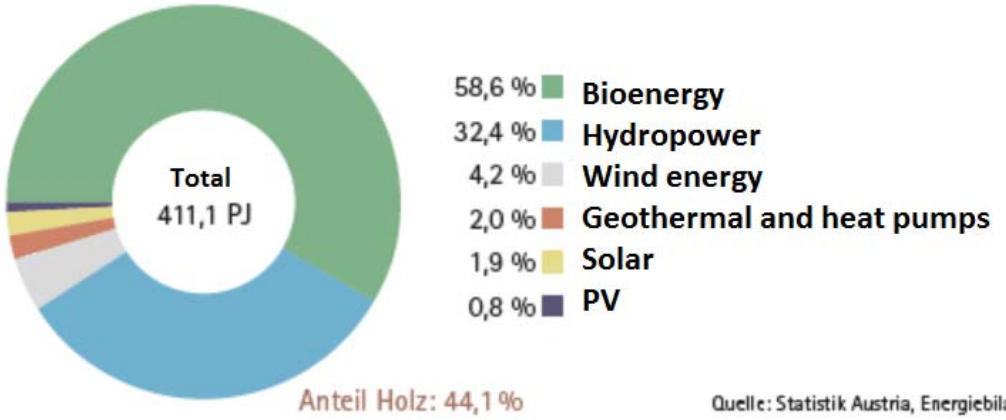
- Statistics
- Research organisations
- Companies
- Implementations

Gross energy consumption in Austria and share of renewables



Quelle: Statistik Austria, Energiebilanz 2015

Wood share: 12,9%

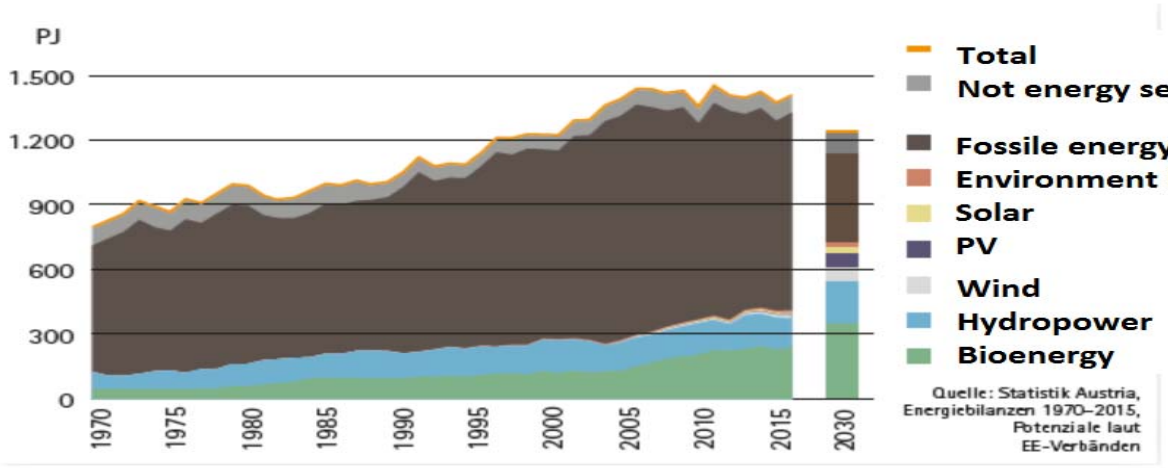


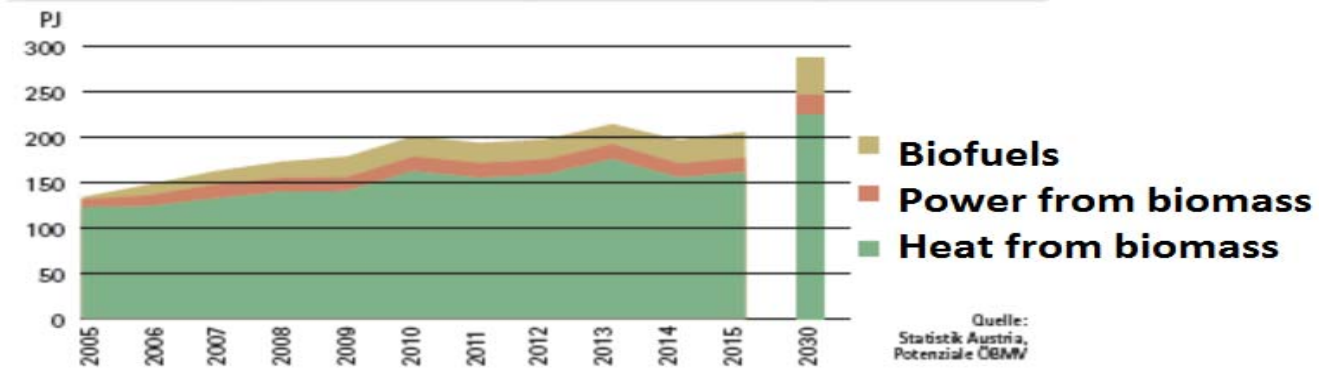
Anteil Holz: 44,1 %

Quelle: Statistik Austria, Energiebilanz 2015

Gross energy consumption in 2015 and future potential (Fig.1)

Potential potential of biomass (Fig.2)





Austrian Research Organisations

Graz University of Technology – Institute of Thermal Engineering

- Combustion and gasification
  CFD-simulations
- reactive fluid flows
- solar thermal processes
- extrusion and injection molding (polymers)
- thermal Management
- Thermo-dynamical process simulation
- Fluidized bed combustion
- Second Generation Fuels and fuel cells
- CO2-free gas- and coal-burning power plant

Joanneum Research Graz - Department of Energy Research

- Life Cycle Assessment
- Microchannel FT technology; actuall most work is done over MICROINNOVA (http://www.microinnova.com/index.php/en/about-us/news)

Austrian Research Organisations

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

- Multi-staged fixed bed gasification systems

Bioenergy 2020+

- Product gas production/treatment/utilization
- Process development and optimization
- Measuring and analysis technology
- Fundamental R&D on ashes and bed materials
- 1st and 2nd generation biofuels
- Representative of Austria in IEA Bioenergy Task 39 liquid biofuels
- Secretary of IEA Advanced Motor Fuels
- ExCo member in IEA Bioenergy (Manfred Wörgetter)

Austrian Research Organisations

Vienna University of Technology, Institute of Chemical Engineering

- R&D in dual fluidised bed steam gasification (G-volution)
- 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)
  - No activities with FICFB, has still patent
  - Involved in Skive (over Carbona)
  - Active in UK gasification projects
  - **www.andritz.com**

- **GE Jenbacher**
  - Production of product gas motors
  - **http://www.jenbacher.com**

- **Güssing Renewable Energy (GRE)**
  - FICFB gasifiers for CHP, BioSNG and other synthesis (sister company of the biomass CHP Güssing)
  - **http://www.gussingrenewable.com/**

Austrian companies

- **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
- **Hargassner**
  Fixed bed gasification
  - http://www.hargassner.at
- **Urbas**
  fixed bed gasification
  - http://www.urbas.at
- **Glock Ökoenergie**
  fixed bed gasification (Imbert)
  - http://www.glock-oeko.at
- **ZT Lettner**
  - http://www.zt-lettner.at

Actual projects

Upgrading of alternative, residual biomass feedstocks and conversion of excess heat to liquid fuels in a combined Gasification, Fischer Tropsch and Aqueous Phase Reforming plant.

- Horizon 2020 EU-funded project
- 14 partners from across Europe
- Aim is to to deliver the next generation of biofuel production technologies supporting the de-carbonization of the transportation sector
- Coordinated by Güssing Energy Technologies (www.get.ac.at),
- started in September 2017
- Duration four years
- Partners: TU Wien, Güssing Energy Technologies, Beta Renewables (Italy), IREC (Spain), IChPW (Poland), RECORD (Italy), POLITO (Italy), Bioenergy2020+ (Austria), CRF (Italy), CEA (France), Johnson Matthey (UK), Atmostat (France), R2M (Spain) and Skupina Fabrika (Slovenia)

Implementations

Commercial FICFB gasifiers

Location	endn	Fuel / Product MW, MW	Start up	Supplier	Status
Güssing, AT	Gas engine	8.0_{fuel} / 2.0_{el}	2002	AE&E, Repotec	On hold
Oberwart, AT	Gas engine / ORC / H_2	8.5_{fuel} / 2.8_{el}	2008	Ortner Anlagenbau	Maintanance
Villach, AT	Gas engine	15_{fuel} / 3.7_{el}	2010	Ortner Anlagenbau	On hold
Senden/Ulm, DE	Gas engine / ORC	14_{fuel} / 5_{el}	2011	Repotec	Operational
Burgeis, IT	Gas engine	2_{fuel} / 0.5_{el}	2012	Repotec, RevoGas	On hold
Göteborg, Sweden	BioSNG	32_{fuel}/20_{BioSNG}	2013	Repotec/ Valmet	Operational
California	R&D	1 MW_{fuel}	2013	GREG	Operational
Gaya, France	BioSNG R&D	0,5 MW_{fuel}	2016	Repotec	Commissioning
Thailand	Gas engine	4_{fuel} / 1_{el}	2016	GREG	Commissioning

* After ~100,000 hours of operation Güssing was shut down by end of 2016 due to ending of the feed in tarif

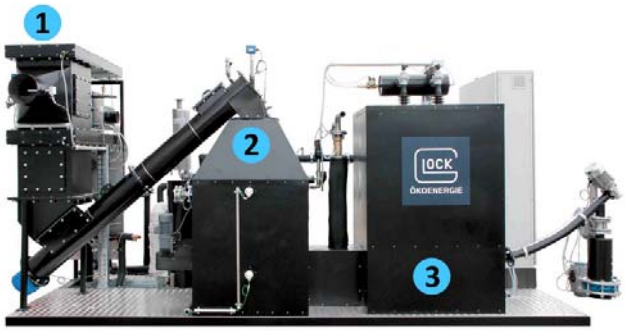
References

- 20 plants in operation (Austria, Germany, Italy, Bosnia)
- 5 further plants - start up End of 2017 (one in Japan)
- Min. 2 plants – start up in 2018 (Croatia)

Cooperation in Japan

At the end of June, **Forest Energy, Inc.** and **SYNCRAFT®** signed a partnership agreement in Schwaz/A. The goal is the realization of several wood power plant projects in Japan. We are looking forward to a good business cooperation!

Glock Ökoenergie



1 WOOD CHIP DRYING
The drying unit is fed automatically via a chip conveyor. Wood chips with a max. humidity of 30% may be used.

2 WOOD GASIFIER
Fixed bed downdraft gasifier (Imbert principle). Converting wood chips into wood gas.

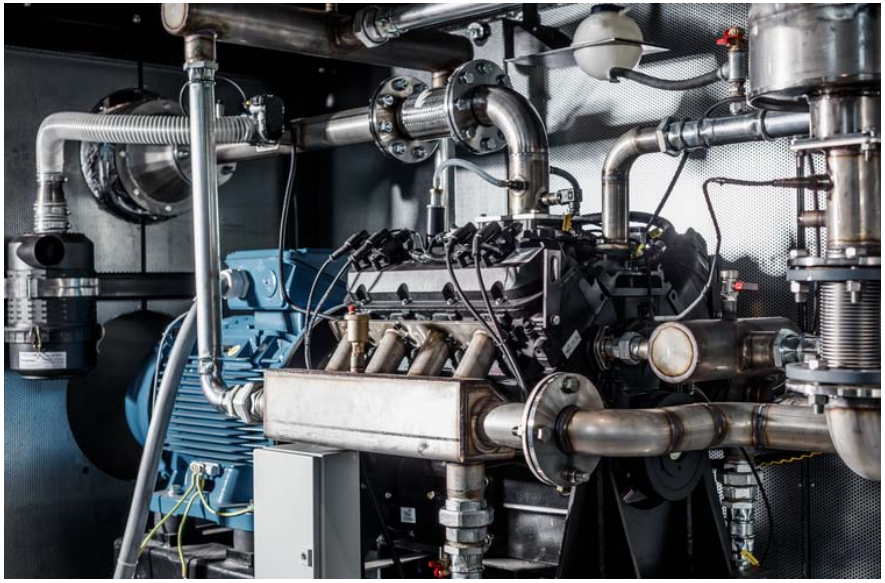
3 HOT GAS FILTER
Special filters are used to clean the wood gas. All ashes from this process are discharged from the filter by a spiral conveyor

4 GAS HEAT EXCHANGER
The hot wood gas is cooled. The heat generated by the cooling process is supplied to the heating process.

5 SAFETY FILTER
The safety filter serves as protection of the internal combustion engine.

6 CHP
The cooled and purified wood gas is fed to a combustion engine which actuates a generator. The electricity produced by the generator is fed into the power grid. The heat from the internal combustion engine is supplied to the heating process.

Wood gasifiers
GGV 1.7 and GGV 2.7

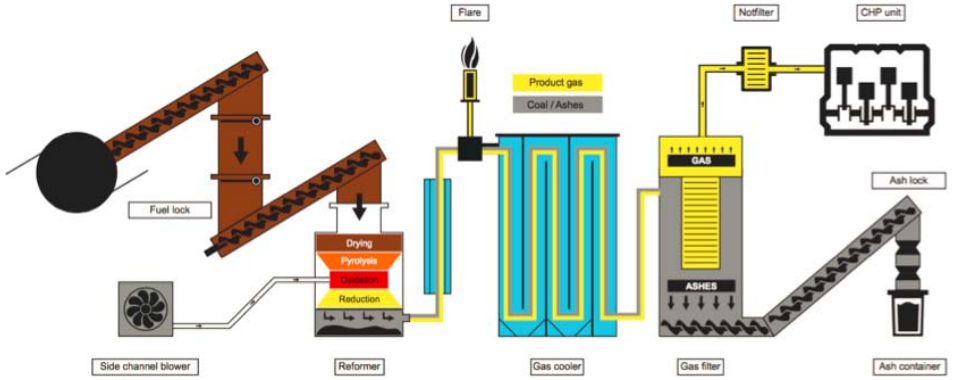


18 kW electrical power rating*
44 kW thermal power rating*
19 kg/h chips consumption*
400 V/50Hz electrical output
max. 90°C thermal output
5.209 x 2.221 x 2.620 mm dimensions

*according to: ISO 17225-4 A1 P16S-P31S

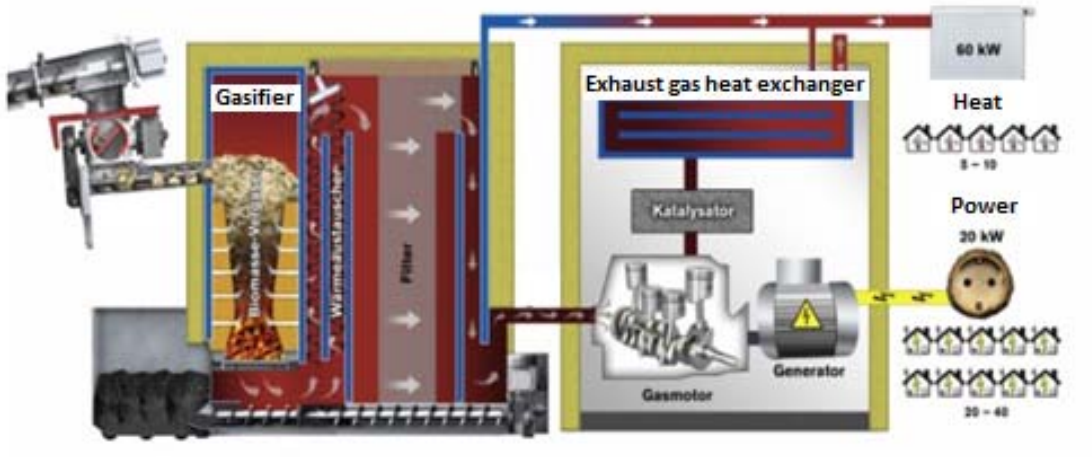
55 kW electrical power rating*
120 kW thermal power rating*
50/60 kg/h chips consumption*
400/660 V/50Hz electrical output
max. 90°C thermal output
5.000 x 2.700 x 3.400 mm dimensions

Fixed bed gasifier CHP 50



Technical data		CHP50
Power output	kW	49/51
Heat output	kW	~107
Feedstock (wood chips) consumption by 6000 op.hours	t	300
Overall efficiency	%	~83
Power efficiency	%	~27

NO NEWS



Technical data		
Power output	kW	20
Heat output	kW	61
Overall efficiency	%	95,3
Feedstock (wood chips) consumption by 5000 op. hours	m^3	500

NO NEWS