

Ongoing work of the IEA Bioenergy Task33 Thermal Gasification of Biomass, with a special focus on fluidized bed gasification

Dr. Reinhard Rauch

Vienna, University of Technology Institute of Chemical Engineering



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## Content

- IEA Bioenergy
- Technology
- Examples



# Topics of IEA Bioenergy



Integrating research themes across the value chain: environmental and economic sustainability, system studies, fuel standards, greenhouse gas balances, barriers to deployment, management decision support systems



## Strategic Plan

### Vision:

- Substantial bioenergy contribution to future global energy demands
- Increased security of supply
- Reducing greenhouse gas emissions

### Mission:

- Commercialisation and market deployment of environmentally sound, socially acceptable, and cost-competitive bioenergy
- Advise policy and industrial decision makers

### Strategy:

- Provide an international forum for sharing information and developing best practices
- Produce authoritative information on key strategic issues affecting deployment





## Participating countries

- Australia
- Austria
- Belgium
- Brazil
- Canada
- Croatia
- Denmark
- European Commission
- Finland
- France
- Germany

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**IEA Bioenergy** 

**Italy** 

FORSCHUNGS

- Ireland
- Japan
- Korea (seit 2010)
- Netherlands
- New Zealand
- Norway
- South Africa
- Sweden
- Switzerland
- Turkey (seit 2010)
- United Kingdom
- United States



## Output

- Strategic position papers
- Annual Reports
- Newsletters (vierteljährlich)







## http://www.ieabioenergy.com





## IEA Bioenergy Task33

Task 33 is a working group of international experts with the aim to promote the commercialization of efficient, economical, and environmentally preferable biomass gasification processes.

Main work is:

- Networking
- Information exchange
- Standardisation
- Workshops and task meetings

## http://www.ieatask33.org



## Database of existing biomass gasifiers



lockata (comme



## Why Gasification





## Gasifiers, based on gasification media





Technology	Gasification agent	Type of reactor	Location	Status
AER	steam	dual fludised bed	Geislingen (GER)	Planning of Demoplant
Artfuel	oxygen/ steam	CFB	Clausthal (GER)	Pilot plant in operation
Bioliq	oxygen	staged gasification (decentral + central)	Karlsruhe (GER)	Commissioning of Demoplant
BioMCN	oxygen	entrained flow	The Netherlands	Planning of Demoplant
Carbo V	oxygen	staged gasification	Freiberg (GER)	Commissioning of Demoplant
Chemrec	oxygen	entrained flow	Sweden	Pilot plant in operation
Chrisgas	oxygen/ steam	CFB	Värnamo, Sweden	Commissioning of Demoplant
Enerkem	oxygen/ steam	BFB	Canada	Construction of Demoplant
FICFB / Repotec	steam	dual fludised bed	Güssing (AT)	In operation
FICFB / Ortner	steam	dual fludised bed	Oberwart (AT)	In operation
GoBiGas	steam	dual fludised bed	Göteborg, Sweden	Planning of Demoplant
Heat Pipe Reformer	steam	indirekt fluidised bed	Pfaffenhofen (GER)	Commissioning of Demoplant
MILENA	steam	dual fludised bed	ECN, (The Netherlands)	Comissioning of pilot plant
Range Fuels		staged gasification	US	Construction of commercial plant
Ultra Clean Gas	oxygen/ steam	CFB	Finland	Commissioning of Demoplant



### Staged combustion: Austrian Energy Ecofluid ®





## Temperature and oxygen content





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## Lahti Co-firing



- no commissioning problems
- high fuel flexibility
- gasifier availability > 95 %

Gasifier feed

preparation

- boiler emissions decreased

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1 1		
-		-
Walter and		



Main

360

boiler

th

MW













## **VVBGC** Project





## **Biomass CHP Güssing**





## **Biomass CHP Güssing**



#### Institute of Chemical Engineering Oberwart plant - Overview ing Group Future Energy Technology





## FICFB Ulm, Germany





# Biomass to SNG: GOBIGAS GoBiGas – phase 1

Production:		Consumption:		
Bio-SNG	20 MW	Fuel (pellets)	32 MW	
District heating	4 MW	Electricity	2,5 MW	
Heat to heat pumps	8 MW	RME (bio-oil)	0.5 MW	



🕝 Göteborg Energi





# Heat Pipe Reformer

- Developed at TU Munich
- Pressurised gasifier at 5 bar
- Demonstration plant in Pfaffenhofen (Germany) in commissioning







# Stora Enso / Neste Oil Joint Venture for FT BTL Diesel Fuel

50/50 Joint Venture "NSE Biofuels Oy" to first develop technology and later produce next generation renewable diesel crude from wood / forest residues Currently building a 12MW demonstration plant in Stora

Enso's Varkaus mill, to be in use spring 2009

Investment decision for a commercial scale plant when the parties have enough experience from the demonstration plant

Strong development consortium

- Joint Venture partners:
- Testing & research partner:
- Gasification supplier:







### New Developments

Abgas Produktgas Abscheider Abscheide VERBRENNUNGSREAKTOR transportierende Wirbelschicht VERGASUNGSREAKTOR turbulente Wirbelschichtzonen alternativer Brennstoffeintrag Zonen mit erhöhtem Gas-Feststoffkontakt Sekundärdampf Sekundär-\_\_\_\_ luft 11111 Brennstoffeintrag Primär-dampf Primär-luft 1 1 1 1.1.1

Institute of Chemical Engineering Working Group Future Energy Technology

#### **G-volution System**





## Summary

- Work on gasification of biomass is going on, but mainly applied R&D
- Political frame conditions are good, but there is the trend to electric cars and no one thinks about, where the electricity comes from!
- Several Demoplants are on the way!