



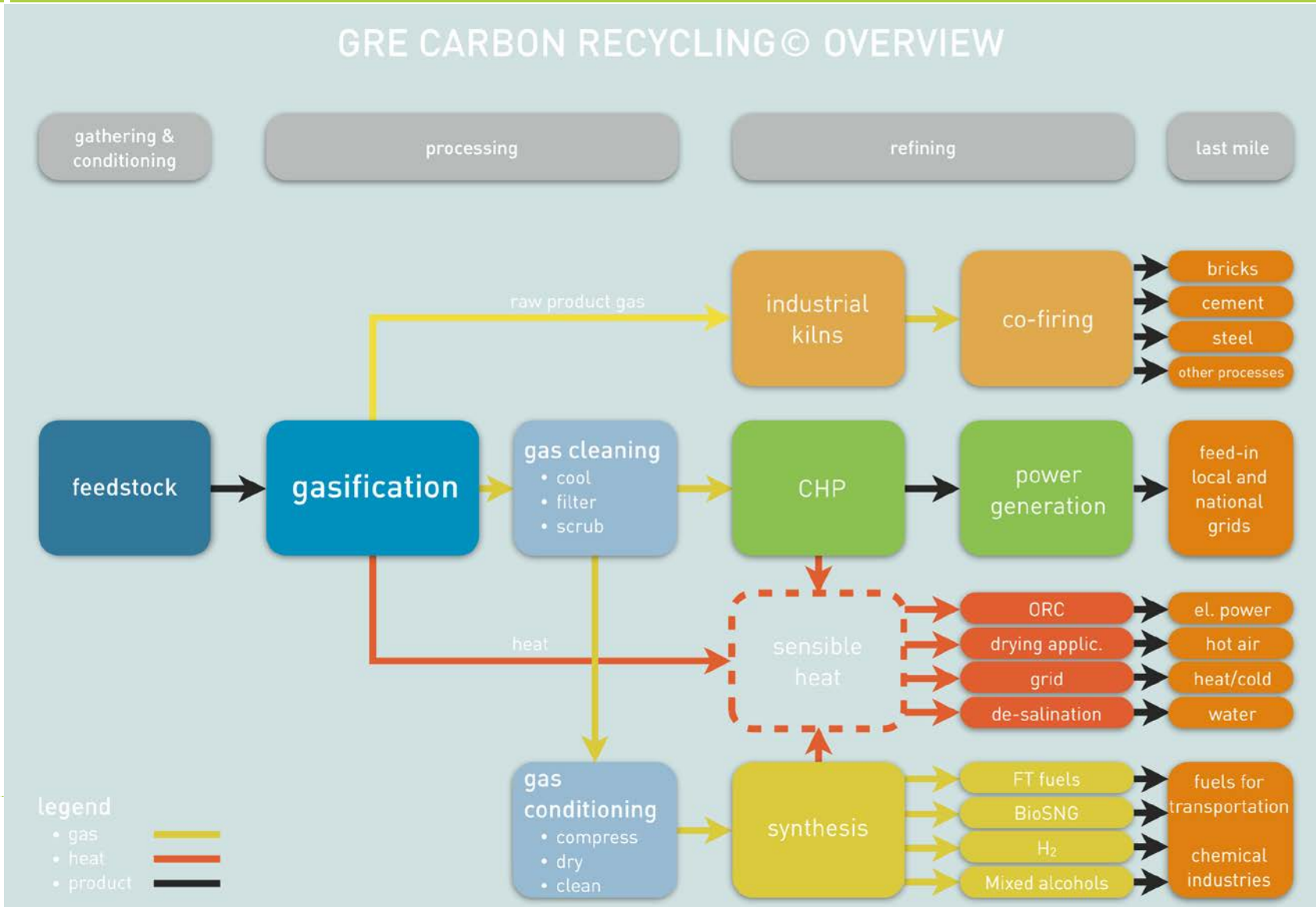
1 MWe1 Prototype Dual Fluidised Bed Gasifier Fuelled with Renewable Energy Resources

Güssing Renewable Energy

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GRE Carbon Recycling Overview



Dual fluidised Bed (DFB) Gasifier System



Biomassekraftwerk Güssing
GmbH & CoKG [BKG]



- Average >7,500 hours operation p.a. since commissioning in 2002
- District heating: 300 homes, 50 offices, local schools, army base, a hospital and industry (wood and plant drying)
- GREG demonstration plant; R&D collaboration with Vienna University of Technology, Bioenergy2020+ (15 on-site researchers) and industry (GE Jenbacher, SGC Energia, Calders, Caterpillar ...)

Dual fluidised Bed (DFB) Gasifier System

Biomass CHP Güssing



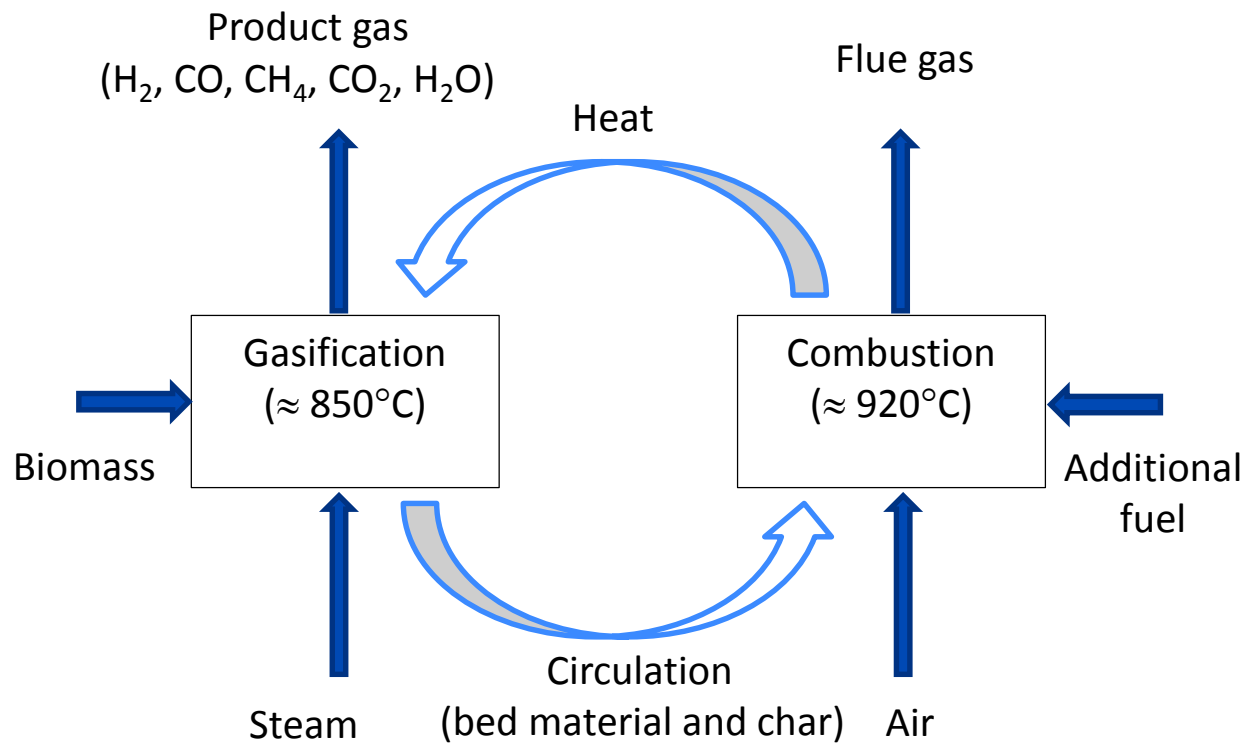
Gasifier

BioSNG PDU

Research lab

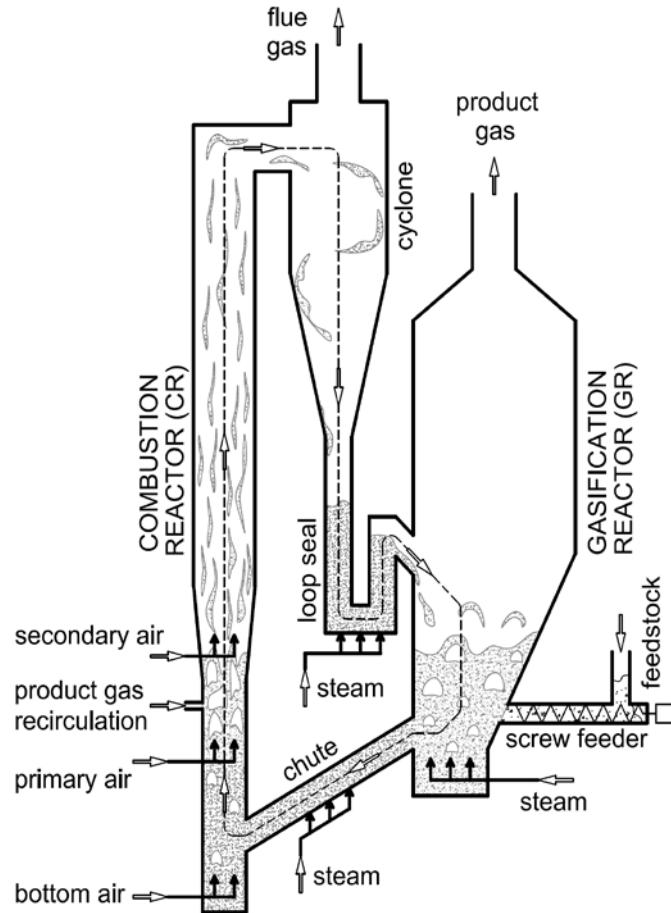
Fuelling Station

Dual fluidised Bed (DFB) Gasifier System



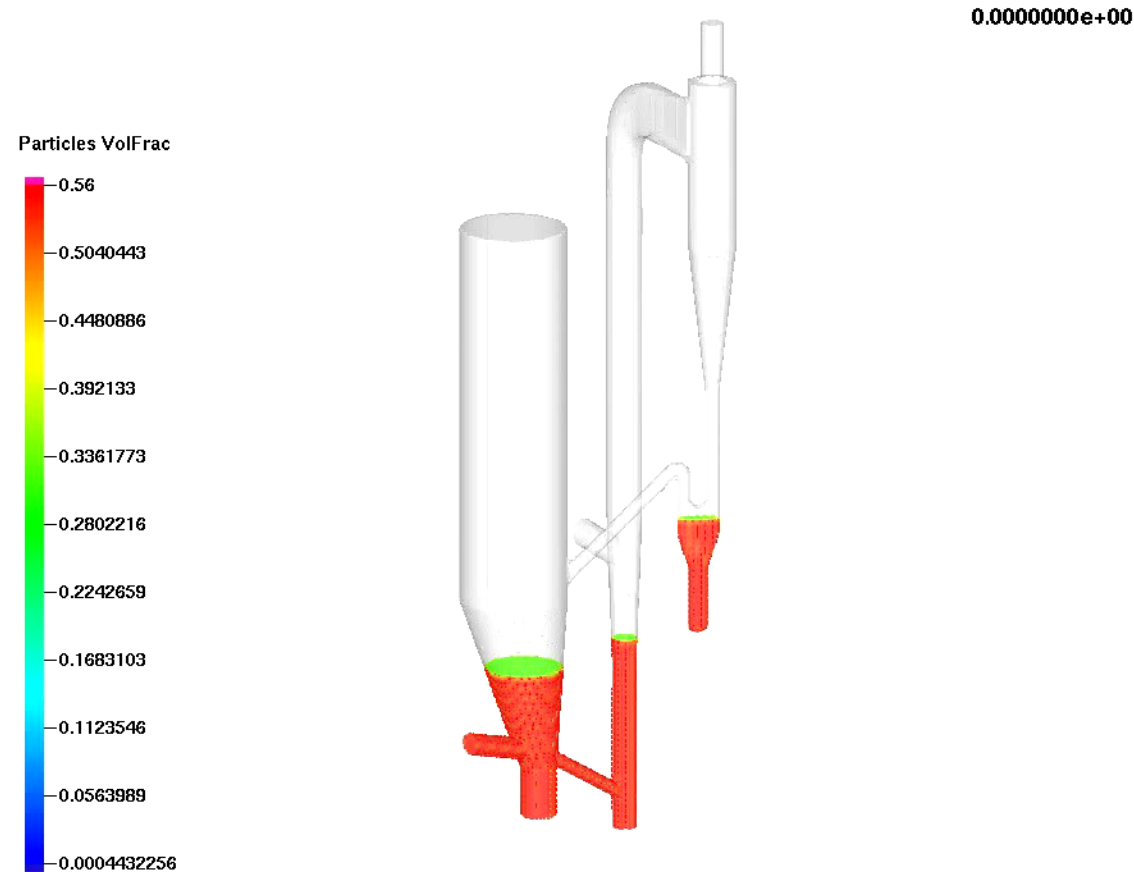
Basic concept of the DFB gasifier

Dual fluidised Bed (DFB) Gasifier System



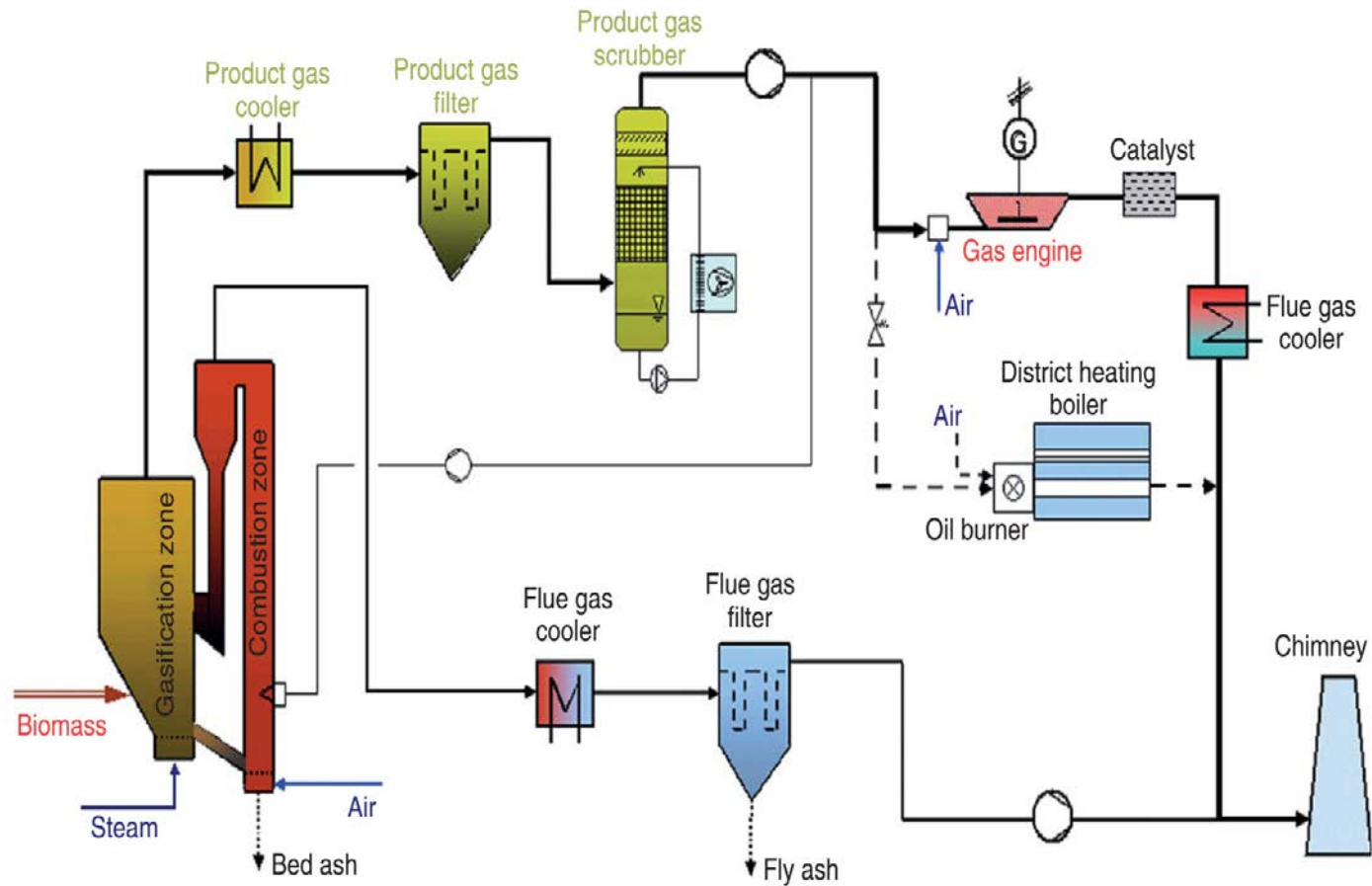
The DFB steam gasifier components

Dual fluidised Bed (DFB) Gasifier System



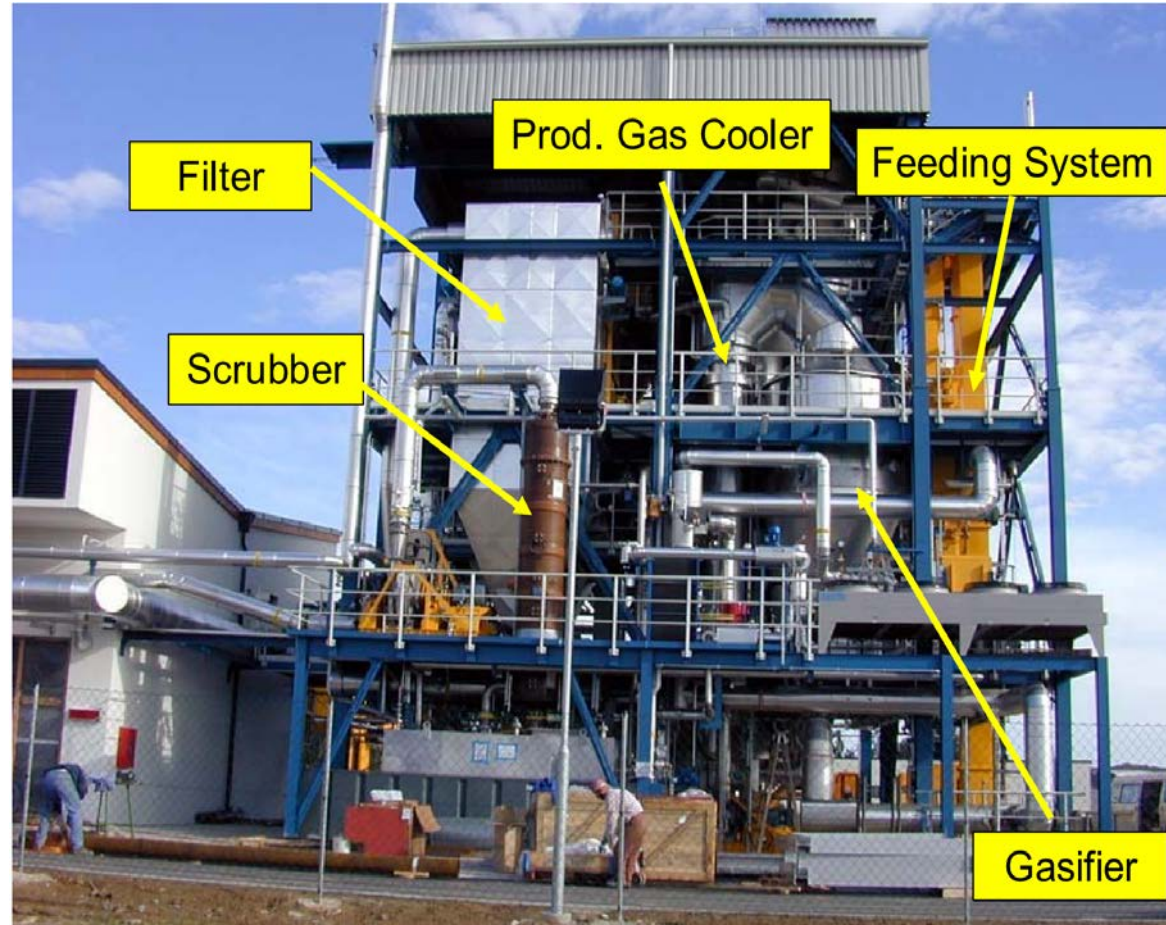
Circulation of the sand in the DFB gasifier

Dual fluidised Bed (DFB) Gasifier System



Schematic diagram of the CHP – DFB biomass gasifier

Dual fluidised Bed (DFB) Gasifier System



Gussing plant

Dual fluidised Bed (DFB) Gasifier System

Characteristic data of the CHP – DFB biomass gasifier process in Gussing

Type of plant	Demonstration plant
Fuel power	9,000-9,500 kW
Electrical output	2,000 kW
Thermal output	4,000 kW
Electrical efficiency	21-22 %
Thermal efficiency	42-44 %
Total efficiency	63-66 %

Dual fluidised Bed (DFB) Gasifier System

Product gas composition from the DFB biomass gasifier

Component	Concentration (dry basis)
Hydrogen (H ₂)	35 - 45 vol%
Carbon monoxide (CO)	19 - 23 vol%
Carbon dioxide (CO ₂)	20 - 25 vol%
Methane (CH ₄)	9 - 11 vol%
Ethylene (C ₂ H ₄)	2 - 3 vol%
Nitrogen (N ₂)	≈ 1.0 vol%
Particulates	30 - 100 g/Nm ³
Tars	1 - 5 g/Nm ³

Dual fluidised Bed (DFB) Gasifier System

Advantages of the DFB gasifier

- High H₂ and CO content in the product gas
- Almost no N₂ in the product gas
- High calorific value (LHV) of the product gas of >12 MJ/Nm³
- Low tar in the product gas of <7 g/Nm³
- No waste water
- No char to be disposed
- Only ash from the feedstock is waste from the process

Dual fluidised Bed (DFB) Gasifier System

The DFB gasifier in Thailand is located in Nongbua, Nakhonsawan province



Dual fluidised Bed (DFB) Gasifier System

Characteristic data of the DFB biomass gasifier process in Thailand

Type of plant	Commercial plant
Fuel power	3,800 kW
Electrical output	1,000 kW
Thermal output	1,250 kW
Electrical efficiency	≈ 26 %
Thermal efficiency	≈ 33 %
Total efficiency	≈ 59 %



Dual fluidised Bed (DFB) Gasifier System

New design & Improvements	Gussing	Thailand
1. Fuel feeding system	Screw feeder	Piston feeder with pneumatic system
2. Biomass dryer	No dryer	Dryer is installed
3. Gasifier design	Height to diameter (H/D) ratio is smaller	Height to diameter (H/D) ratio is larger
4. Tar scrubber design	Height to diameter (H/D) ratio is smaller	Height to diameter (H/D) ratio is larger
5. Heat exchanger type		
5.1 Product gas cooler	Shell and tube with smaller diameter of the tubes	Shell and tube with larger diameter of the tubes
5.2 Flue gas cooling system	Shell and tube	Double pipes
6. Alternative heat application	District hot water	Cooling system by absorption chiller Organic Rankine Cycle (ORC) process





More info can be found in

<http://www.gussingrenewable.com/>

<http://www.gussingrenewable.co.th/>

<http://greg.tv/en/136>

www.ficfb.at