

SWISS ENERGY TECHNOLOGY

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**– WE ARE
ENERGY!**



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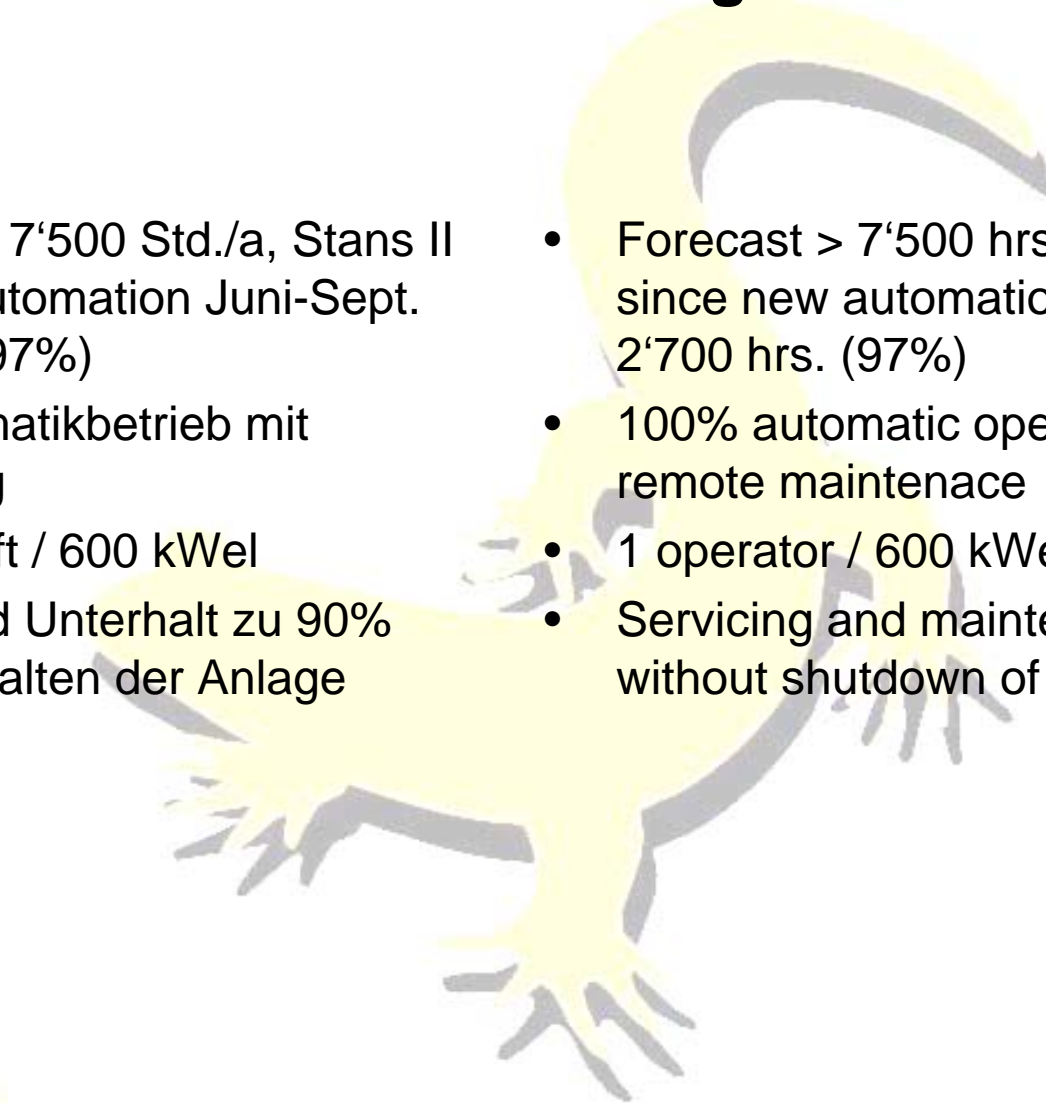
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CH – 6020 Emmenbrücke
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Fakten und Zahlen 1 / Facts and Figures 1

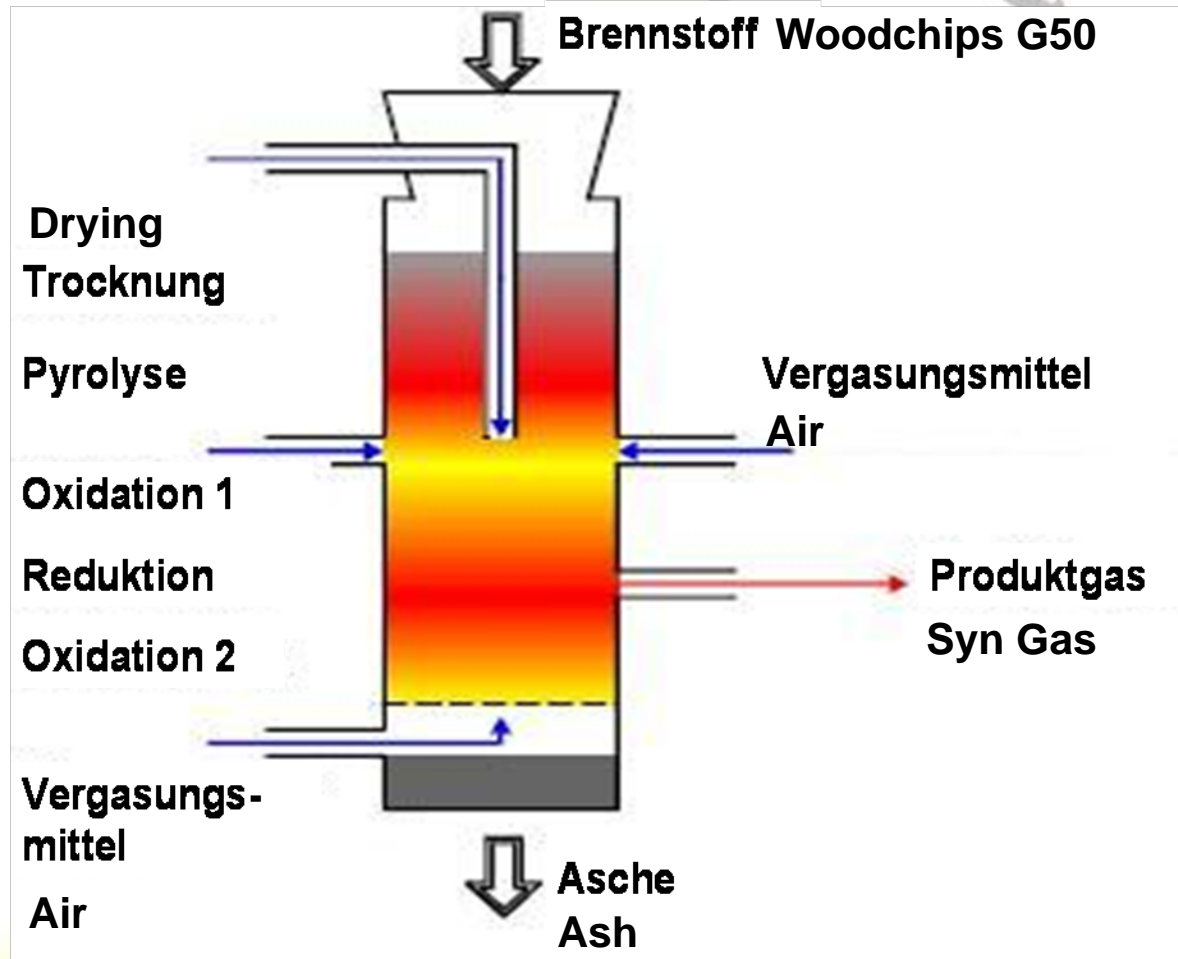
- 15 Jahre Forschung & Entwicklung
- Gleichstrom Festbett Vergaser
150 kWel, Holzverbrauch ca. 135 kg/h (atro 15%), ca. 1-2 % Asche
- Trockene Gasreinigung,
Adsorbensverbrauch ca. 0.5 kg/h/Reaktor und ca. 0.5l/h/Reaktor RME
- 5 Anlagen erstellt:
 - - Emmen 80 kWel, 3'500 Std.
 - - Spiez 130 kWel, 17'000 Std.
 - - Güssing 300 kWel, 6'000 Std.
 - - Stans I 600 kWel, 7'500 Std.
 - - Stans II 600 kWel, 13'000 Std.
- 15 Years reserch & development
- Fixedbed cocurrent flow gasifire,
wood cons. Ca. 135 kg/h (drysubstance), ca. 1-2% ash
- Dry gascleaning, calcium carbonate ca. 0.5 kg/h/reactor, and RME 0.5 l/h/r
- 5 plants well-built:
 - - Emmen 80 kWel, 3'500 hrs.
 - - Spiez 130 kWel, 17'000 hrs.
 - - Güssing 300 kWel, 6'000 hrs.
 - - Stans I, 600 kWel, 7'500 hrs.
 - - Stans II, 600 kWel, 13'000 hrs.

Fakten und Zahlen 2 / Facts and Figures 2

- Erwartung > 7'500 Std./a, Stans II mit neuer Automation Juni-Sept. 2'700 Std. (97%)
- 100% Automatikbetrieb mit Fernwartung
- 1 Arbeitskraft / 600 kWel
- Wartung und Unterhalt zu 90% keine Abschalten der Anlage
- Forecast > 7'500 hrs/y, Stans II since new automation june-sept. 2'700 hrs. (97%)
- 100% automatic operating with remote maintenace
- 1 operator / 600 kWel
- Servicing and maintenance 90% without shutdown of the plant



Gasreaktor / gasifire

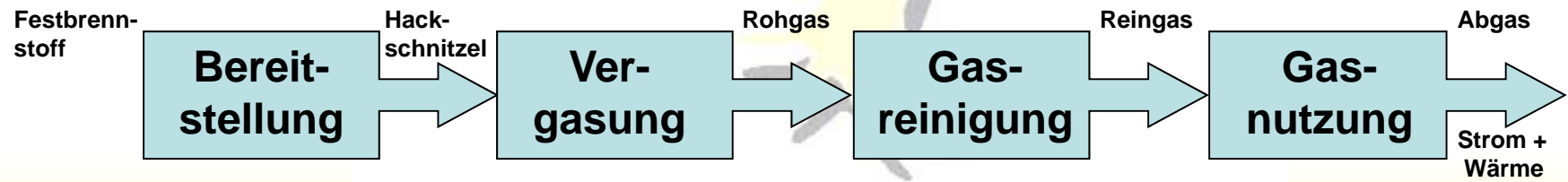
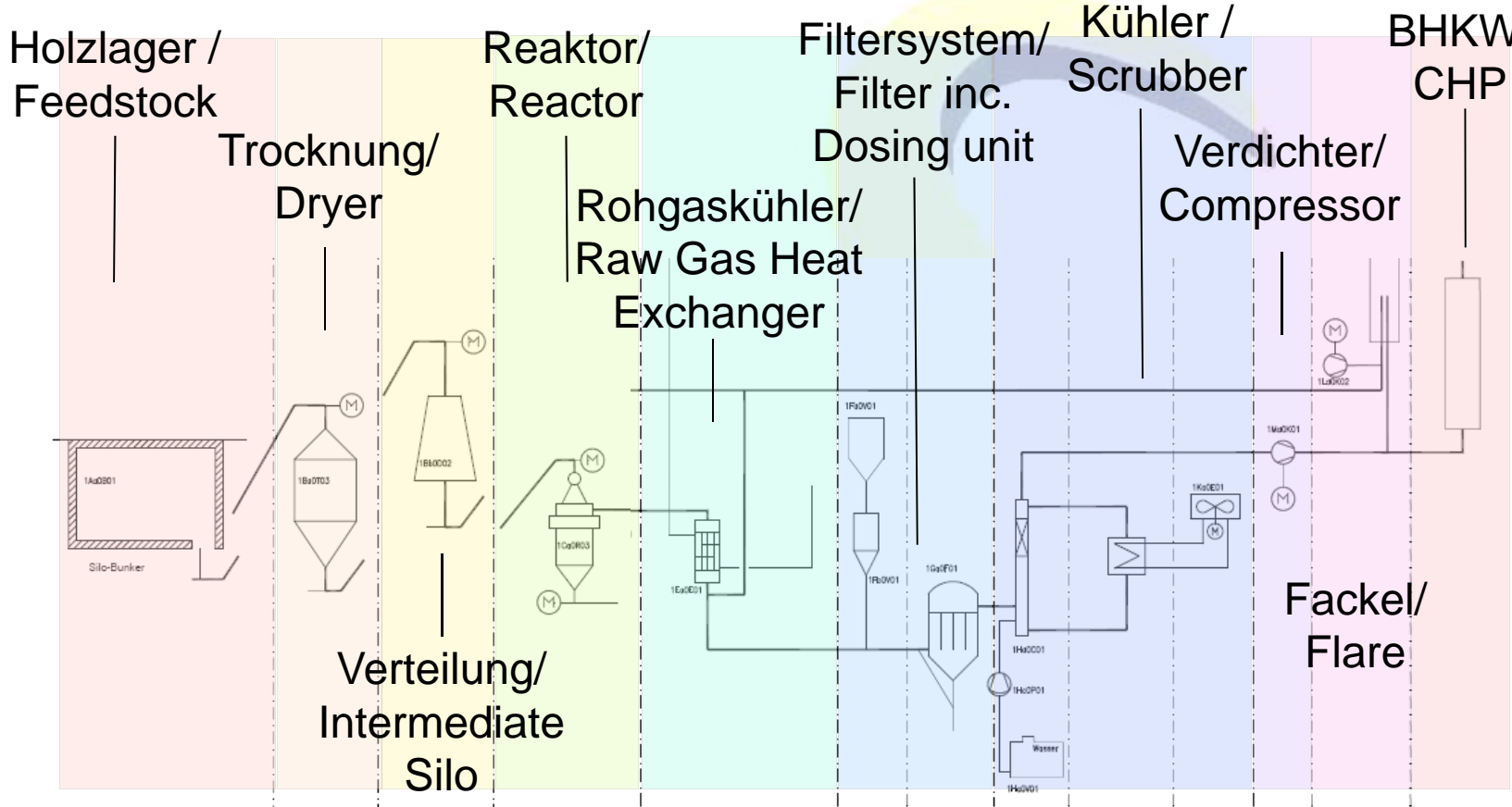


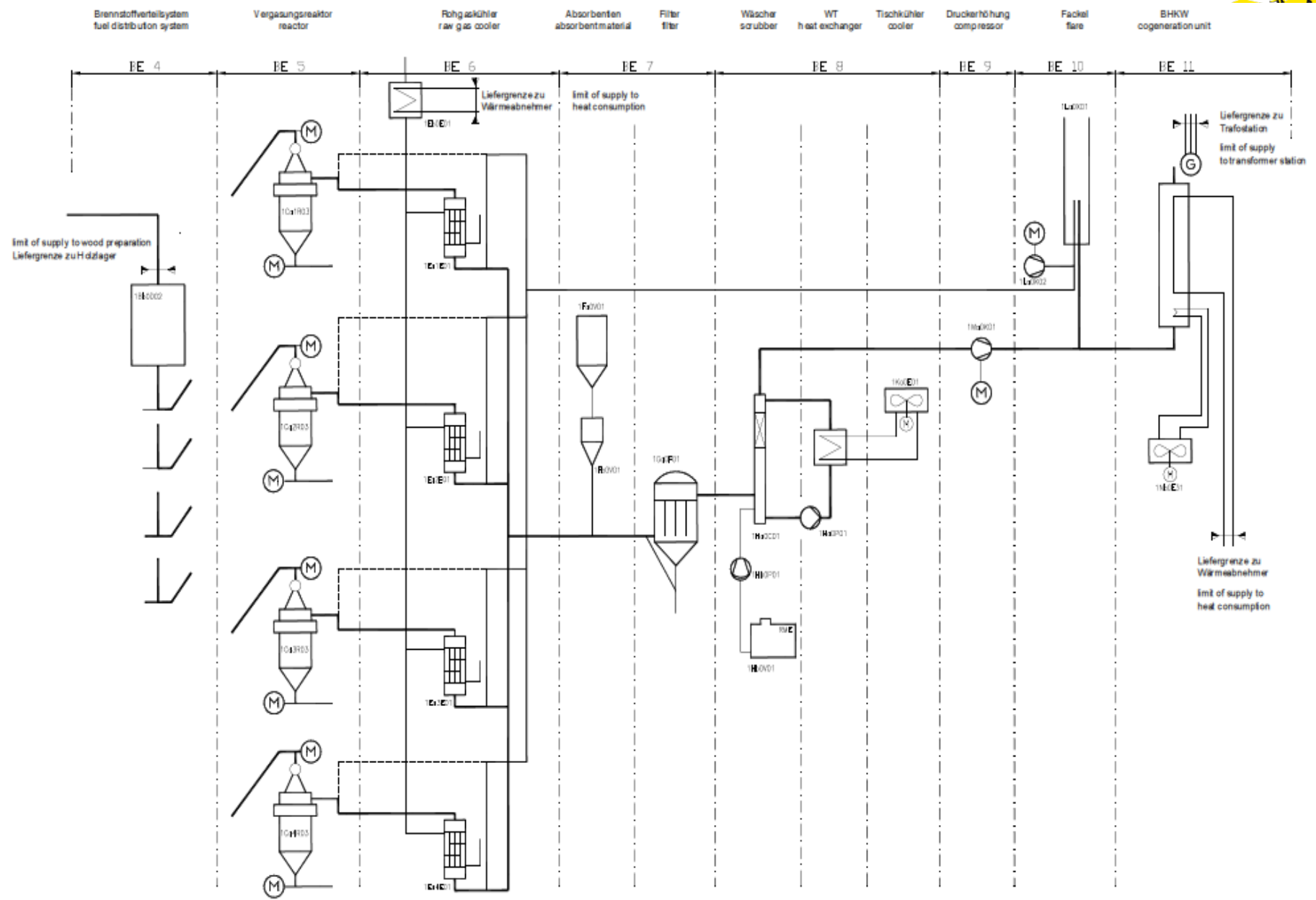
Produktgases / Syngas

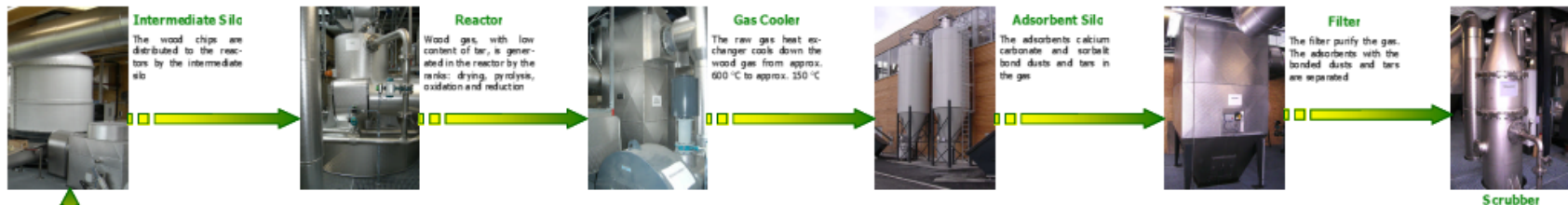
Gaskomponente [Vol-%]	Vergasungsmittel		
	Luft	Luft/O ₂ (80 %)	Wasserdampf
CO	10–20	40–50	25–47
H ₂	9–20	9–17	35–50
CH ₄	1–8	< 1	14–25
CO ₂	10–20	19–25	9–15
N ₂	40–55	15–30	2–3
Heizwert [MJ]/m ³ _{Nl} tr	4–6,5	7–9	12–17

Quelle: FNR, Schriftenreihe „Nachwachsende Rohstoffe“ Band 29

Fliessschema / Flow-Schet







Chain Conveyor

The conveyor discharges the wood chips into the intermediate silo



Wood Storage

The wood chips are transported to the chain conveyor by a sliding floor



Reception

The wood chips are delivered to the plant by lorries



Wood Standards

Grading G 30
Fines < 5 mm, max. 2 %
Overlength > 100 mm, max. 3%
Max. length: 200 mm
Moisture < 15 %



Ash Container

The container is used for storage and professional disposal of the ash



Flare

The flare burns the gas off during the start up and shutdown phase of the plant as well as in a case of emergency breakdown



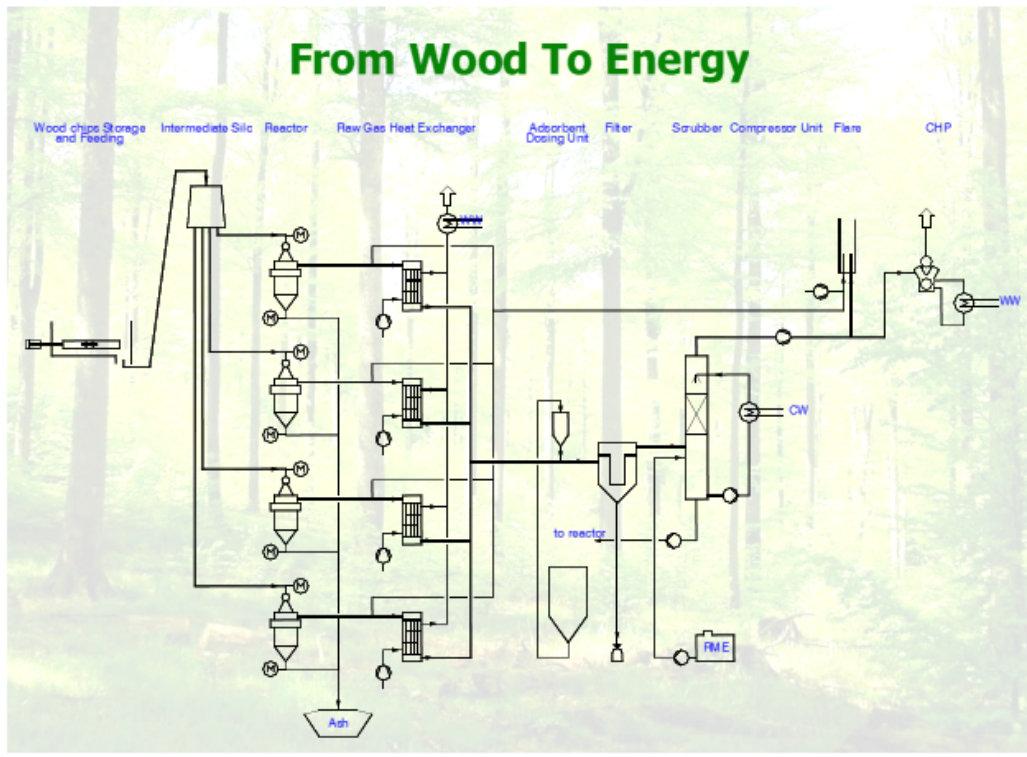
Big Bag

The big bag collects the charged adsorbent for a professional disposal



Energy Grid

The generated electricity is supplied to the local grid. The heat can be fed in the district heating network



Compressor

The required gas pressure for the engine is generated by the compressor



CHP Unit

The CHP unit converts the CO₂ - neutral gas into heat and power



Brennstofflogistik / Feedstock logistic



Holzqualität entscheidet / Woodquality is relevant

Stückigkeit					
	Hauptanteil: min. 80%	Feinanteil: max. 2%	Überlängen: max. 1%	Maximale Länge	Maximale Diagonale im Querschnitt
G 63	8 mm bis 63mm	Kleiner 5 mm	Grösser 100 mm	200 mm	30 mm



Und wenn die nicht stimmt / If it's not correct



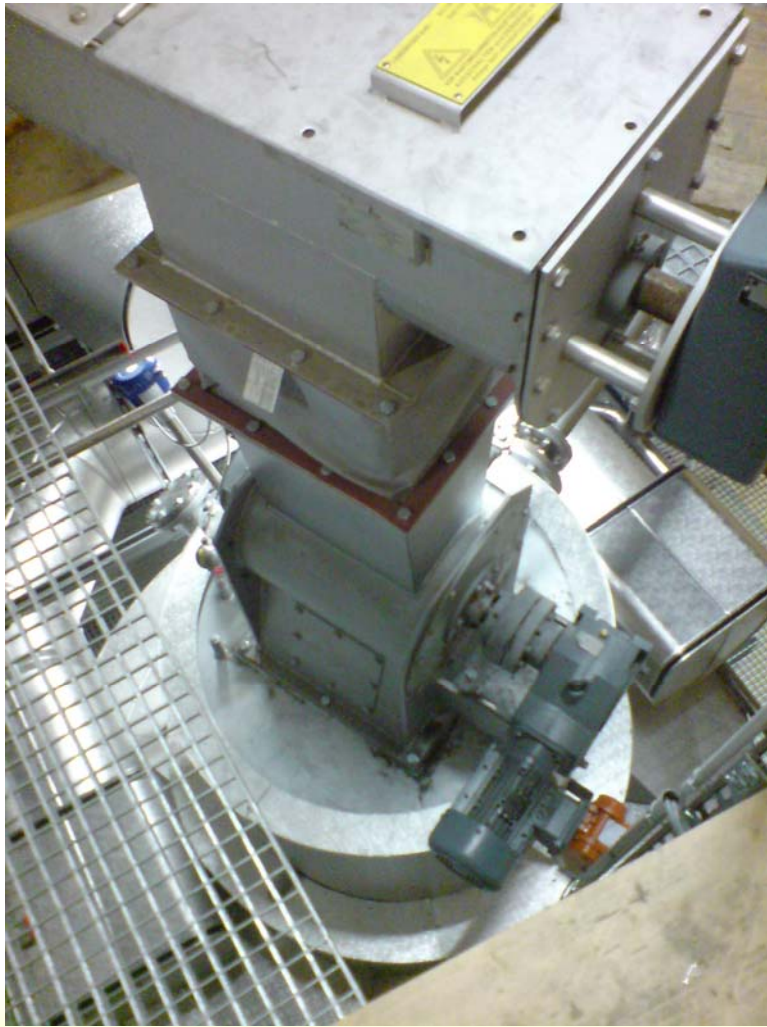
Brennstofflagerung / Wood chips Storage



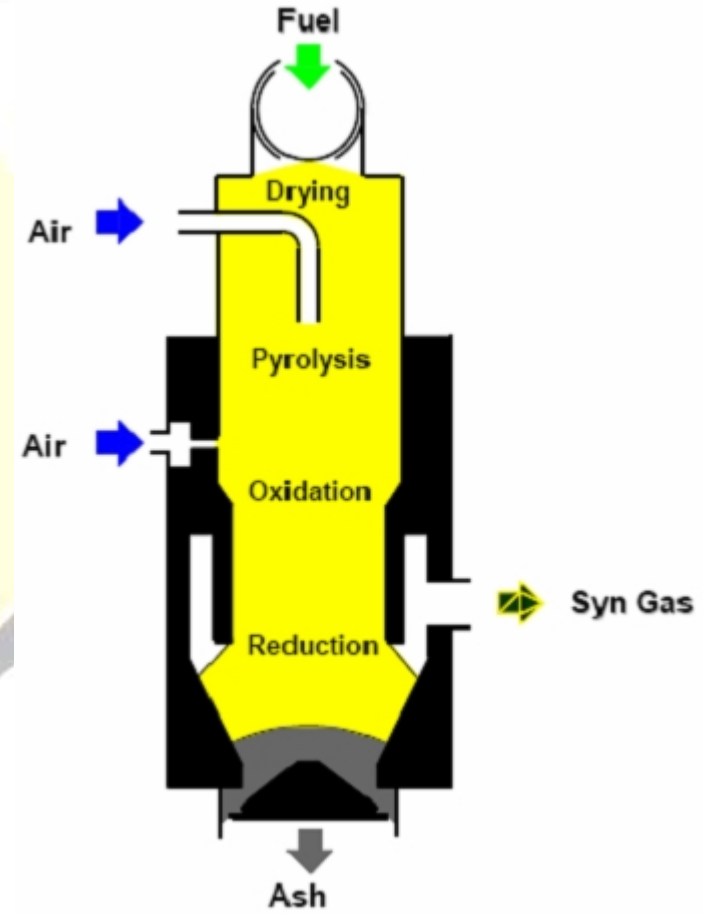
Brennstoffverteilung / Intermediate Silo



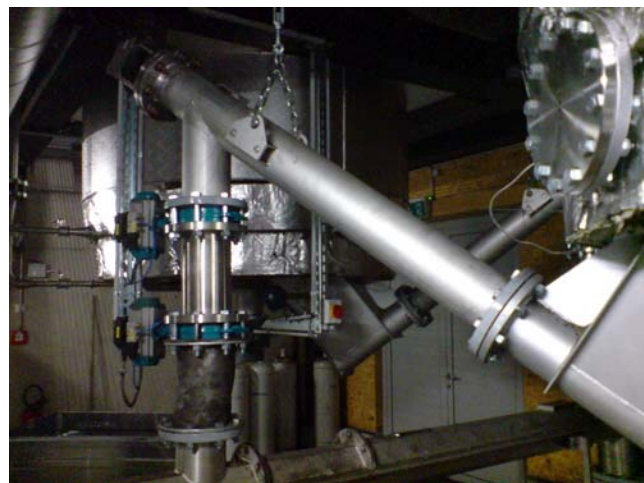
Brennstoffeinschleusung / Lock



Reaktor / Reactor



Ascheaustrag / Ash



+



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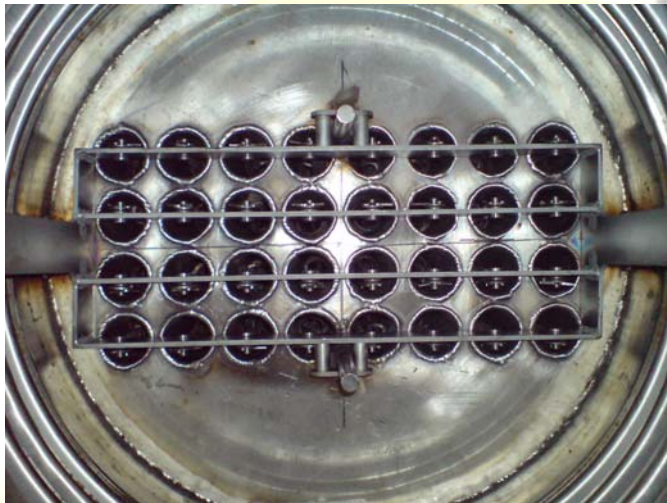
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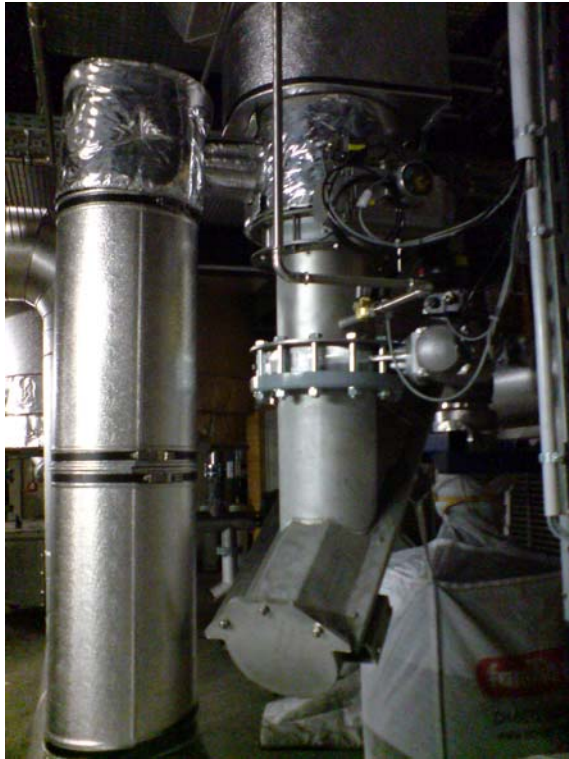
Rohgaskühlung / Raw Gas Heat Exchanger



Rohgaskühlung / Raw Gas Heat Exchanger



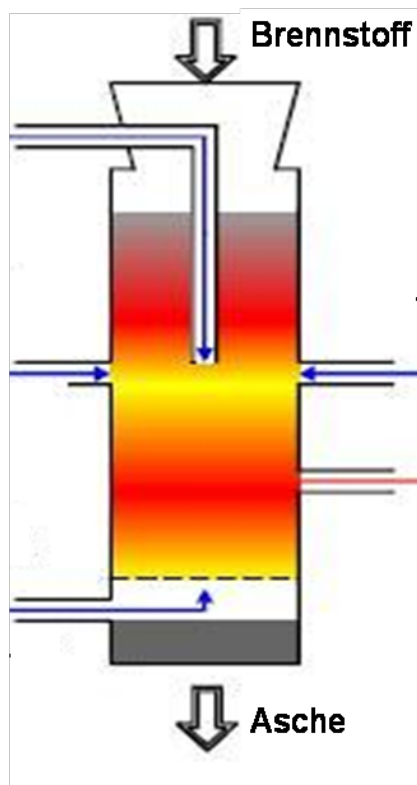
Kalkdosierung / Calcium Carbonat dosing unit



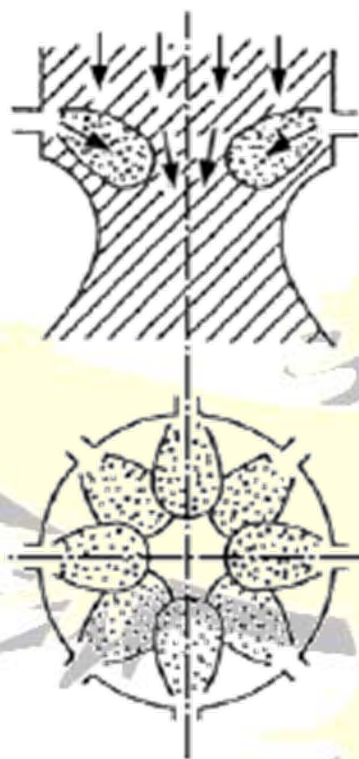
Gewebefilter / Baghouse Filter



Wäscherkühlung / Scrubber



REAKTOR

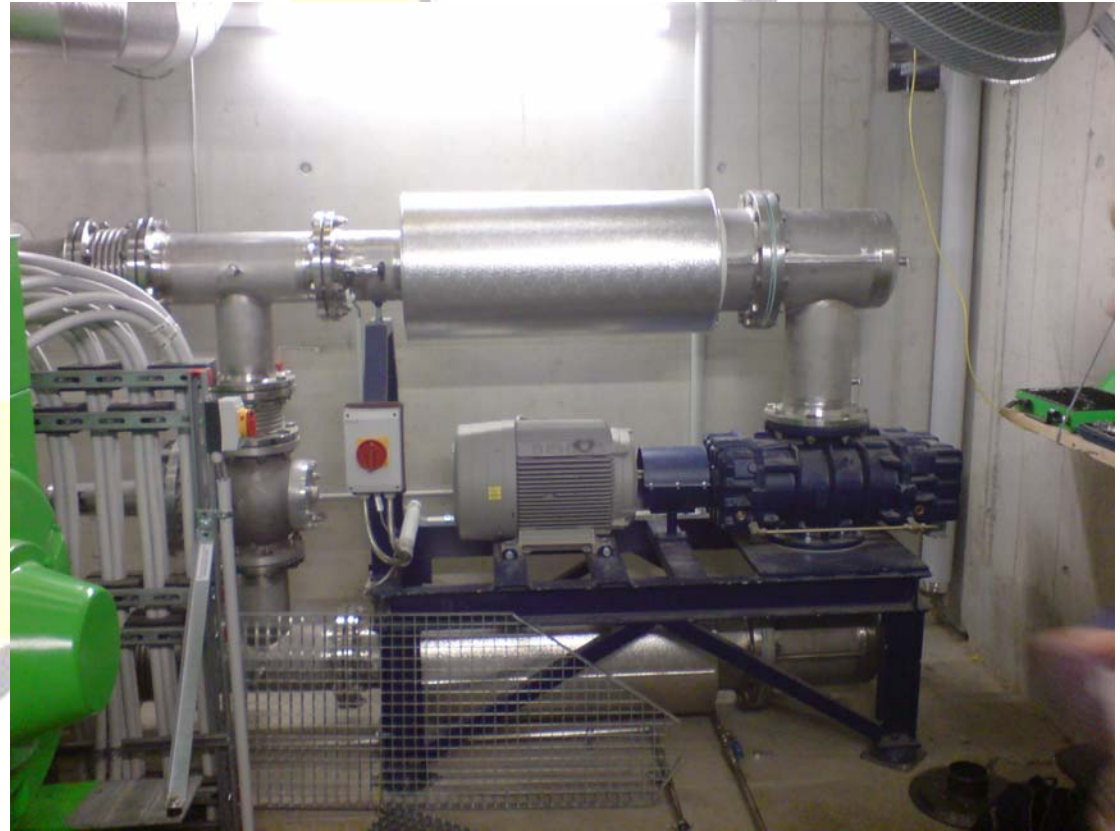
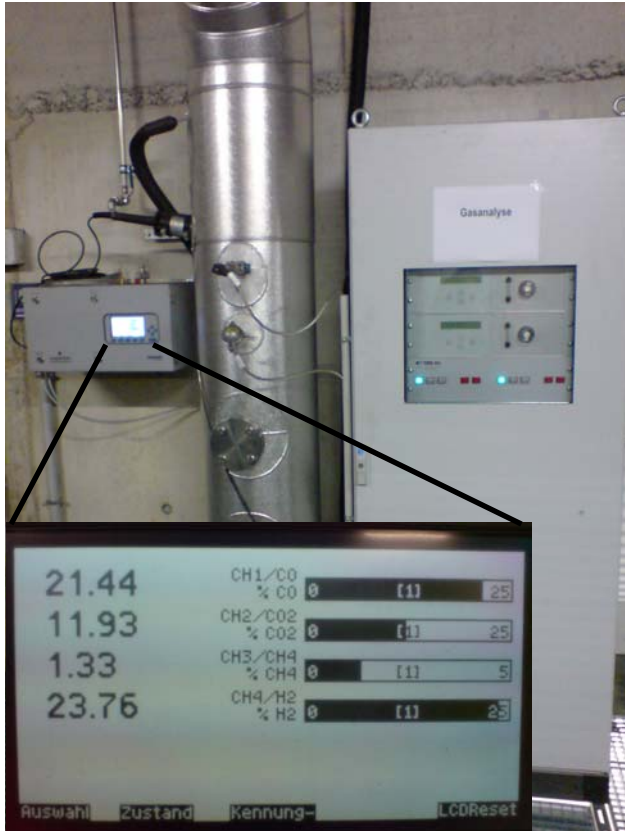


OXIDATIONSZONE

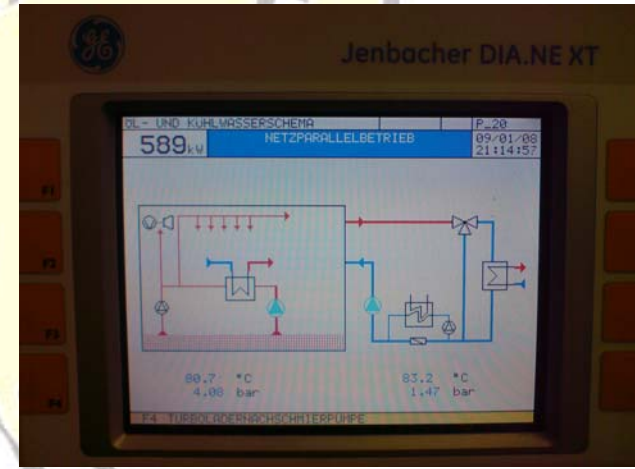


WÄSCHERKÜHLER

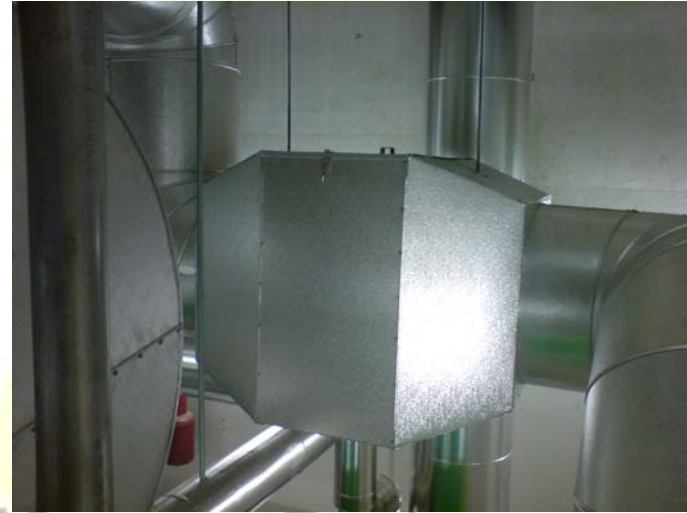
Gasanalyse, Druckerhöhung / Gasanalysis, Compr.



BHKW / CHP



Abgasbehandlung / Exhaust Gas cleaning



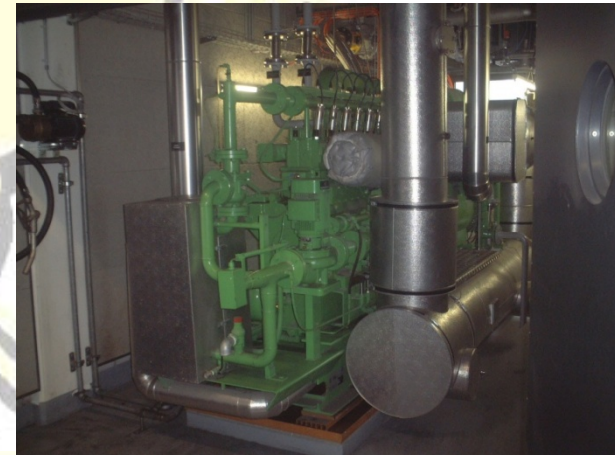
Fackel / Flare



Fernwärme / District heating



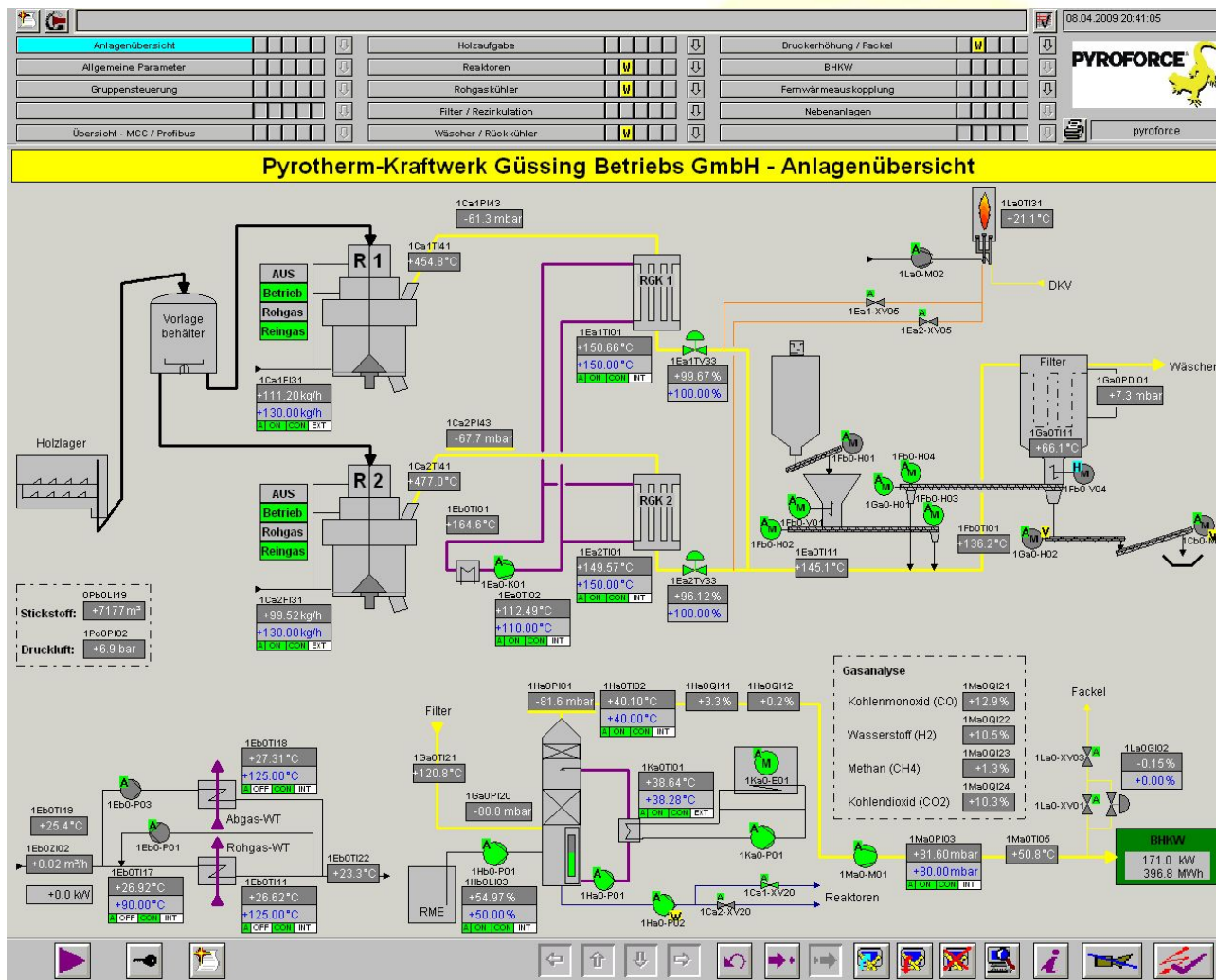
Anlage Spiez (CH) / Spiez plant (CH)



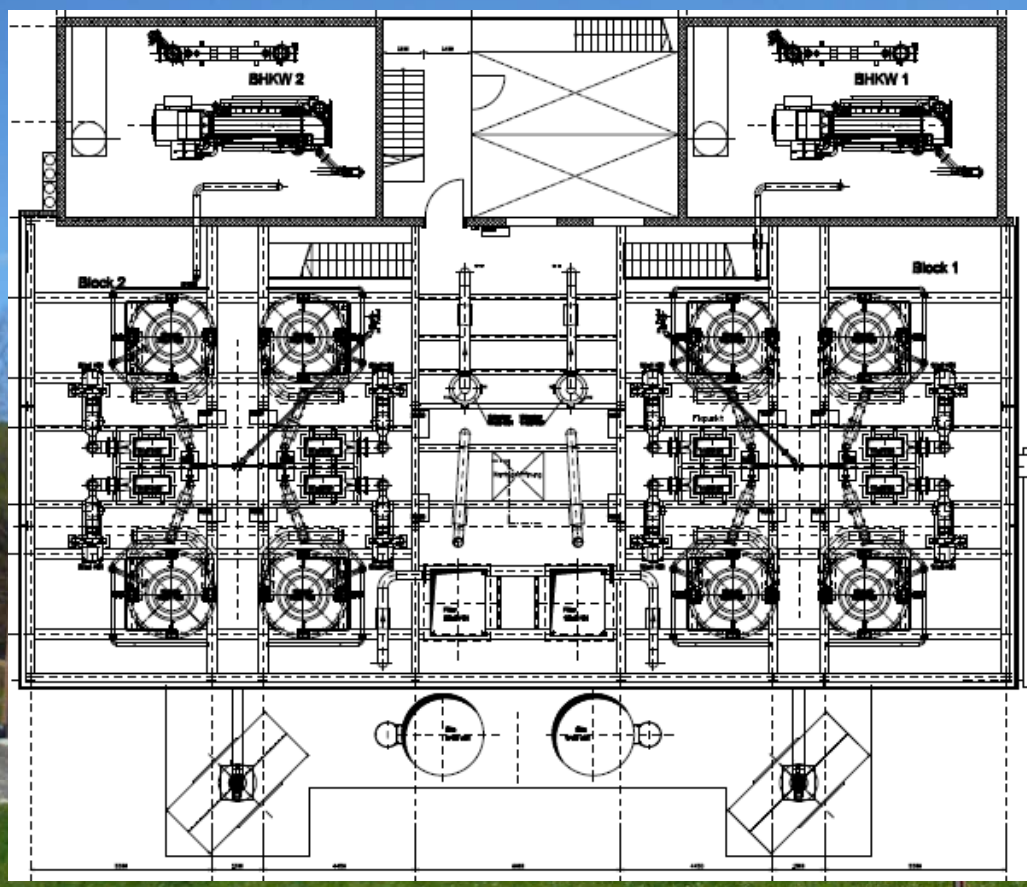
Güssing (A)



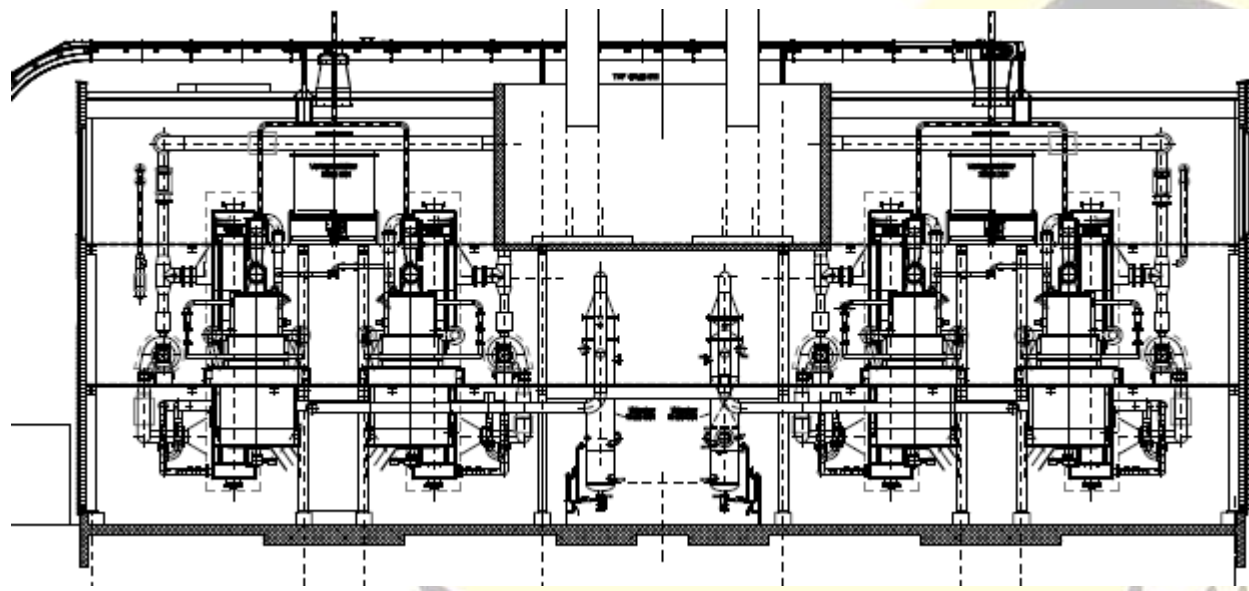
Güssing (A)



Stans I + II (CH)



Stans I + II (CH)



Fazit / Conclusion

Die PYROFORCE®

Technologie ist wirtschaftlich umsetzbar
cost effectiv

Die PYROFORCE®

Technologie gewährt Zusicherungen
allowd representations

- Stromleistung / El. power
- Wärmeleistung / Heat
- Wirkungsgrad / Efficiency
- Betriebsmittelverbrauch / Consumption
- Verfügbarkeit / operational availability



Selbstverständlich werden die Zusicherung nur bei Einhaltung der Technischen Anweisungen und der Unterhalt- und Wartungsvorschriften gewährt

Swiss Energy Technology

PYROFORCE[®]

Erfolgreich im Einsatz
Successful in operation

