Good day, ladies and gentlemen.
Dobrý deň, dámy a páni.

I would like to present our experience of "energy concepts".
Chcel by som predstaviť naše skúsenosti z "energetických koncepcií".

Energy concepts for heating, cooling and electricity

from renewable and fossil fuels

Project Development - Project organization/-management, planning, implementation and commissioning

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Energy concepts for heating, cooling and electricity

from renewable and fossil fuels

contents

1. Fundamentals of our energy concepts sustainability and energy efficiency

Sustainability Global Warming - Global Challenges

1. Limiting, distribution and trading of rights to CO^2 emissions
2. Support and exchange of climate-friendly technologies
3. Protection and sustainable use of forests
4. International support for adaptation
5. Strengthening the Development Policy

Energy efficiency of tomorrow - a balance between economic and ecological

1. Reduction of fossil fuels such as coal, oil and gas
2. Use of natural resources such as solar, wind and biomass
3. Energy consumption in accordance with the growth in the natural
4. Consideration of ecosystems in other parts of
5. Joint projects to develop and utilize innovative technologies

We have knowledge, understanding, and imagination.
If we sum all at one plant, we will shape the future
Victor Desigo

1. Fundamentals of our energy concepts sustainability and energy efficiency

DIN V 18599 – Energy efficiency of buildings

design and implementation

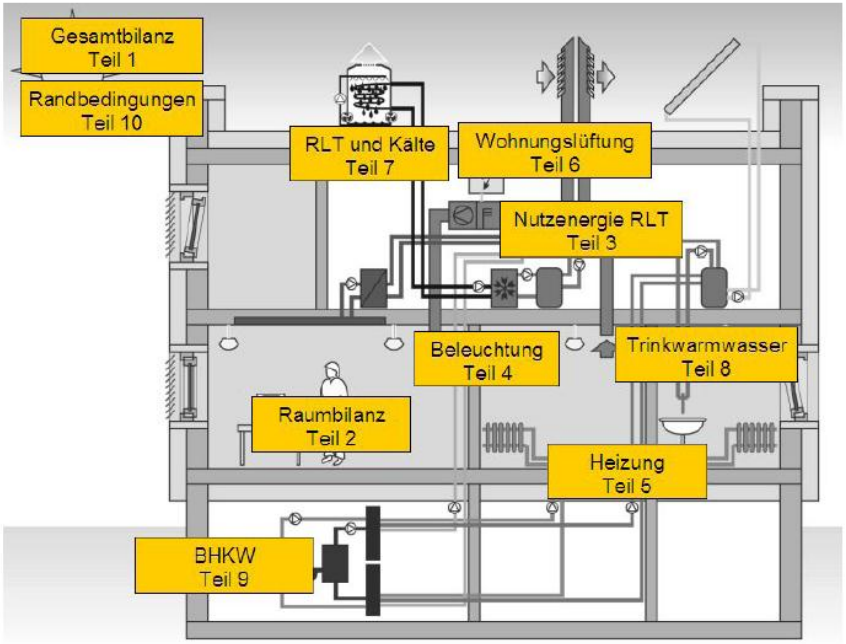


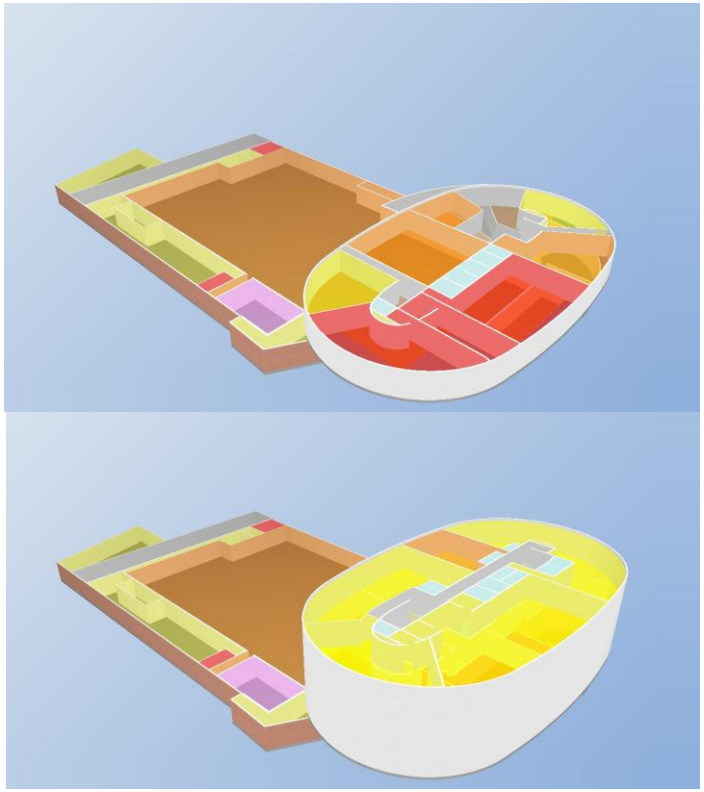
Bild 1 - Schematische Darstellung des Bilanzumfangs von DIN V 18599

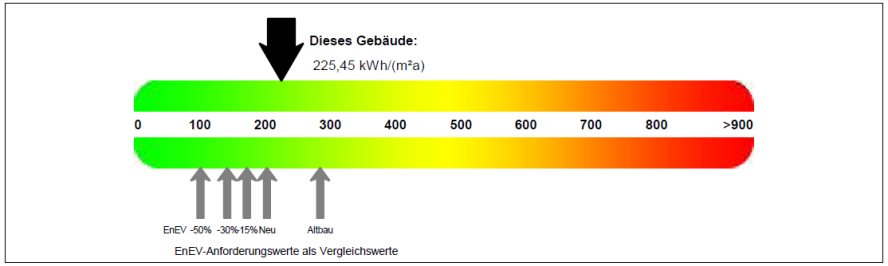
1. Consideration of the environment at the site, determine the resources and data on climate throughout the year
2. Review of energy sources at the site and in the region
3. Classification of objects in zones of in the building and the type of use
4. Calculation of the demand for useful energy, final energy and primary energy for heating, cooling, ventilation, hot water and lighting
5. System design for bivalent producing of heat, cooling and electricity
6. Energy concept from renewable and fossil fuels

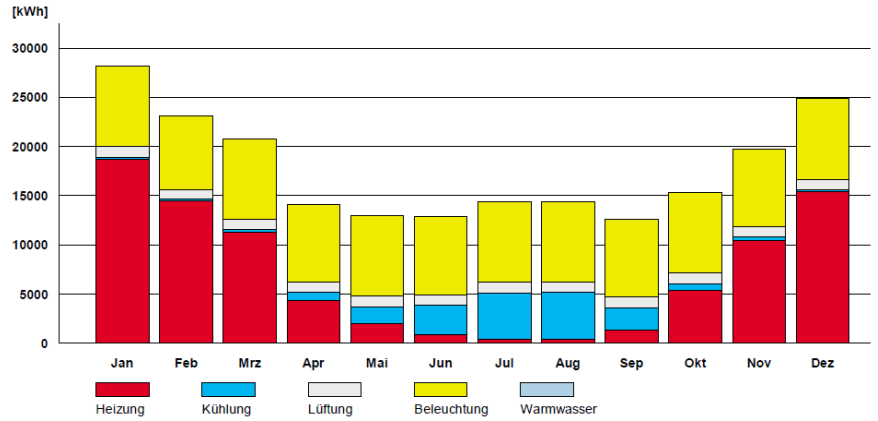
Quelle: Deutsches Institut für Normung e. V., Berlin

1. Fundamentals of our energy concepts sustainability and energy efficiency

Building Simulation Review of heating, cooling, ventilation, lighting and hot water for over a year







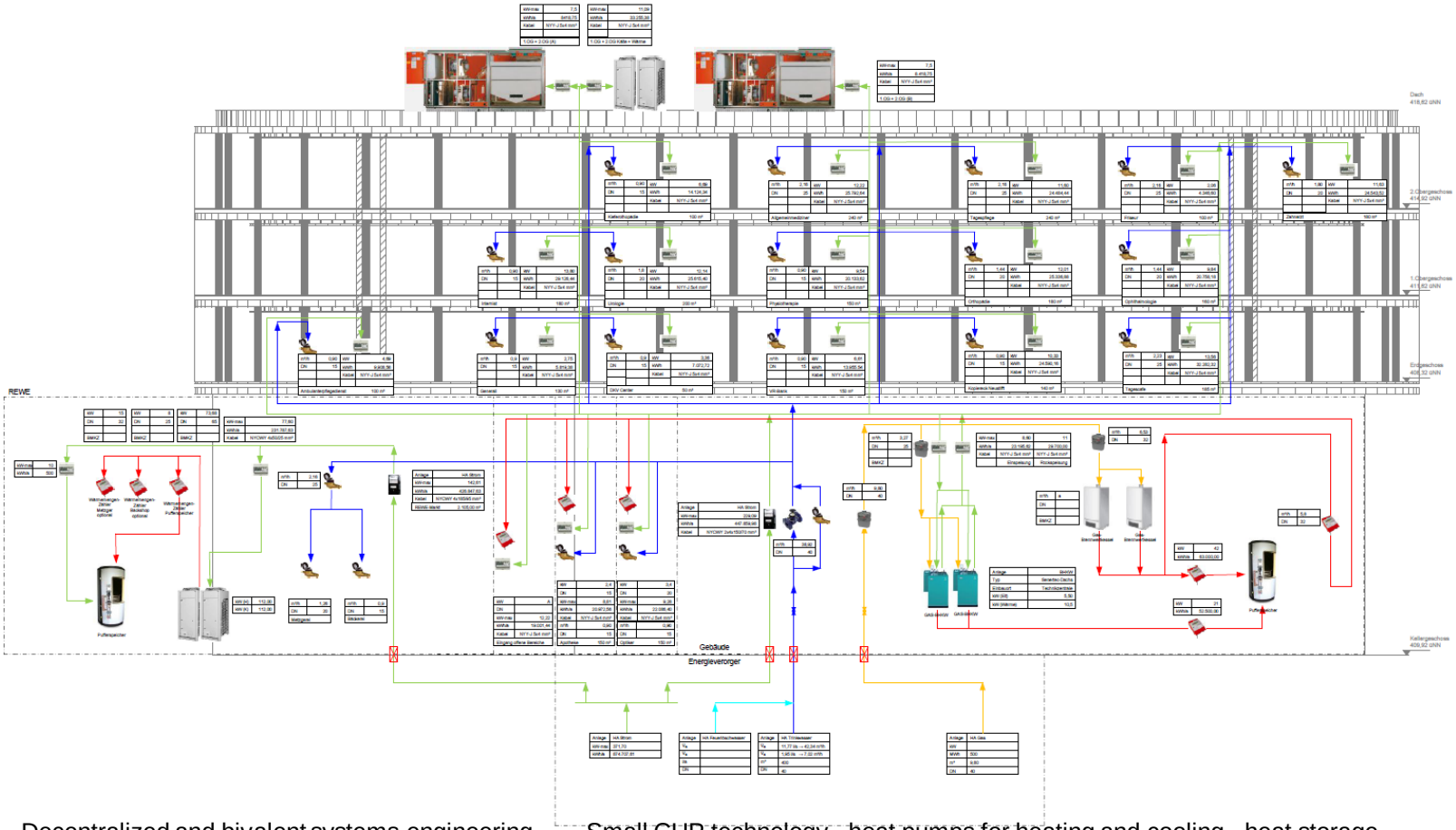
Zones according to DIN V 18599

- Restaurant
- Retail/Store
- Ambulance/Therapeutic practice
- Group office
- Retail/Department store (excluding food products)
- Cubicle
- Traffic area
- Storage/Technology
- Besides surface without dayroom
- Toilet in the non-residential buildings

1. Fundamentals of our energy concepts sustainability and energy efficiency

Building and Energy Management

Measurement and metering for water, heat, cold and electricity

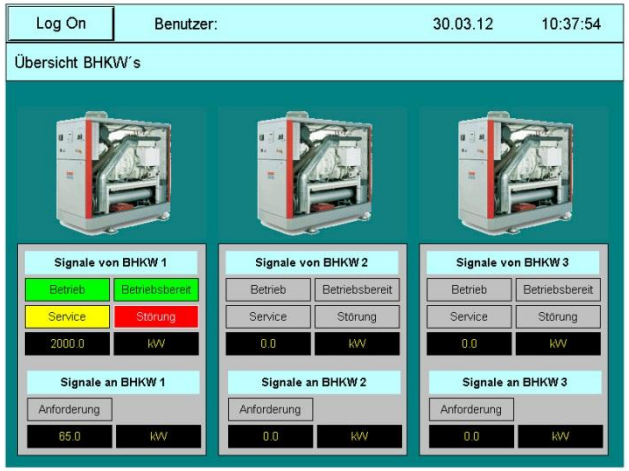


Decentralized and bivalent systems engineering - Small CHP technology - heat pumps for heating and cooling - heat storage

2. Combined heat and power (CHP) plants small decentralized CHP

Bivalent heat and electricity

Natural gas supply for the economic base

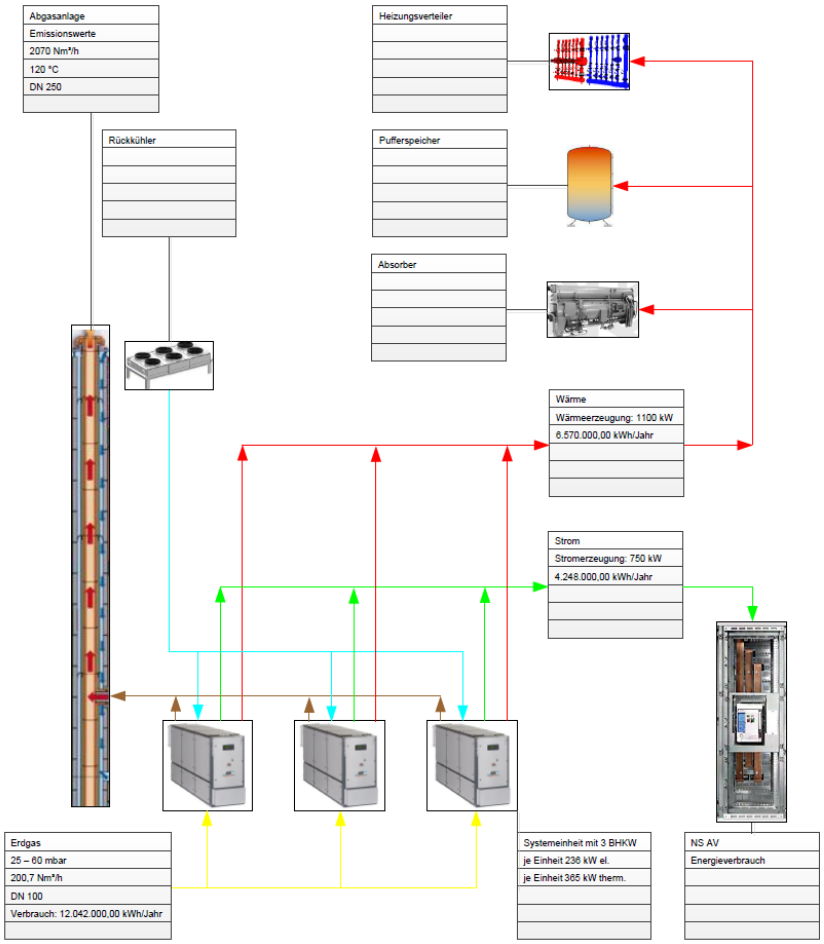


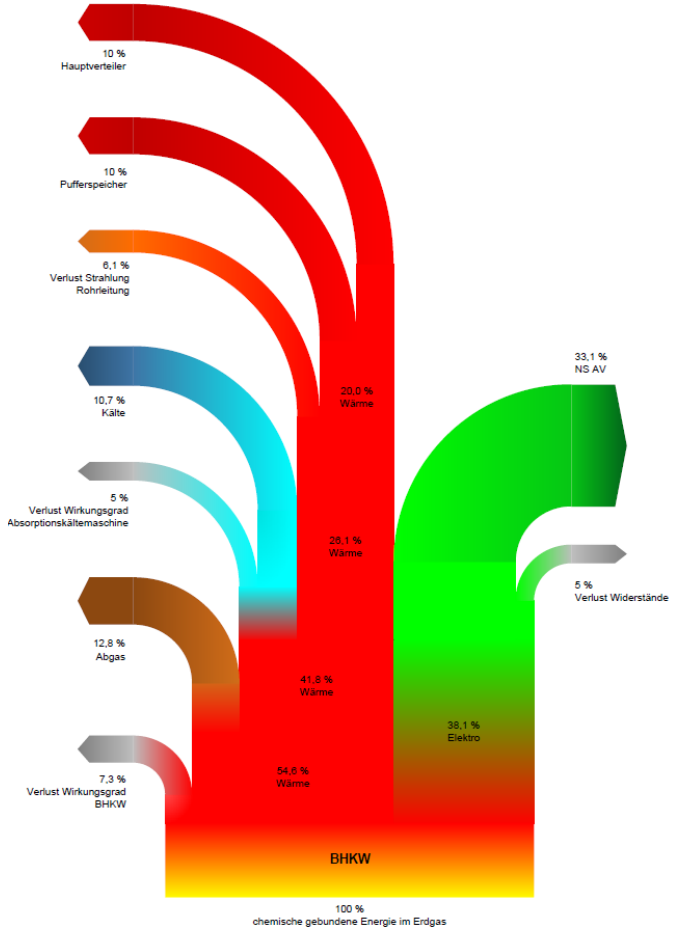
Hospital Bayreuth
Medical treatment with 1100 beds,
Emergency room, 7 surgical units and intensive care units

Specifications:		Combined Heat and Power
Heat	4.5 MW	3 x 370 kW CHP
Cold	1,5 MW	1 x 800 kW absorber
Power	1.5 MW	3 x 240 kW CHP
		CHP – start up in 2012

2. Combined heat and power (CHP) plants small decentralized CHP

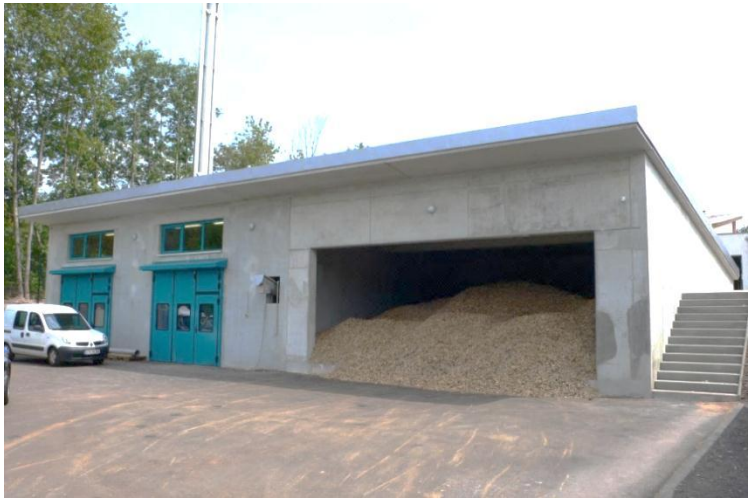
Overview of the system components and assessment of the energy flow



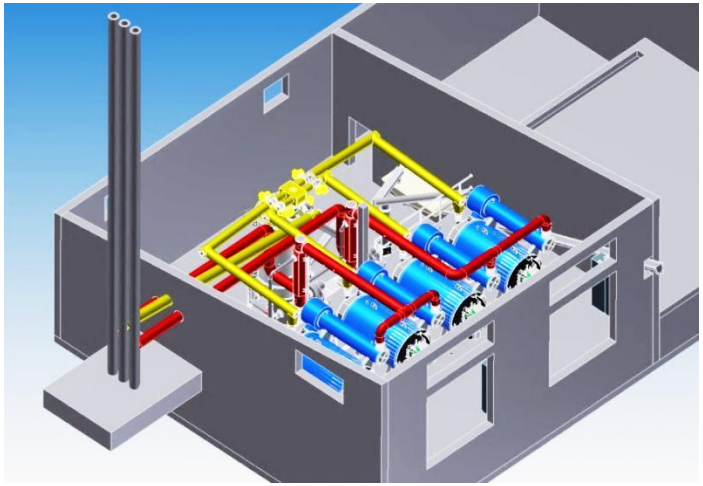


3. Thermal gasification of wood gas engines and hot gas engines

Reference Germany – Thüringen – Tabarz



Heat and power generation with biomass - wood chips



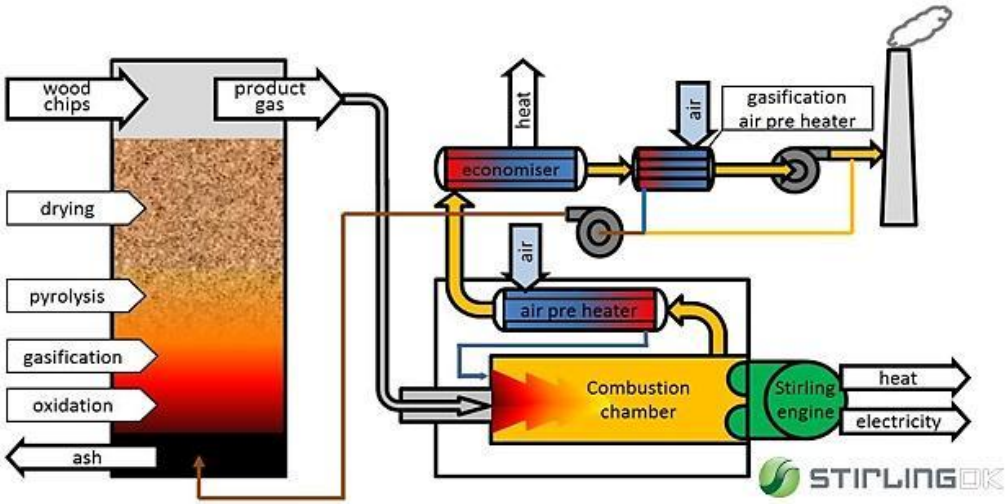
sponsored by
European Regional Development Found ERDF
Free State Thüringen
Thüringen development bank

environmentally friendly

Planing	2007 – 2009
execution	2010 – 2011
Start up	October 2011

3. Thermal gasification of wood gas engines and hot gas engines

Countercurrent gasification with heat and electricity via Stirling engine Stirling



Temperatures during the gasification process

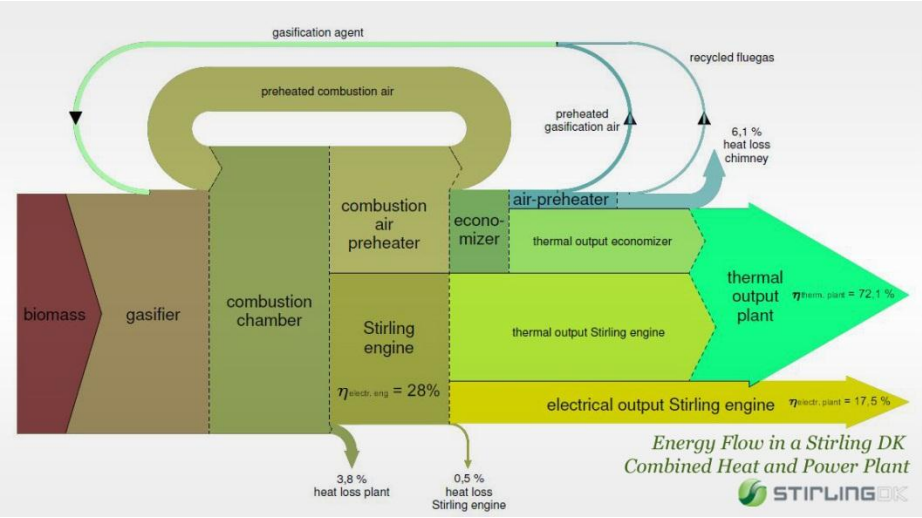
Carburetor - Pyrolysis:	750 °C to 1050°C
wood gas:	55 °C to 75°C
Heating medium:	flue gas
Stirling engine working medium:	Helium
Flue gas temperature before air preheater:	750 °C to 850 °C

Power plant with biomass

Fuel:	Wood chips with moisture 45 % to 55 % lumpiness - length to 12 cm
Consumption:	max. 4 x 70 kg/h per unit
Firing:	800 kW
heat output:	4 x 170 kW
Heat storage	with 20,000 + 40,000 l
electrical power:	4 x 35 kW (140 kW)
Operating hours per year:	6500 – 7500

3. Thermal gasification of wood gas engines and hot gas engines

Countercurrent gasification and hot gas engine Stirling - emissions and energy flow



Parameters	Biogas IC¹	Stirling Biogas EC	Unit
Methane Number	80	No restrictions	-
Calorific value	>5	>3	kWh/Nm3
Chlorine	<100	<100	mg/Nm3CH4
Fluoride	<50	No restrictions	mg/Nm3CH4
Total-chlorine-fluoride	<100	<100	mg/Nm3CH4
Dust < 5µm	<5	No restrictions	mg/Nm3CH4
Oil vapour	<400	No restrictions	mg/Nm3CH4
Silicon	<5	No restrictions	mg/Nm3CH4
Sulphur	<300	<300	mg/Nm3
Hydrogen sulphide	<200/<306	<200/<306	ppm/mg/Nm3
Ammonia	<50/<38	No restrictions	ppm/mg/Nm3

Furthermore, the internal combustion biogas engine requires burnable gas to be fed to the engine in the following state:

Gas pressure on tapping (mbar)	20≤p ≥ 50
Max. gas pressure fluctuations after zero pressure controller (mbar)	±≤3
Max gas temperature (°C)	30
Max relative humidity (%)	60

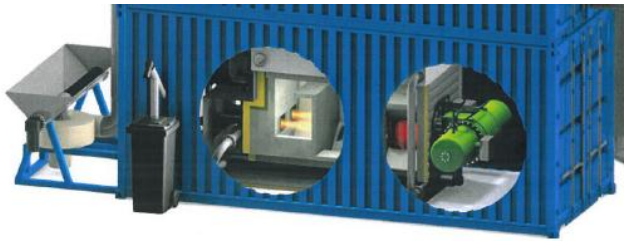
extension 2013
Gas cleaning over 3 stages - cooling, filtration 1 and 2
to pure gas for engine operation in CHP

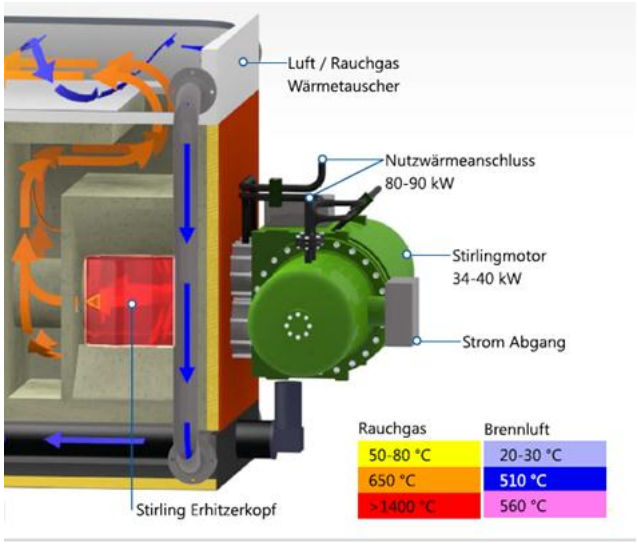
Heat Power 380 kW

Electrity power 30 – 50 kW
100 – 150 kW

4. Development of high-temperature combustion systems and modules

Direct combustion of wood chips with Stirling engine





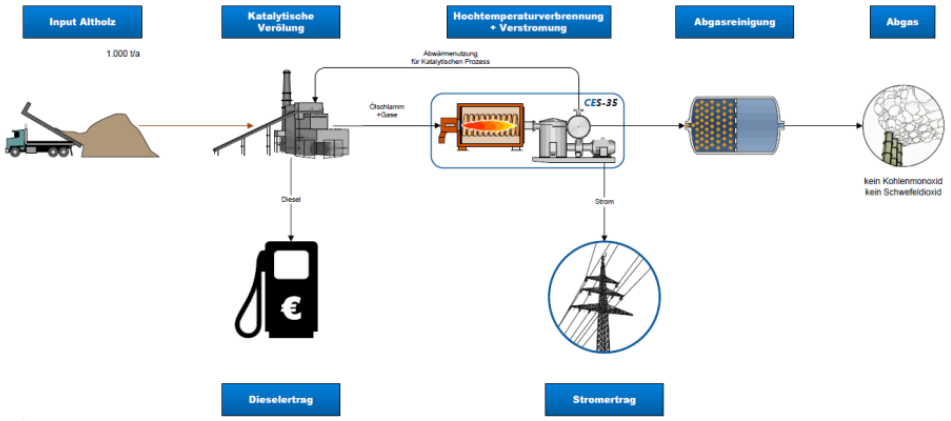
Firing:	175 kW
Heat output:	80 kW
Temperatures VL/RL:	80 °C/60 °C
electrical power:	35 kW
Current efficiency:	28 %
Voltage:	400 V 50 Hz
Plant overall efficiency:	> 96 %
Operating hours per year:	6.000 to 7.000
Fuel:	Wood chips - moisture to 50 % integrated process interruption
Consumption figure baseload:	per Day 2 x 5,11 m³ per Day 2 x 419 t (at 2,64 kWh/kg)
Storehouse for 7 days:	at least 75 m³ recommendation
Green emissions exhaust	(CO < 10; NOx <150 ppm)

environmentally conscious - Patented technology

Pilot plant	2012
Small series production	2013

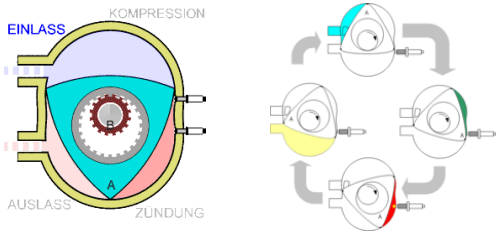
4. Development of high-temperature combustion systems and modules

Direct combustion of wood chips and expansion of the process
with production of synthetic diesel and additional production of electricity with high and low temperature motors



environmentally friendly - Patented technology

Pilot plant	2013
Small series production	2014



option 1
Circulation - high temperature 450 °C
+ Evaporation of organic medium
+ Turbine to generate electricity

option 2
Circulation - low temperature 90 °C
+ Evaporation of organic medium
+ Turbine to generate electricity

5. Bivalent heat and power thermal storage in biomass cogeneration plant

Reference Germany – Bayern Bivalent heat and power economic use of biomass and natural gas

Hospital Bayreuth Hohe Warte
Medical treatment with 1100 beds,
Emergency room, 7 surgical units and intensive care units

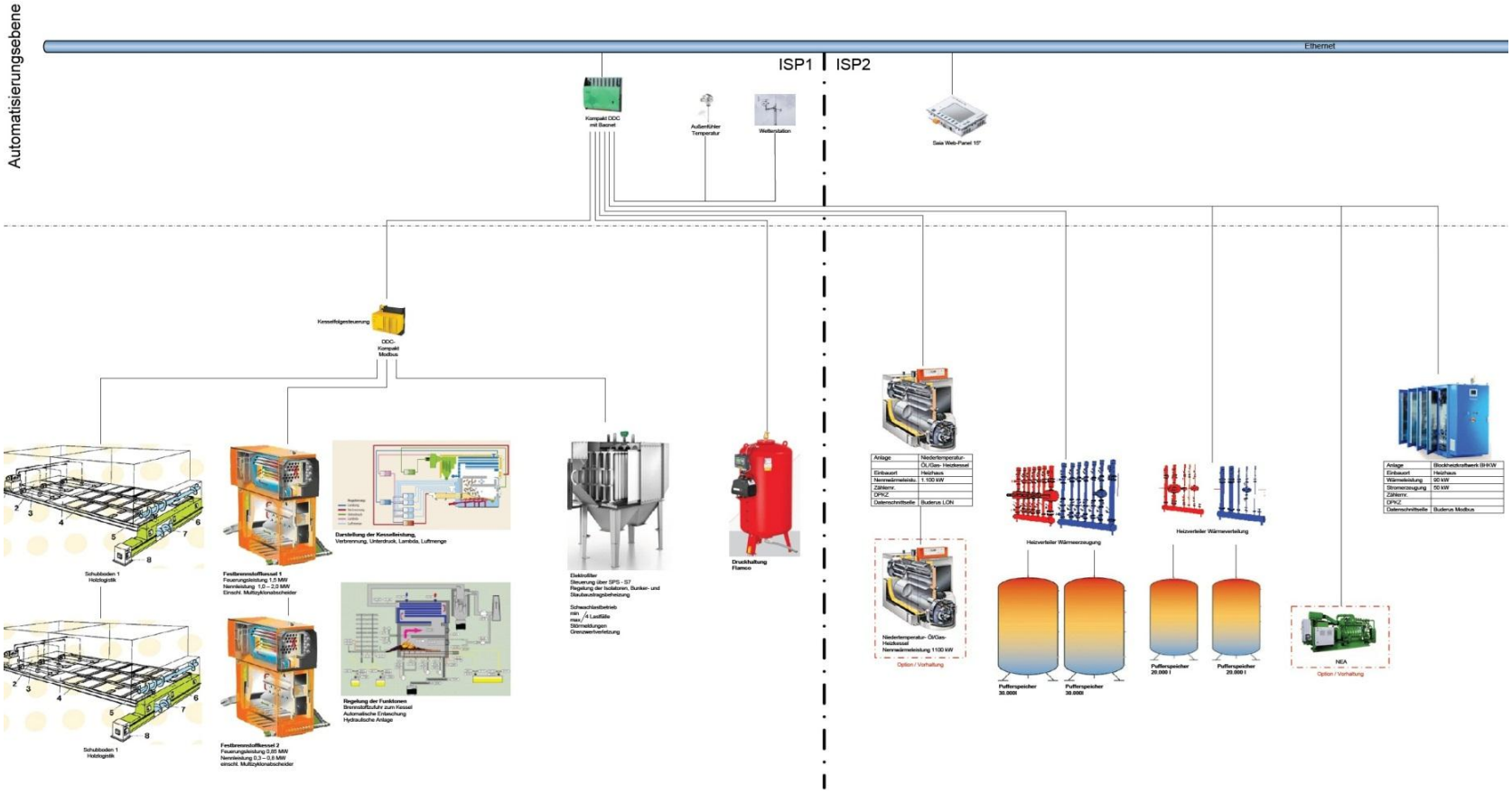
Specifications:		Biomass and gas
Heat	3.5 MW	1600 kW + 700 kW
Heat storage		with 40,000 + 60,000 l
Cold	1,5 MW	1 x 350 kW absorber
Power	1.2 MW	50 kW + 480 kW CHP

environmentally friendly
Sponsoring by Free State Bayern

Planing	2008 – 2010
execution	2011 – 2012
Start up	December 2012

5. Bivalent heat and power thermal storage in biomass cogeneration plant

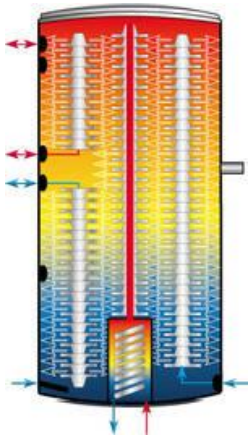
Bivalent heat and power economic use of biomass and natural gas



5. Bivalent heat and power thermal storage in biomass cogeneration plant

sustainable energy heat storage as an energy manager

Storage volume in l	**100.000,00**	**100.000,00**	**100.000,00**	**100.000,00**	**100.000,00**	**100.000,00**	**100.000,00**	**100.000,00**
temperature leading in °C	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
temperature return in °C	60,00	60,00	60,00	60,00	60,00	60,00	60,00	60,00
Discharge time in hours	12,00	10,00	8,00	6,00	4,00	3,00	2,00	1,00
performance heat in kW	**376,32**	**451,59**	**564,49**	**752,65**	**1.128,97**	**1.505,30**	**2.257,94**	**4.515,89**
storage volume in l	**40.000,00**	**40.000,00**	**40.000,00**	**40.000,00**	**40.000,00**	**40.000,00**	**40.000,00**	**40.000,00**
temperature leading in °C	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00
temperature return in °C	60,00	60,00	60,00	60,00	60,00	60,00	60,00	60,00
Discharge time in hours	12,00	10,00	8,00	6,00	4,00	3,00	2,00	1,00
performance heat in kW	**150,53**	**180,64**	**225,79**	**301,06**	**451,59**	**602,12**	**903,18**	**1.806,36**



Reference Germany - Thüringen
Tabarz Wellness
Heat storage - Buffer storage 20,000 l + 40,000 l

Reference Germany - Bayern
Hospital Bayreuth Hohe Warte
Heat storage - Buffer storage 40.000l + 60,000 l

Thank you for your attention

Ďakujem za vašu pozornosť

OUR SERVICES

Project Development - Project organization/-management, planning, implementation and commissioning

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