



# PROJECT



## HEAT SUPPLY OF COMMERCIAL CUSTOMER

## *The Company*



The company was founded in 2004.

The technical skills, especially in the range of:

- **fluidized bed technology**
- **boiler furnace systems**
- **plant design and optimization**

base on the activity at research & development institutions in Magdeburg, Berlin and Rostock for many years. Applied know-how was gained with 4 longtime running reference units.

commercial register: Rostock, HRB 9928

manager: Mr. V. Spiegelberg

## *The Project*



is the erection and the operation of a compact stationary fluidized bed combustor (SFBC) for the thermal recycling of solid, past-like and liquid wastes, especially high calorific refuses.

**The main process aim is the heat supply to a brewery and a cheese dairy (if applicable further customer).**

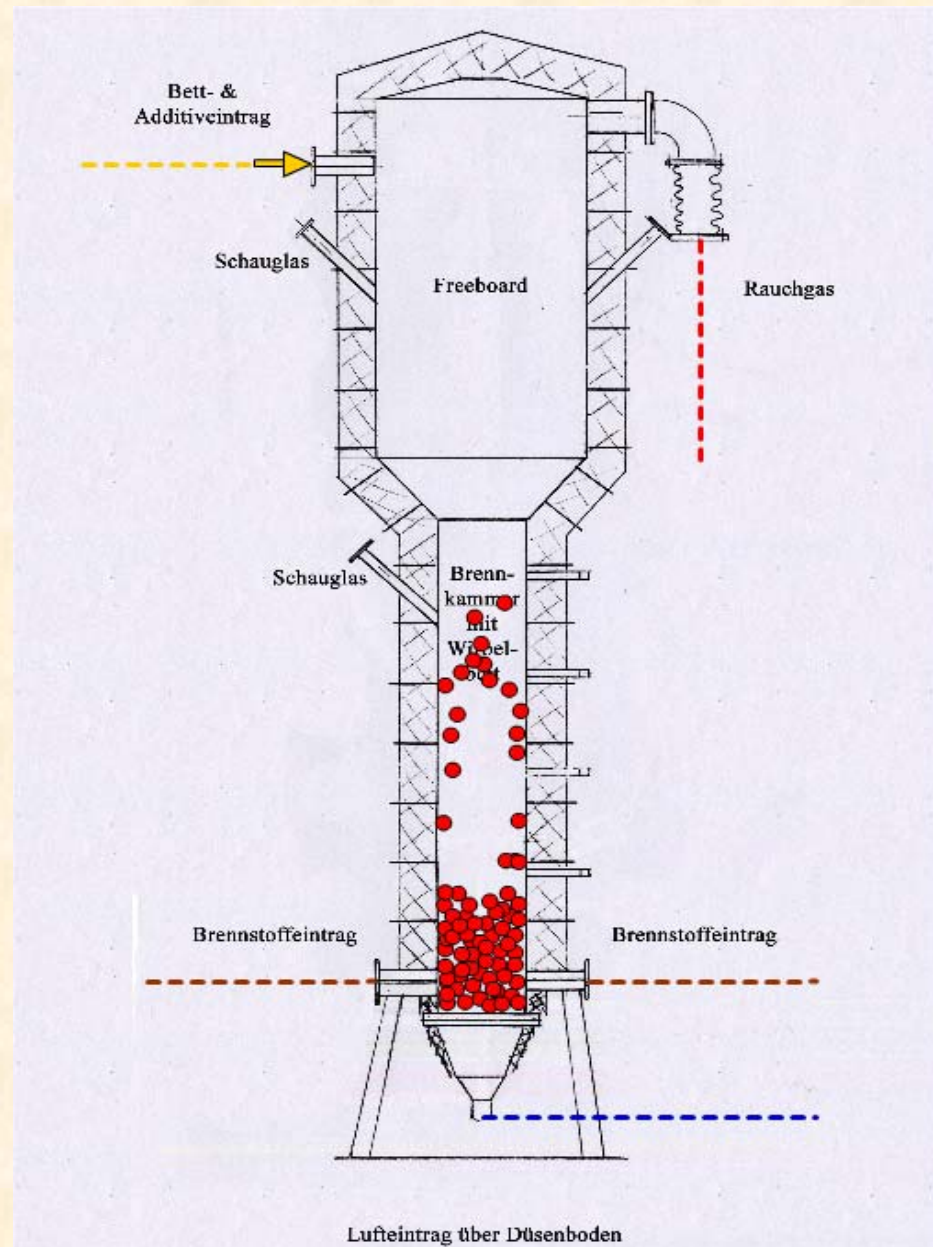
The emerged importance of our process concept is the flameless combustion within a turbulent sand bed with a consistent temperature (> 850 °C).

Because of the long residence time for the fuel it is possible to burn solid, past-like and liquid fuels reliable and minimize emissions in the combustor already .

The SFBC is equipped with a powerful, state-of-the-art, multi-stage flue gas treatment system which ensures the reliable environmental compliance (17. BImSchV).

# The Process

**ES+S**



# *The Fuels*



- solid, combustible waste
- plastic, rubber, packaging
- oil sludge
- tar-containing matter (roofing cardboard)
- solvent
- industrial/commercial waste
- liquid, combustible waste
- municipal waste

# *Quantities & Contractors*



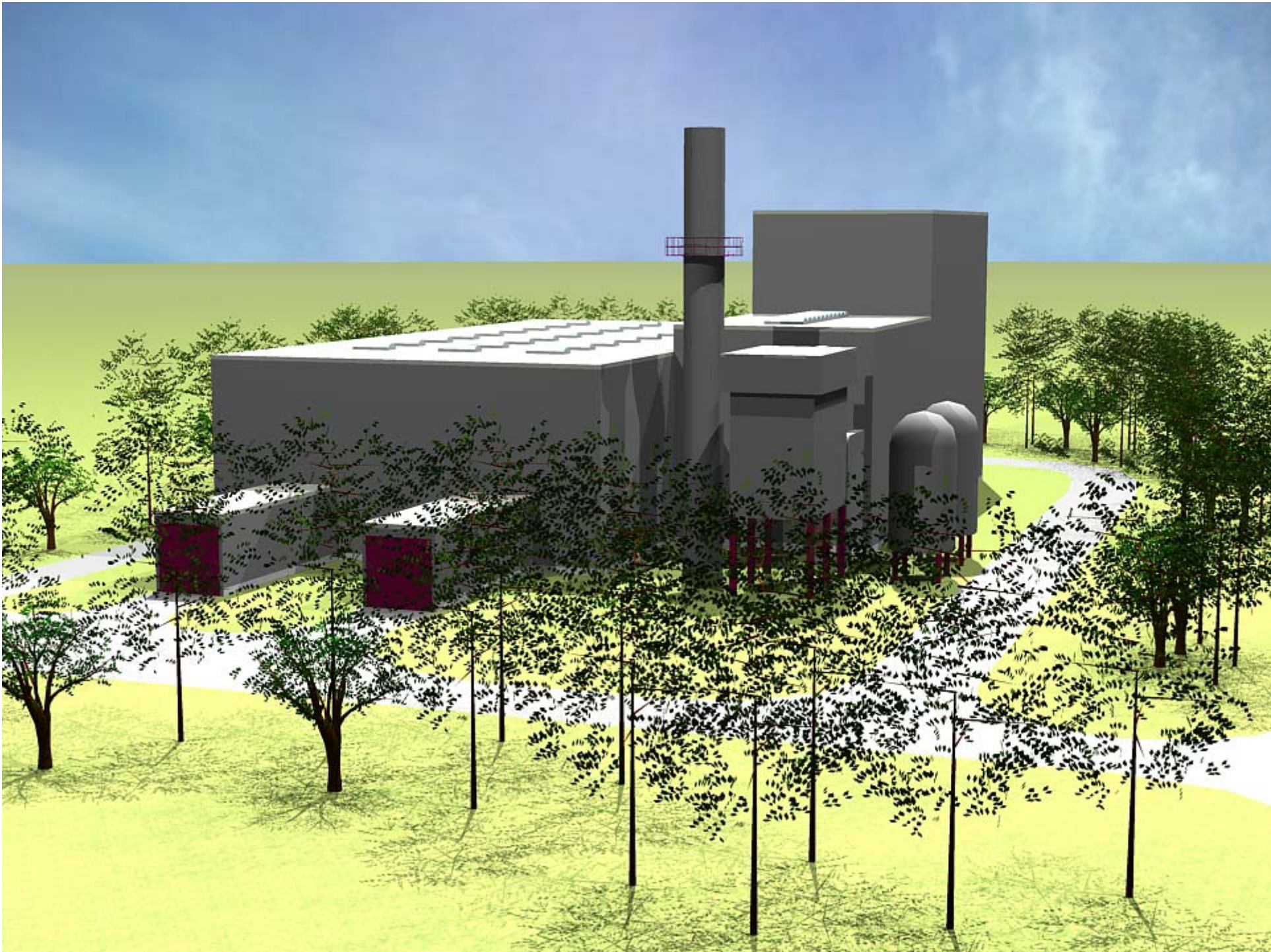
- delivery

necessary quantities: 34 000 to 40 000 t/a

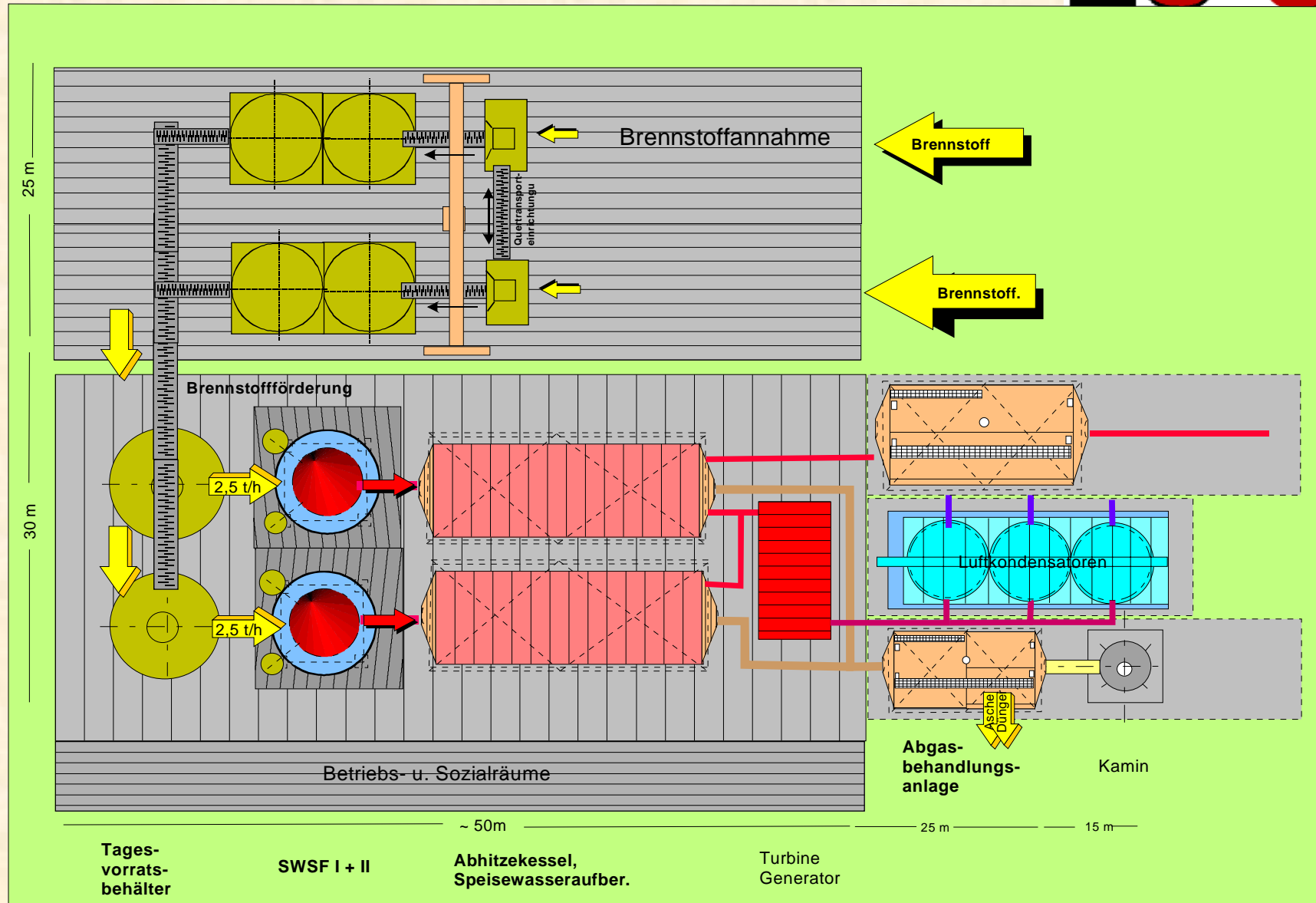
- contractors

5 (small business) waste management companies





# Technisches Konzept



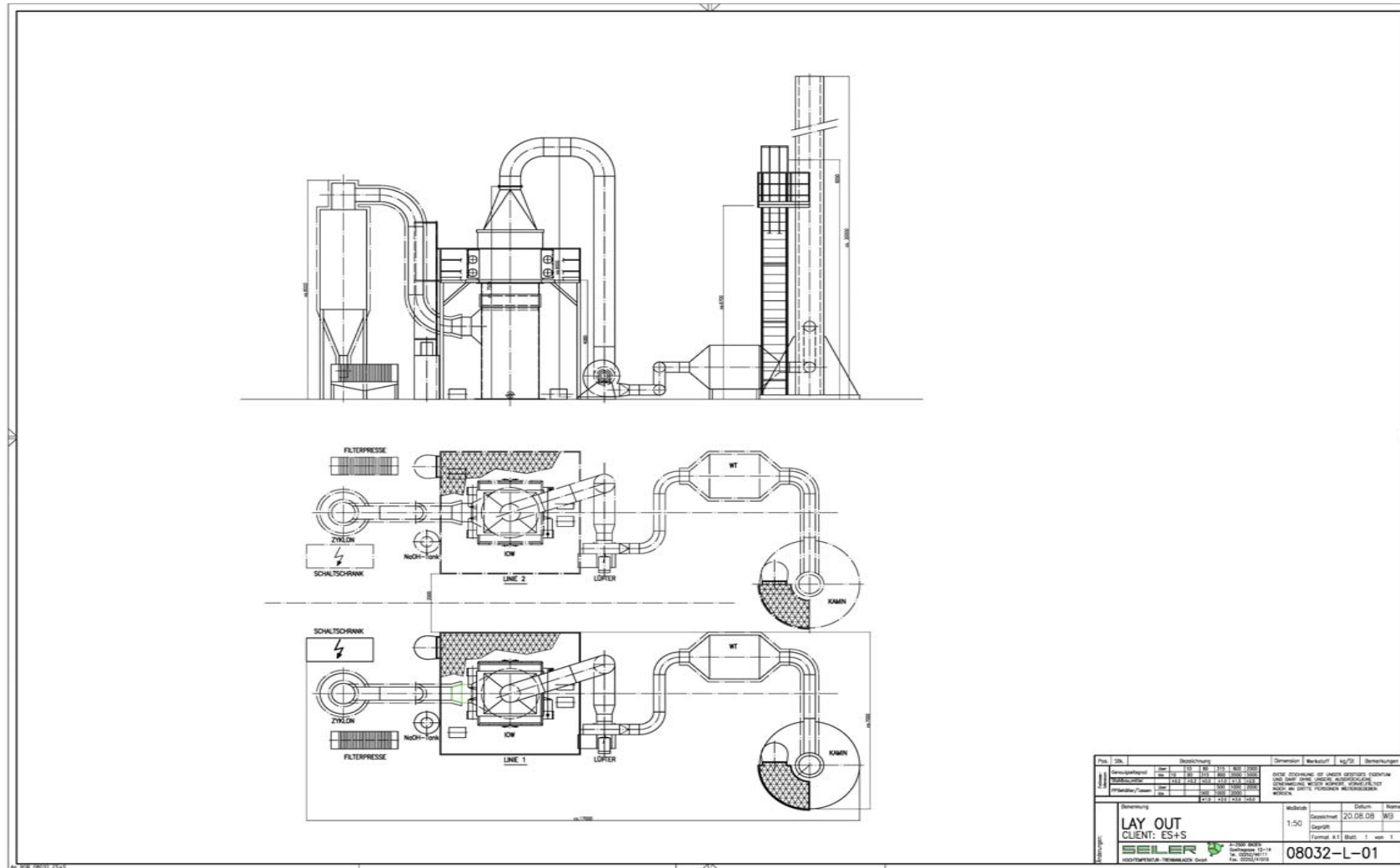
# *The Flue Gas Treatment System*



A flue gas treatment system adequate to the state-of-the-art ( Best Available Technology (BAT) „waste combustion“) will be installed to meet the environmental limits, prescript in the German ordinance for waste combustion 17. BImSchV reliable.

An appropriate concept is made together with an experienced producer.

# Flue Gas Treatment System *multi-staged* (current design state!)



Pos.	Stk.	Beschreibung	Dimension	Material	kg/2l	Bemerkungen
1	1	ICW	1100 x 1100 x 1100	St 37	1100	
2	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
3	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
4	1	WT	1100 x 1100 x 1100	St 37	1100	
5	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
6	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
7	1	ICW	1100 x 1100 x 1100	St 37	1100	
8	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
9	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
10	1	WT	1100 x 1100 x 1100	St 37	1100	
11	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
12	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
13	1	ICW	1100 x 1100 x 1100	St 37	1100	
14	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
15	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
16	1	WT	1100 x 1100 x 1100	St 37	1100	
17	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
18	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
19	1	ICW	1100 x 1100 x 1100	St 37	1100	
20	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
21	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
22	1	WT	1100 x 1100 x 1100	St 37	1100	
23	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
24	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
25	1	ICW	1100 x 1100 x 1100	St 37	1100	
26	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
27	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
28	1	WT	1100 x 1100 x 1100	St 37	1100	
29	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
30	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
31	1	ICW	1100 x 1100 x 1100	St 37	1100	
32	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
33	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
34	1	WT	1100 x 1100 x 1100	St 37	1100	
35	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
36	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
37	1	ICW	1100 x 1100 x 1100	St 37	1100	
38	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
39	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
40	1	WT	1100 x 1100 x 1100	St 37	1100	
41	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
42	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
43	1	ICW	1100 x 1100 x 1100	St 37	1100	
44	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
45	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
46	1	WT	1100 x 1100 x 1100	St 37	1100	
47	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
48	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
49	1	ICW	1100 x 1100 x 1100	St 37	1100	
50	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
51	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
52	1	WT	1100 x 1100 x 1100	St 37	1100	
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57	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
58	1	WT	1100 x 1100 x 1100	St 37	1100	
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67	1	ICW	1100 x 1100 x 1100	St 37	1100	
68	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
69	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
70	1	WT	1100 x 1100 x 1100	St 37	1100	
71	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
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74	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
75	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
76	1	WT	1100 x 1100 x 1100	St 37	1100	
77	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
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79	1	ICW	1100 x 1100 x 1100	St 37	1100	
80	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
81	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
82	1	WT	1100 x 1100 x 1100	St 37	1100	
83	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
84	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
85	1	ICW	1100 x 1100 x 1100	St 37	1100	
86	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
87	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
88	1	WT	1100 x 1100 x 1100	St 37	1100	
89	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
90	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
91	1	ICW	1100 x 1100 x 1100	St 37	1100	
92	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
93	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
94	1	WT	1100 x 1100 x 1100	St 37	1100	
95	1	SCHALTSCHRANK	1100 x 1100 x 1100	St 37	1100	
96	1	ZYLON	1100 x 1100 x 1100	St 37	1100	
97	1	ICW	1100 x 1100 x 1100	St 37	1100	
98	1	LÖFGER	1100 x 1100 x 1100	St 37	1100	
99	1	KAMIN	1100 x 1100 x 1100	St 37	1100	
100	1	WT	1100 x 1100 x 1100	St 37	1100	

# *Emissions abatement directly within the SFBC*



- CO - highly fuel burnout leads to minimal CO
  
- NO<sub>x</sub> - no prompt NO<sub>x</sub>
  - no thermal NO<sub>x</sub>
  - fuel - NO<sub>x</sub> can be minimized by:
    - spraying ammonia or urea into the combustion chamber (SNCR-method)
    - decrease the oxygen concentration in the flue gas (LEA-method)
  
- SO<sub>2</sub> - nearly complete desulfurization with limestone metering into the SFBC (additive process)
  
- HCl - abatement with the additive process

## *Exhaust Air (odor)*



- low bio-degradable share in the fuel
- No outdoor-storage of the wastes!
- Aspiration of the combustion air via the waste depot
- Lock system for the waste reception
- Two-lined-suction-system ensures a constant aspiration of the exhaust air
- Emergency exhaust air blower

## *SFBC Performance data (approx.)*



Combustion heat performance:	20,4 MW <sub>th</sub>
Steam flow:	20 t/h
Turbine performance (gross)	3,6 MW <sub>el</sub>
Steam supply:	10,0 t/h
efficiency (power & heat):	0,71
Free condensation heat (55°C):	5,0 MW

# *Energy conception 1*



## **ES+S** as exclusive heat supplier

**ES+S** can provide: max. 70 000 MWh / a

**cheese dairy** demand: 30 000 MWh / a

**brewery** demand: 30 000 MWh / a

The condensation heat is available yet.

## *Energy conception 2*



ES+S power supplier

ES+S can provide: to ca. 20 000 MWh / a

Feed in the electricity network of e.on e.dis possible without any problems.

The combined-heat-and-power act (**KWK 2002 § 4 (3)**) regulates the acceptance and transmission of electricity to a third party.