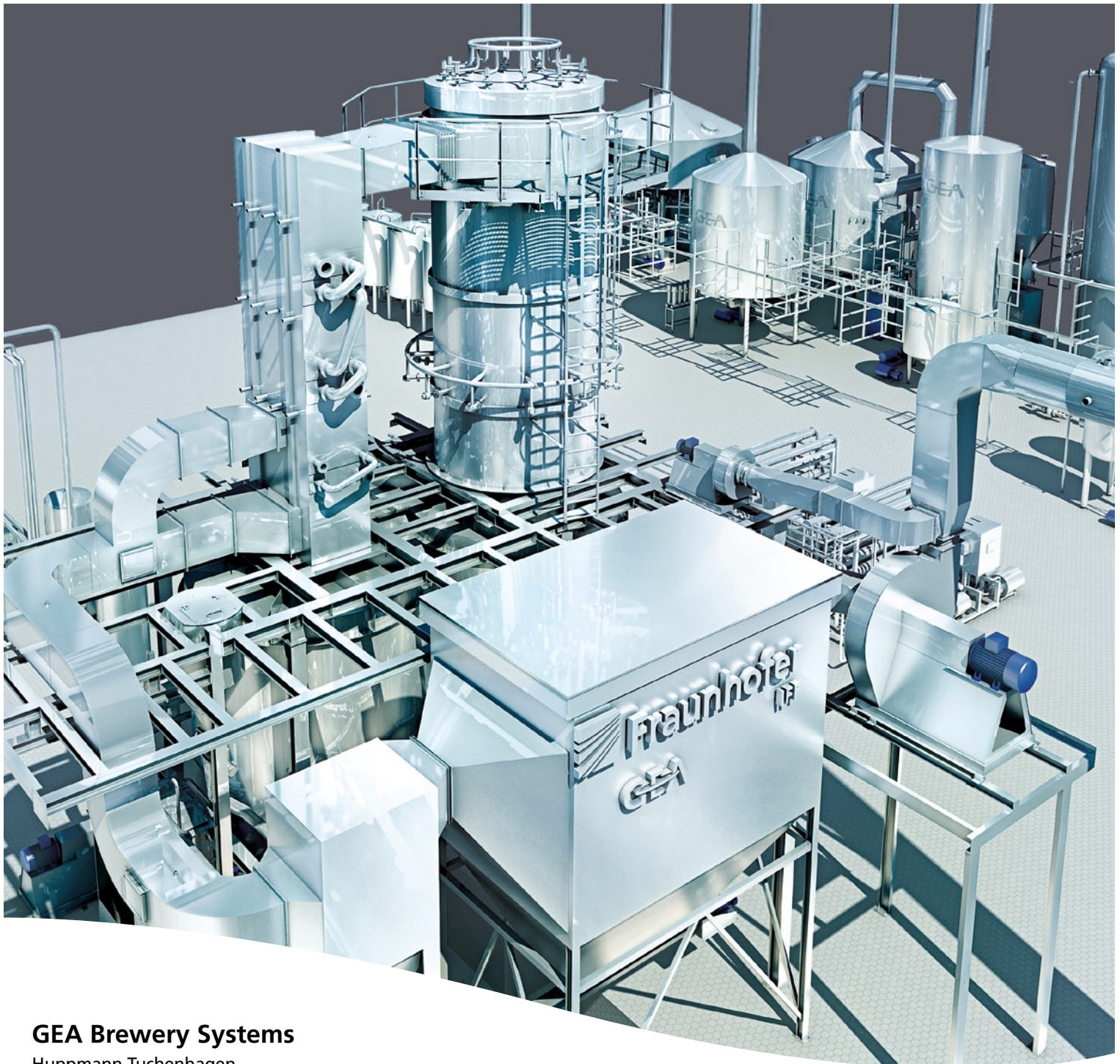


HEAT-STER™:

Sustainable energy production.



The energy-efficient brewery.

Steadily rising prices for fossil fuels such as oil or gas due to limited availability and increased global demand should encourage breweries to intensify their efforts towards the utilization of renewable energies.

The Best Available Techniques Reference Documents (BREFs) published by the EU commission in the context of Integrated Pollution Prevention and Control also stipulate the efficient use of energy, sustainable utilization of raw materials and systematic reduction of emissions and effluents.

Spent grains as an alternative to fossil energy sources.

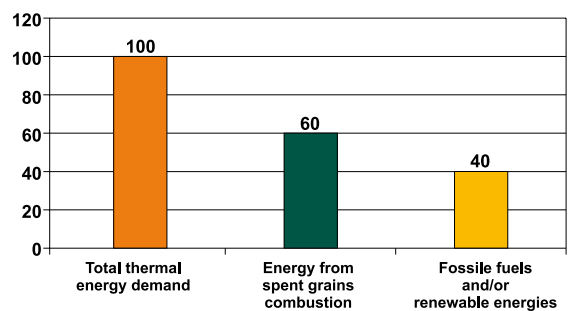
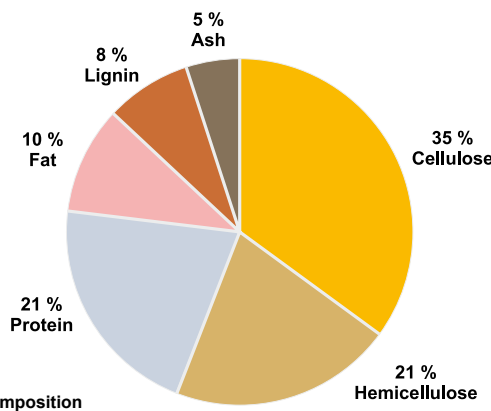
In breweries, fossil fuels can be substituted by spent grains. Spent grains are available as a fuel source exactly when the brewery requires thermal energy for the production process. There is a direct connection between the amount of energy needed in the brewhouse and the amount of spent grains resulting from wort production. Intermediate storage of spent grains as fuel is not necessary.

The thermal potential of spent grains is optimally used in the combination with JETSTAR™ boiling and an energy storage system.

Provision of thermal energy from spent grains.

The analysis of the energy consumers in the different sections of a brewery shows that a heat carrier at a high energy level must be available in the brewhouse for the heating processes during mashing and wort boiling. Saturated steam is produced in the HEAT-STER™, a spent grains combustion system based on fluidized bed technology with a downstream steam boiler or, if a thermal oil boiler is used, with a peak load steam generator heated with thermal oil.

The amount of heat generated by spent grains combustion is sufficient for the complete production area, so that other sources of energy can be used to provide thermal energy for the filling area.



FACTS & FIGURES

Comparison of calorific value:

Spent grains (100 % dry matter)	18,640 kJ/kg
Spent grains (50 % dry matter)	8,500–9,000 kJ/kg
Wood (63 % dry matter)	10,500 kJ/kg
Brown coal	10,200 kJ/kg

Heat from spent grains

In a brewery with a high share of returnable containers and an energy recovery system in the brewhouse, between 60 % and 70 % of the heat demand can be met through the thermal utilization of spent grains. Thus, the HEAT-STER™ provides the basis for sustainability in the brewing industry.

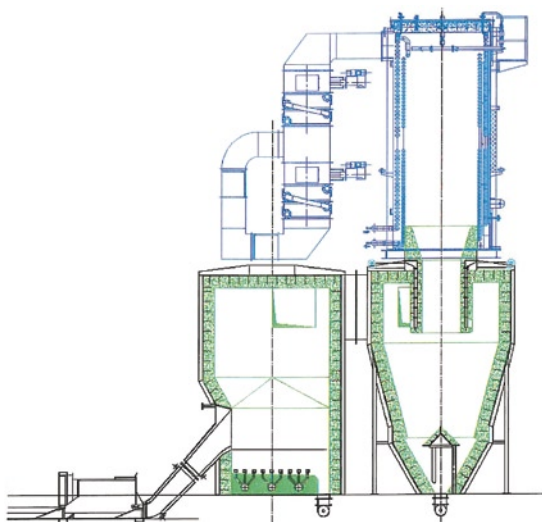
Basic data for the design of a spent grains combustion system.

The design of the spent grains combustion equipment depends on the amount of spent grains produced in the process. So, the thermal output of a spent grains combustion system for a brewery with approx. 1 million hl sales beer per year can be designed with approx. 4–5 MW. Breweries with 2 or 3 million hl sales beer per year need double or triple the thermal output.

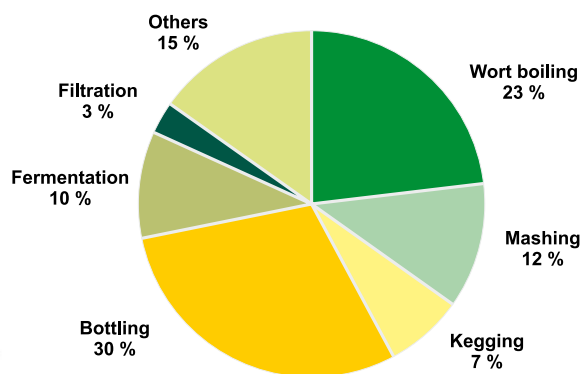
The complete spent grains combustion system for steam generation consists of the furnace with fluidized bed technology, which is particularly advantageous for spent grains combustion. In combination with optimized distribution of primary and secondary air as well as injection of secondary air at specific points above the firebed, this technology allows combustion of the still wet

spent grains in compliance with the emission limit values (according to “TA Luft”, the German Technical Instructions on Air Quality Control). In trials conducted in an industrial plant with a combustion heat performance of approx. 5 MW, limit values were adhered to without the use of additives and without specific flue gas cleaning. Capacity control of the combustion system can be between 50 % and 100 %.

The hot flue gases are led through an afterburner to the boiler, where water for steam generation or thermal oil is heated. The thermal oil is led via an ORC system for power generation, the residual heat is provided to the hot water supply system. Downstream of the boiler there are economisers for the recovery of heat from exhaust gases and dedusting systems like separating cyclone, electric filter or fibrous filter.



(Reference: Kohlbach)

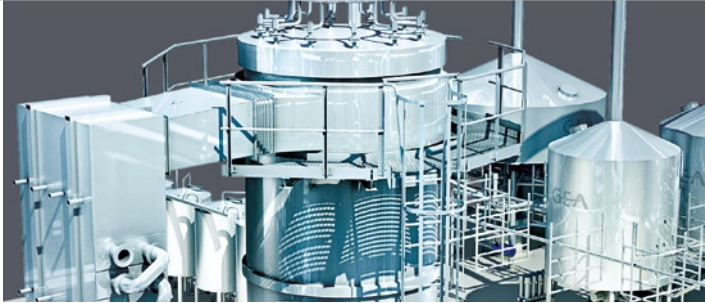


Combustion in the fluidized bed

The fluidized bed in the HEAT-STER™ provides optimal conditions for spent grains combustion. Grate firing is hardly suitable due to the particle size of spent grains. The ash of spent grains from a fluidized bed system can be certified and used as additive for flower soil.

Optimal energy supply concept

Thermal utilization of spent grains covers the total heat demand of beer production (green). Other energy sources are required only for the filling area (yellow). In addition to fossil fuels, we provide solutions with combined systems and alternative energy sources.



HEAT-STER™:

The concept for the future

We have developed this technology in cooperation with the Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg. Thus, a competent team is available to plan and realize a sustainable energy supply of your brewery.

Contact us!



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