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1 *A plant that recovers heat from polluted exhaust.*
Photo: Fraunhofer IFF
2 *Thermally recoverable residues.*
Photo: Patric Heidecke, Fraunhofer IFF

ENERGY FROM INDUSTRIAL RESIDUES

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Environmentally Compatible Recovery of Wastes to Generate Heat

The demand for energy in the form of electricity and heat has risen continually in recent years. A change in this trend is nowhere in sight in the near future. A critical factor in production plants in particular, energy costs have direct economic impacts on companies. Green and efficient use of energy is imperative, not only from an economic but also from an ecological standpoint.

The environmentally compatible recovery of wastes on site to generate heat and electricity combines cost cutting with potential to reduce CO_2 by using fewer fossil energy carriers.

Custom Plant Solutions

Our goal is to create closed and efficient material and energy cycles for production processes in order to cut energy costs and residue disposal costs sustainably.

The challenge is to modify production processes and material and energy flows, which differ in virtually every company, for specific conditions and to find custom plant solutions in order to integrate systems that recover heat and power from residues with high heating values optimally in the production process. To do so, we develop custom plant solutions such as a plant that recovers heat from finely granulated industrial residues.

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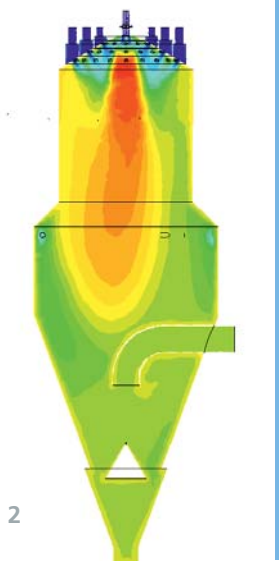

The Working Principle

We employ residues with high heating values and small particulate dimensions, which are used thermochemically, as base material. The complete plant essentially consists of an entrained flow reactor, a heat exchanger that extracts useful heat and flue gas purification components that reduce gaseous emissions. The residues with high heating values are converted thermochemically in the heart of the plant, the entrained flow reactor. The heat produced can be used in production, e.g. as hot water with a temperature range of 70-90 °C. Thermal oil can also be used as a heat carrier to supply high-temperature heat of up to around 350 °C. Flue gas can be used to directly heat objects or even systems up to 800 °C. Cogeneration processes can be implemented to produce power. A specially developed, water-cooled custom nozzle ensures that the fuel supply is distributed optimally during the conversion process. This assures that the residue added is injected directly into the reaction zone.

Our Services – Your Successes

In keeping with your individual needs, the entrained flow system can be designed for thermal outputs of 50 kW to several megawatts, roughly corresponding to a capacity to process fifty to several thousand tons of residues annually.

The concrete benefits:

- Lower energy and disposal costs
- Reduced use of fossil energy carriers
- Power produced by cogeneration in larger plants

In short, they enhance your energy efficiency and thus boost your competitiveness sustainably.

Our Expertise – Your Edge

The Process and Plant Engineering Business Unit has many years of experience planning and engineering and overseeing the construction and commissioning of prototype combustion and gasification plants. We develop highly advanced thermal conversion systems for our clients and build custom plants that recover energy from biomass, biological residues and wastes with high heating values. Advanced simulation systems, special software applications and, building upon them, the development of innovative solutions are prominent in our work.

Rely on our top team of excellent researchers with backgrounds in process engineering, process equipment and plant engineering, instrumentation and control engineering and computerized simulation. Allow us to use our extensive project experience and latest research findings to turn our innovations into your successes.

Select References

- Planning and building innovative biomass cogeneration plants
- Developing a technology for the distributed use of residues from mechanical biological treatment systems
- Development of special thermal afterburning systems that heat production processes, including re-engineering of production lines

1 *Pilot plant that recovers energy from finely granulated industrial residues. Photo: Fraunhofer IFF*

2 *Results of a simulation of a potential nozzle geometry. Simulation: Dr. Wolfram Heineken, Fraunhofer IFF*