Concepts of thermal sewage sludge utilisation
The process

The system design is based on the combination of a sludge dryer and subsequent combustion in a fluidised bed incinerator with state-of-the-art flue gas cleaning and is individually adapted to the specific sewage sludge volumes and customer requirements.

The individual components of the thermal sludge utilisation concept can be varied as required to suit the customer’s specific needs. Maximum efficiency and economy, as well as safety and reliability, are achieved by selecting the best suitable technical solution.

Depending on the specific site conditions, it can be selected from two design versions of the sludge2energy systems for thermal sludge utilisation:

▸ **Hot water boiler**
▸ **Steam boiler**

The heart of the incineration concept is a **stationary fluidised bed incinerator** with an open nozzle floor, optimised for the requirements of thermal sewage sludge utilisation. This flexibly controllable fluidised bed incinerator represents a reliable and safe system with high energy efficiency and minimal pollutant emissions.
The user's benefits

- Efficiently combined drying and thermal utilisation of sewage sludge in a fluidised bed furnace
- A wide variety of municipal sewage sludges can be utilised thermally due to efficient use of energy, without the need for additional external energy.
- Individually planned and customised to site-specific conditions
- Compact, modular and functional design with minimum space requirements
- Low investment and operational costs due to the optimised concept of thermal drying and utilisation
- Optimal sewage sludge quantity and mass reduction
- Minimised expenses and costs for sewage sludge transport
- Long-term cost certainty and disposal safety
- Dry flue gas cleaning process without generation of wastewater
- Optimised flue gas cleaning meeting specific customer requirements (site demands, P-recycling)
- Low pollutant emissions, significantly below legal limits (17. BImSch, TA Luft)
- Fully automatic operation 24 h/d, 7 d/week with a high plant availability of 8,000 h/a
- High flexibility of sewage sludge utilisation
- Production of phosphorus-rich sewage sludge ash and optional phosphorus recovery
- Optional power generation taking into account specific individual conditions and plant size

Thermal self-sufficiency

Depending on the organic dry matter (oDS) and dry matter content (DS), completely energy self-sufficient utilisation of the sewage sludge produced with the sludge2energy process is already possible with preceding sewage sludge dewatering to approx. 22 – 32% DS!
Hot water boiler variant

Fuel heat output per line: 0.6 to 3.5 MW
Throughput of dewatered sewage sludge: approx. 2,000 to 11,000 t dry matter/a

Capacity range:
- Fuel heat output per line: 0.6 to 3.5 MW
- Input dry residue content: approx. 25 % DR
- Throughput of dewatered sewage sludge: approx. 2,000 to 11,000 t dry matter/a
- Organic content of dry matter: approx. 60 % oDS
Process description

Drying
The “hot water boiler” concept uses a belt dryer as the drying unit. To ensure self-sufficient incineration, the partial stream dried to 90% dry residue (DR) is remixed with the remaining dewatered sewage sludge to 45% DR before incineration and then thermally utilised in the stationary fluidised bed furnace.

Incineration
The flue gases are cooled in the waste heat boiler. In this boiler, the heat energy released during the incineration of the sewage sludge is transferred to the hot water system. The heat required to supply the various internal consumers, such as for sewage sludge drying and air preheating, is taken from this hot water circuit.

Flue gas cleaning
Dry flue gas cleaning is used to minimise pollutant gas emissions, which means that no wastewater is produced. The legal requirements with regard to the separation of pollutants from the flue gases of sewage sludge incineration are demonstrably and reliably met.

Phosphorus recovery
The phosphorus-containing sewage sludge ashes from the sludge2energy plant are a valuable starting material for future phosphate recovery.
Steam boiler variant

- **Capacity range:**
  - Fuel heat output per line: 3.5 to 18 MW
  - Throughput of dewatered sewage sludge: approx. 11,000 to 50,000 t dry matter/a
  - Input dry residue content: approx. 25 % DR
  - Organic content of dry matter: approx. 60 % oDS

---

1. Sewage sludge acceptance and storage
2. Sewage sludge drying with contact dryer
3. Condensation stage
4. Storage tank for vapour condensate
5. Sludge logistics and input
6. Stationary fluidised bed furnace
7. Waste heat steam boiler
8. Pre-separation of fly ash / fabric filter
9. Conditioned dry sorption / reactor
10. Fabric filter for flue gas cleaning
11. Two-stage scrubber
12. Chimney, emission control
13. Phosphate-containing ash
14. Residue logistics
15. Sorbent dosing
16. Steam turbine, power generator
Drying
Disc dryers are used for drying the sewage sludge. These dryers provide homogeneous partial drying to approx. 45 % dry residue (DR), which enables the self-sustaining combustion of the sewage sludge in the furnace.

Incineration
The subsequent thermal utilisation of the sewage sludge takes place in a stationary fluidised bed incinerator. In the waste heat boiler, the energy from the flue gas is converted into usable steam. The energetic utilization of the steam produced in the boiler plant takes place via a steam turbine with generator. In addition, the exhaust steam available in the boiler plant supplies the sewage sludge drying plant and all other internal heat consumers with the required heat.

Flue gas cleaning
The flue gas is cleaned in a multi-stage, wastewater-free flue gas purification plant using state-of-the-art technology. The flue gas purification concept meets the requirements of modern sewage sludge incineration.

Phosphorus recovery
The phosphorus-containing ash from the pre-separation process is available for phosphorus recovery together with the low-pollutant sewage sludge ash produced in the boiler.
**Concept development**

You benefit from our many years of know-how in the entire field of municipal sewage sludge treatment already during the concept development in the early project phase.

By preparing feasibility studies, we examine possible promising solutions for your sewage sludge utilisation project.

The development of customised holistic solutions, taking into account technical feasibility and economic efficiency, is the focus of sludge2energy GmbH during the preliminary planning of your project.

The strategies and recommendations for action we develop are always based on individual customer requirements and circumstances – and can also contribute to the success of your next project.

---

**Planning**

sludge2energy GmbH is available as a reliable partner for the planning of your sewage sludge utilisation project. We will be happy to advise you with our expertise – individually, comprehensively and in every phase of your construction project.

**Approval planning**

In addition to the design planning, S2E also supports you as a reliable professional partner in the approval planning of your sewage sludge incineration plant. We help you to write and compile the necessary documentation and advise you on the submission of the documents. We actively contribute our experience from previous projects. Our competent team will accompany you throughout the entire approval procedure for your construction project, from the initial planning phase to successful project realisation.

**Detailed planning**

An important step towards the success of your project is the careful elaboration of the plant technology. As part of this project phase, we prepare comprehensive and detailed plans for the entire plant. Together with our customers, we develop a holistic technical concept for the integration and implementation of the thermal sewage sludge incineration plant on your site in technical clarification meetings. Here, we consider all relevant framework conditions and the possible use of existing infrastructure as well as the identification of possible synergy potentials at the future site – whether on sewage treatment plants, power plant or greenfield sites.
Construction and installation

As a reliable and experienced general contractor, we realise thermal sewage sludge utilisation plants at various locations. We always tailor the entire plant for innovative sewage sludge utilisation precisely to the specific requirements of our customers.

With reliable installation teams, we guarantee you time-, benefit- and cost-efficiently coordinated processes for the smooth construction and installation of your project. In addition to the turnkey delivery of new plants as general contractor and the professional assembly of all plant components, commissioning on time is an important milestone for sludge2energy GmbH. We take over the complete construction and assembly for our customers' turnkey projects. We also monitor the quality and performance of the qualified subcontractors. Experience has shown that this means that there are therefore significantly fewer interfaces and planning tasks to be coordinated and monitored by you or the general planner.

With leading expert know-how, sludge2energy GmbH creates the basis for the sustainable and economic utilisation of your sewage sludge volumes. With a high level of project management competence, we accompany you as a strong partner in the construction of your sewage sludge mono-incineration plant.

Operation

In addition to cold and hot commissioning, we also offer operational support and operational management for your S2E mono-incineration plants.

Operational support

Qualified employees support you during start-up. Your added value consists of an intensive transfer of know-how between the plant constructor and the operating staff of the mono-incineration plant, from which you benefit technically and economically at all times.

We also offer a constant exchange with your operating personnel during the continuous operation of the plant. This includes, for example, process engineering support for the plant, setting up and maintaining a plant management system, in this case the BMS WARIOS® developed within the group, organising and implementing plant inspections and carrying out other maintenance measures in accordance with DIN 31051 and DIN EN 13306 for all plant components.

Plant management

We also offer the entire technical and commercial management of S2E mono-incineration plants. Technical management includes commissioning, optimisation and control of process sequences and optimisation of operating costs, as well as emergency management, occupational health and safety and waste disposal.

With our service staff and experienced process engineers, we are your professional partner and take on all the responsibilities and duties associated with technical management, including accounting.

Maintenance and servicing

You benefit from our high-performance service as a plant owner when we operate the plant for you, and as a plant owner and operator, you also benefit after the construction and commissioning of your S2E sewage sludge mono-incineration plant. We thus guarantee you the highest operational reliability of your plant with a constantly high sewage sludge throughput.
# Projects & References

## Thermal sewage sludge utilisation plant Hannover-Lahe, Germany

**Capacity**
- Dewatered sewage sludge: 130,000 t/a
- Dry substance: 30,000 t DR/a
- Fuel thermal capacity: 10.57 MW
- District heat extraction: 6 MW

## Thermal sewage sludge utilisation plant in Halle-Lochau, Germany

**Capacity**
- Externally fully dried sewage sludge: 2,750 t/a
- Dewatered sewage sludge: 33,000 t/a
- Dry substance: 10,750 DR/a
- Fuel thermal capacity: 3.5 MW

## Thermal sewage sludge utilisation plant in Straubing, Germany

**Capacity**
- Dewatered sewage sludge: 120,000 t/a
- Dry substance: 40,000 t DR/a
- Fuel thermal capacity: 14 MW
- Energy generation: self-sufficient, with surplus
Projects & References

**Thermal sewage sludge utilisation plant in Utena, Lithuania**

*Capacity*
- Dewatered sewage sludge: 9,076 t/a
- Dry substance: 2,160 t DR/a
- Fuel thermal capacity: 0.68 MW

**Energy-optimised drying concept for the sewage sludge utilisation plant in Altenstadt, Germany**

*Capacity of Belt Dryer BT 24*
- Throughput: 18,000 t/a
- Water evaporation: 1,800 kg/h
- Final solids content: 90 % DR
- Energy supply: Waste heat utilisation from existing mono-combustion (90 °C)

**Thermal sewage sludge utilisation plant in Berlin Waßmannsdorf, Germany**

*General contractor: WTE / WTEB consortium*

*Capacity*
- Fuel: approx. 64,000 t DR/a sewage sludge plus approx. 4,000 t DR/a of screenings
- Fuel thermal capacity: 3 x 10 MW
- 4 HUBER Disc Dryer RotaDry® units
The company – sludge2energy

You benefit from the extensive experience of HUBER SE and WTE Wassertechnik GmbH with associated companies in the planning, construction and operation of wastewater treatment plants, sludge treatment systems and thermal waste utilisation plants. Especially through knowledge of process-technical, energetic and logistic synergies around the topic of sewage sludge, we can offer an optimised economic and operationally reliable overall concept according to your individual needs.

Our professional services cover a wide range of building blocks and offer you competent and customer-oriented support in all phases of your sewage sludge recycling project.

HUBER SE

HUBER SE is a family-owned company that is globally active with more than 1,300 employees, around 800 of whom work at the headquarters in Berching, Germany. The company specialises in high-quality and innovative stainless steel machinery, plants and equipment for municipal and industrial water, wastewater and sludge treatment.

HUBER supports its customers in about 60 countries around the world through subsidiaries, offices or representatives by providing know-how and innovative products for water, wastewater and sludge treatment. With more than 50,000 installations, HUBER is one of the most important international companies in the industry and contributes to solving the world’s water problems with adapted processes.

Sustainability in the field of water utilisation is a primary concern of HUBER and is reflected in a variety of solutions offered for wastewater reuse and recovery of nutrients from wastewater and sludge.

To ensure the customer’s long-term benefit, the HUBER Global Service guarantees the problem-free and reliable operation of the customer’s plants through close cooperation with the local HUBER representations around the world.

WTE Wassertechnik GmbH

The WTE Group – a subsidiary of EVN AG - is a leading European private service provider in the fields of water, technology and energy. The company plans, builds, finances and operates technical plants for wastewater disposal, drinking water supply, heat/energy generation and thermal waste utilisation.

As one of Europe’s leading full-service providers, WTE Group has unique expertise and uses its knowledge to create future-proof solutions that set international standards in terms of energy efficiency, use of resources and investment costs. Through the effective combination of the elements water and energy, they achieve their goal to build efficiently operating yet environment-friendly plants.

We utilise all energy sources in the process chain. In this way, the plants can be operated in an energy self-sufficient and environmentally friendly manner and, on top of that, they can feed energy into the public grid. We feel committed to this sustainable approach and have already implemented it in nearly 100 projects in 16 countries. For the benefit of our customers. For the benefit of the environment.

Learn more at:
www.huber.de | www.wte.de