

SynGas Sewage Sludge Utilization: The compact SynGas Heat Module

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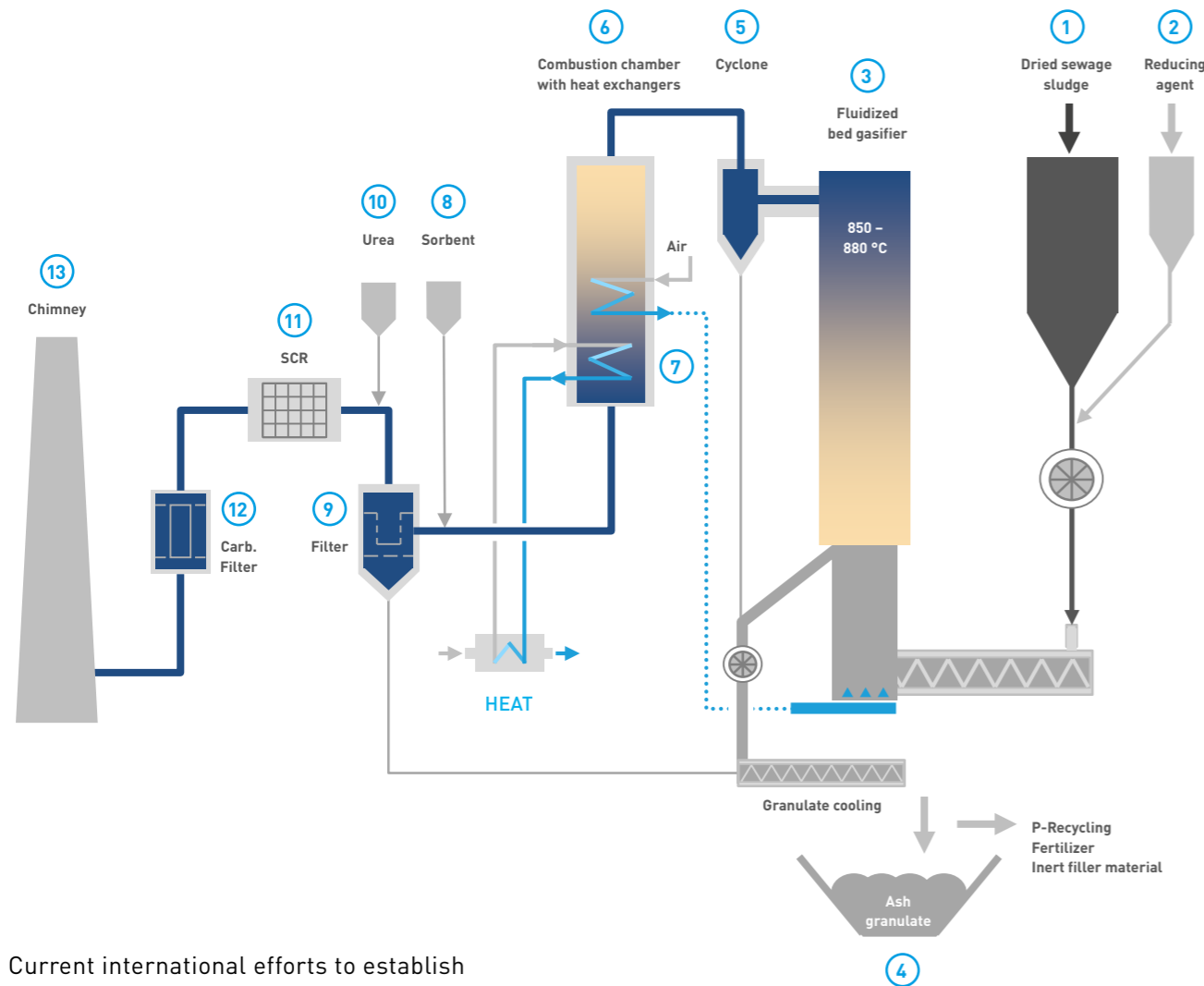
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DECENTRALIZED SLUDGE TREATMENT

AFFORDABLE & EFFECTIVE



Current international efforts to establish an extensive thermal treatment of sewage sludge (as opposed to the agricultural usage) paired with the will to reuse phosphates from sludge will lead to shortages in the sludge disposal channels involving unpredictable escalation of disposal fees.

Especially small municipalities and waste water associations have few opportunities to develop self-tailored, market independent solutions for the thermal treatment of sludge thus being at the mercy of market developments.

Introducing the sewage sludge treatment Heat Module SÜLZLE KOPF SynGas can offer a most compact, robust and affordable thermal sludge treatment plant suitable for small scale applications starting with 500 t DS per year. Operating at high temperatures of at least 850°C, this simplified SynGas Technology combines cost effectiveness with first class decontamination of sludge.

THERMAL TREATMENT OF SLUDGE

Sewage sludge (dry content 85-95%) is conveyed from the silo (1), together with the reducing agent (2), to the fluidized bed gasifier (3). The high gasification temperature of 850°C not only destroys any harmful substances (bacteria, medications, etc.) but also removes heavy metals such as mercury or cadmium from the resulting ash. This allows the use of the ash as fertilizer or for phosphorous recycling even if the treated sludge comes with substantial amounts of heavy metals. The reducing agent acts as a primary desulfurization stage binding sulfur inside the fluidized bed. The nearly carbon free ash is discharged and collected (4).

COMBUSTION OF SYNTHESIS GAS AND HEAT RECOVERY

Having passed its first dedusting stage via the cyclone (5), synthesis gas is burnt within a combustion chamber (6) releasing the heat subsequently recovered by the heat exchangers (7) and supplied to the sludge dryer, for example. The heat is sufficient for the drying of the treated sludge. The drying of the sludge does not require additional, external heat.

FLUE GAS CLEANING ACCORDING TO THE GERMAN 17. BImSchV (or as locally required)

A compact flue gas cleaning section ensures the removal of all harmful substances such as sulfur, heavy metals or nitrogen oxides originating from the sludge and its thermal processing. Sulfur is removed with a sorbent (8) which is added to the synthesis gas after its combustion and removed together with sulfur (and Cadmium) by the subsequent fine filter (9). A selective catalytic reduction (SCR) unit (11) in combination with an urea injection (10) in flue gas removes the nitrogen oxides.

The carbon filter (12) retains heavy metals such as mercury before the clean flue gas leaves the plant through the chimney (13). The flue gas cleaning process can generally take place as a dry or a wet process, according to the local requirements. A dry cleaning produces a solid waste (dust) to be disposed of whereas the wet process produces a condensate to be fed back into the waste water treatment plant.

BENEFITS OF THE SYNGAS HEAT MODULE:

- Gasification and drying of sludge do not require additional heat
- Simple, robust process
- Low investment costs
- Smallest possible facility starting as low as 500 t DS/a
- Container design
- Low erection time (pre-assembly at manufacturer's site)
- Can be scaled up to 15.000 t TS/a
- Ash can be used for P-recycling even if processed sludge contains heavy metals
- Due to the 850 °C gasification temperature the ash is not only decontaminated but also free of heavy metals