



HYGAS

Full utilization of aqueous
organic waste products



▶ SUPERCRITICAL GAS GENERATION

The complete recycling of aqueous organic waste products

Actual situation:

By now the sludge disposal costs are very high and with the amendment of the Sewage Sludge Ordinance, the regulatory requirements become more strict: Sewage Sludge can no longer be applied in large quantities in agriculture and it may only be disposed of in incineration plants if phosphorus is recovered.

The consequence of this: in the future, approximately 1.5 million tonnes of sewage sludge dry substance will have to be disposed of in a different way each year.

In addition to that, the phosphorus contained in the sludge is to be recovered.



▶ THE SOLUTION

The complete recovery of resources

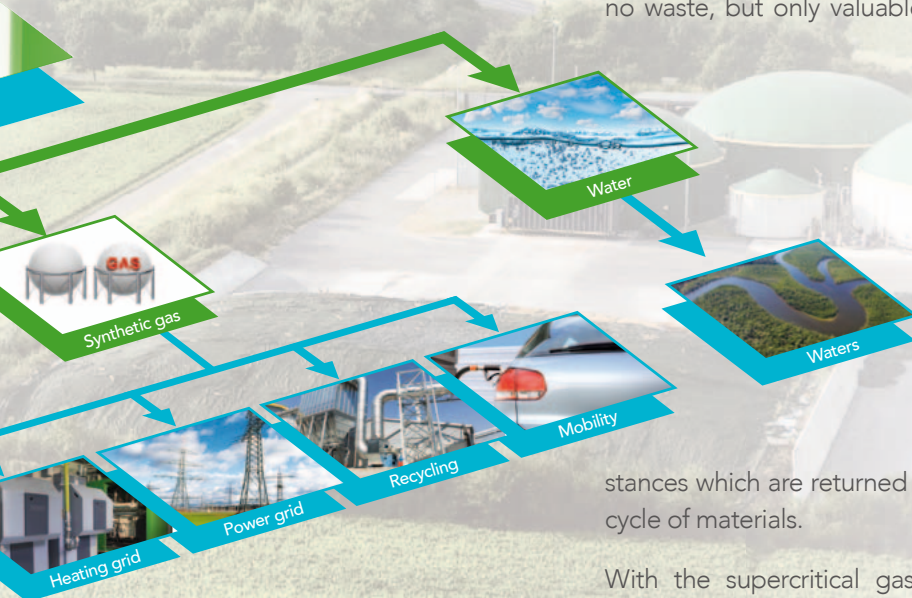
Our plants return 100 % of the nutrients and valuable substances – for example phosphorus – as well as energy that is contained in sewage sludge, pomace or green waste to the cycle of materials. All ingredients are recycled, there is no waste, but only valuable sub-

This process is the only one that already complies with the new sewage sludge regulation.

The end products

The synthesis gas “Hygas” that can be stored, converted into electricity and/or material used.

Marketable substances including – among others – available phosphorus.




stances which are returned to the cycle of materials.

With the supercritical gas generation we make the combustion superfluous and reduce the waste disposal costs.

We deliver:

Plants for the recovery of valuable materials and energy from aqueous organic waste products from 50 to 1,500 kg/h organic dry substance. This corresponds to between 50,000 and 1,350,000 inhabitants.



„We are recovering the phosphorus environmentally friendly and resources gentle and can keep the disposal costs per inhabitant and year stable at around four Euro. With the sale of valuable materials, plant operators generate additional revenues.“

Karl-Heinz Lentz

► THE PROCESS

During the supercritical gas generation, all the ingredients of the organic material are utilized. No waste products are produced which must be disposed of. The nutrient salts formed in the process – including phosphates – are highly plant ready.

They are therefore ideal as a raw material for the production of fertilizers.

Furthermore, the operators of the plants generate revenue: Minerals, metal salts as well as synthetic gas can be merchandised. Potential customers of the valuable substances are the building materials industry, fertilizer industry and metal industry.

The advantages:

Complete recovery of nutrients, valuable materials as well as energy

Clean synthesis gas without inorganic components, storable without compression

Positive electrical energy balance

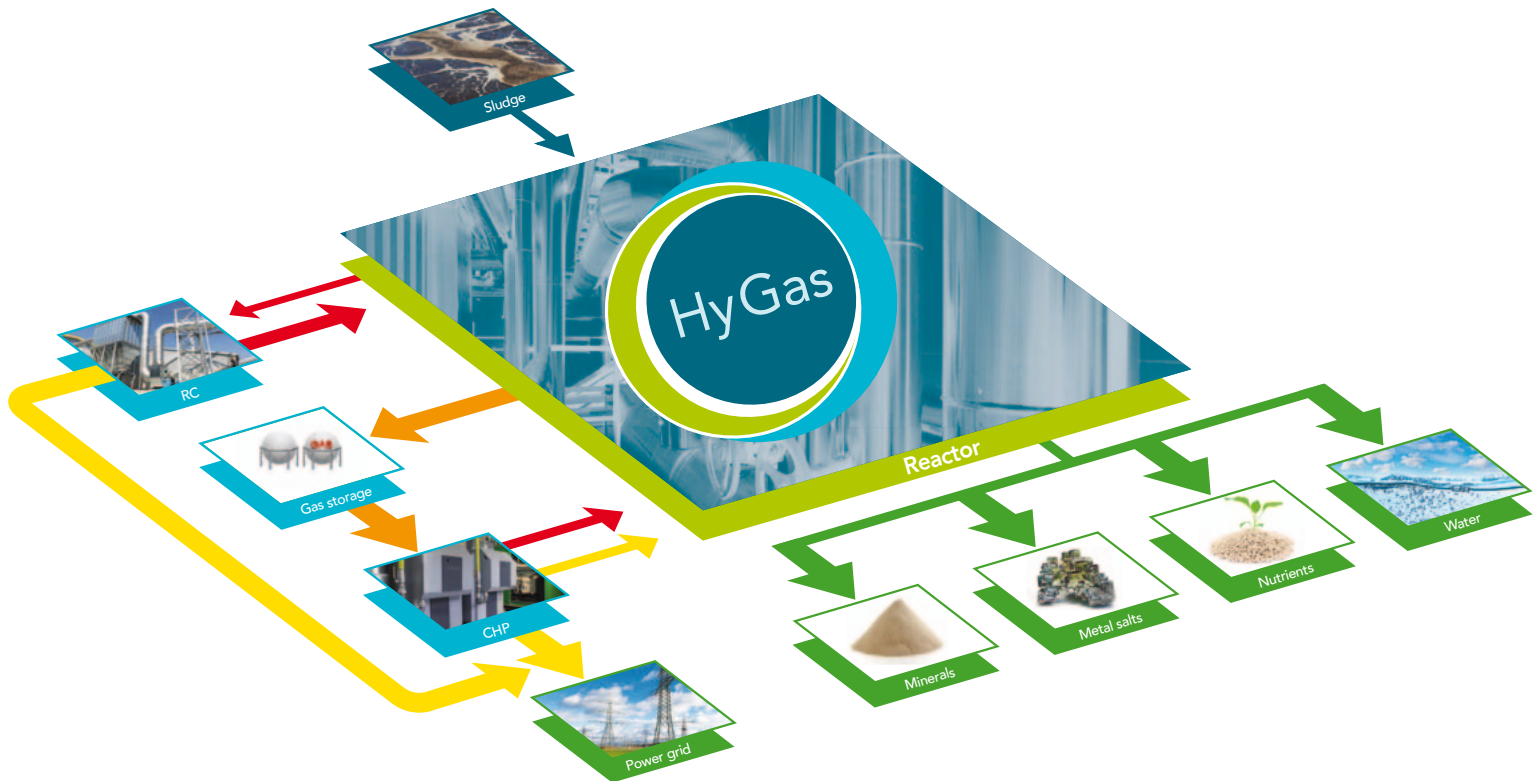
► BALANCE SHEET

The supercritical gas generation pays off primarily by saving the costs of disposal in incineration plants. Also the electrical energy balance is positive: the chemical energy contained in the starting material is converted into electrical current directly in the plant.

A major reason for the high energy efficiency is that in contrast to traditional methods, no pre-drying of the wet material is required and no evaporation losses are produced. Welcome side effects are also that because of the high temperatures the material is hy-

gienized "en-passant" during the process. The exhaust air is free of polluting substances.

Moreover, the CO₂ balance of the plants is significantly improved by the climate friendly power generation.



Plant sizes for digested sludge with 25 % dry matter out of treatment plants

Size of treatment plant (EW)		50,000	100,000	150,000	250,000	500,000	750,000
max. digested sludge (original material)	t _{os} /a	4,000	8,000	12,400	20,400	40,400	60,800
max. dry matter per year	t _{DS} /a	1,000	2,000	3,100	5,100	10,100	15,200
max. net electrical power by HyGas	kW _{el}	85	180	275	460	930	1,400
max. net electricity delivered by HyGas per year	MWh _{el}	737	1,561	2,384	3,988	8,063	12,138
potential for CO ₂ reduction ¹⁾	t/a	419	888	1,357	2,269	4,588	6,907
phosphorus-recovery > 85 % ²⁾	t/a	27	53	83	136	270	400

¹⁾ 569 g/kWh CO₂-emission factor 2014 due to UBA

²⁾ (1,7 g P / Ew*d)

Other waste and system configurations on request!

▶ TECHNOLOGY

The wet organic mass is split into synthesis gas in supercritical water – at a pressure of more than 250 bar and a temperature of more than 600 °C. It can be stored and later on converted into electricity and/or material used. It consists of carbon dioxide, methane and hydrogen as well as propane and ethene.

When leaving the system it is under high pressure and can

be stored without further compression.

Also the solids separated during the process can be sold.

The valuable substances

Minerals for the building materials industry

Highly available for plants phosphorus

Metal salts for the metal industry



► THE LENTZ-PROCESS

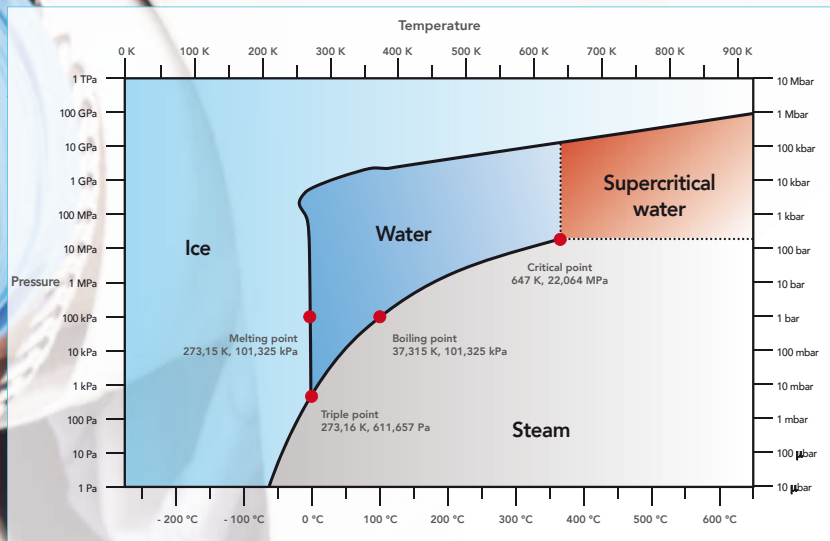
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Karl-Heinz Lentz, founder of iGas energy, uses the exceptional properties of water for the new process, which he has developed specially for the extraction of organic waste products.

Beyond the critical point – at a temperature of at least 374 °C and a pressure of more than

221 bar – it becomes supercritical. It is dense as a liquid but has the same viscosity as a gas.

In this fourth aggregate state organics go completely in solution. If the temperature exceeds 500 °C an oxidation reaction begins at which the hydrocarbons are split.





iGas energy develops and manufactures plants that make most efficient use of what is often referred to as lost resources. The essential element of our products is the profound know-how in gas technology.

iGas energy is part of the SK Group. The expertise in automation and rectifier technology as well as in high-pressure technology contributed by the group companies Fest AG and Maximator GmbH ensures that the equipment is sturdy and of low-maintenance design.

● Resource-saving circular economy

Complete recycling of valuable substances and energy from aqueous organic waste into material cycles.

● Hydrogen from renewables

Power-to-X plants for storage of renewables on the basis of energy conversion into hydrogen by high-pressure PEM-electrolysis.

● Innovative gas technology

Plant technology for supplying industrial processes with gases.



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