

ENERKAL SMART HYBRID PTR SOLUTION



SEWAGE SLUDGE AS A SOURCE OF BIOCHAR AND REUSABLE NUTRIENTS FOR FERTILIZERS

HEDVIGA GROUP, a.s. in its patented **PTR solution**, presents a method of neo-oxidative slow thermal decomposition, which takes place in closed fuel reactor without air access, in the process temperature range of 300 - 600 °C. In the process of thermal conversion, the input charge as **SEWAGE SLUDGE** always decomposes into other fractions - solid carbon / partly liquid oil and gas.

Depending on the origin of this input raw material, here wastewater sewage sludge, these production fractions can further be used as char - partly carbon solid fraction. Especially regarding the content of phosphorus, nitrogen, potassium, applicable too in other combinations as admixtures to auxiliary soil substances in agriculture, but while complying of the conditions of the elimination of infectious and other org. pollutants.

An innovative point of view of PTR technology is especially in the identification of a clear goal of utilization and / or reuse of input raw materials in compliance with the principles of the Circular Economy.

The input raw materials for PTR technologies are different sorted recycles from plastic, rubber and waste biomass, sewage sludge or secondary raw materials. The products that can be produced in slow thermal decomposition (PTR) have parameters of saleable product and at the same time a lower emission factor than to usually produced.

PTR process is strictly non-oxidative process, what is key to assume the quality and usability of thermal decomposition products and represents the most significant difference between our patented PTR technology and others.

A huge advantage of PTR is the specific batch system for processing the input raw material in the PTR technology, which allows a separate and closable PTR reactors with processed in separate batches.

Then can be all PTR operation system modify for any feedstock combination to achieve those requirements parameters e.g., energy efficiency or CO₂ save. This system is called **PTR SMART HYBRID ENERGY**.

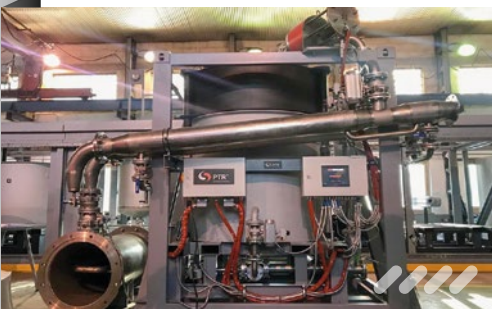
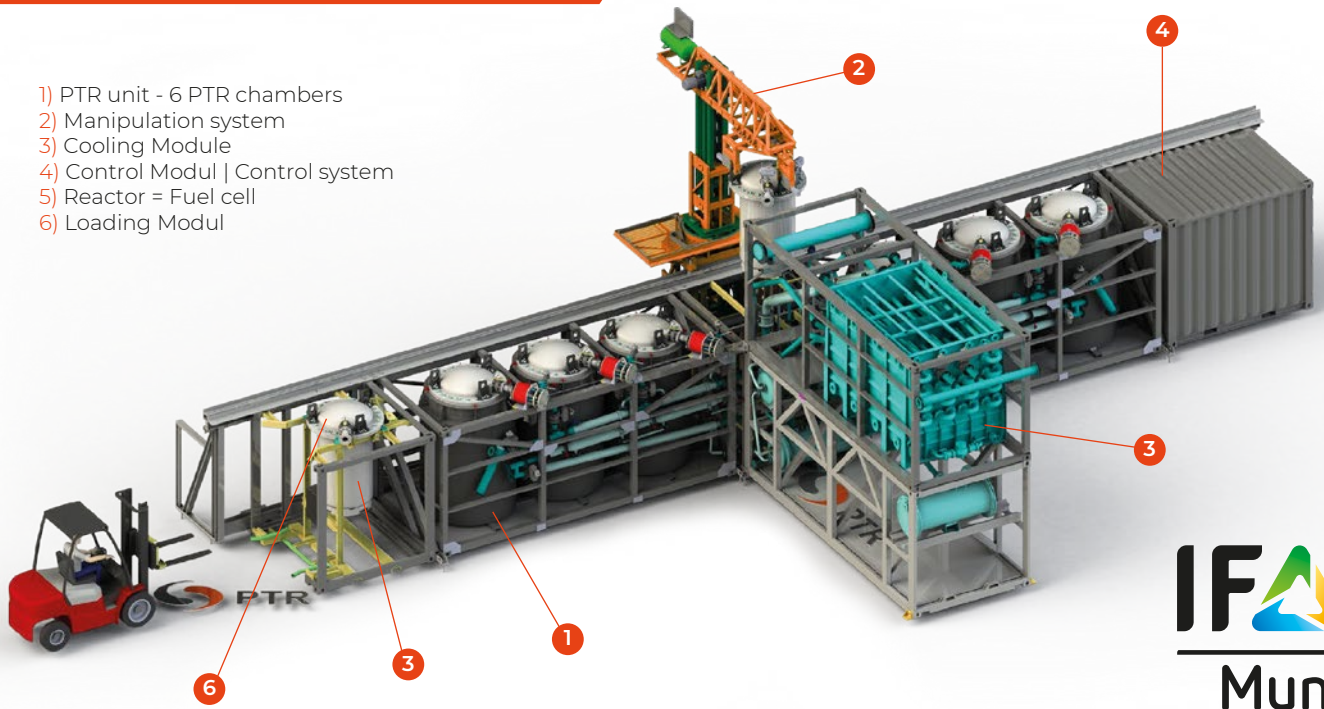
SMART **HYBRID**
ENERGY

ENERKAL
SEWAGE SLUDGE

 **PTR**[®] **1000**
TECHNOLOGY

VISUALIZATION OF PARTICULAR PTR SOLUTION

- 1) PTR unit - 6 PTR chambers
- 2) Manipulation system
- 3) Cooling Module
- 4) Control Modul | Control system
- 5) Reactor = Fuel cell
- 6) Loading Modul



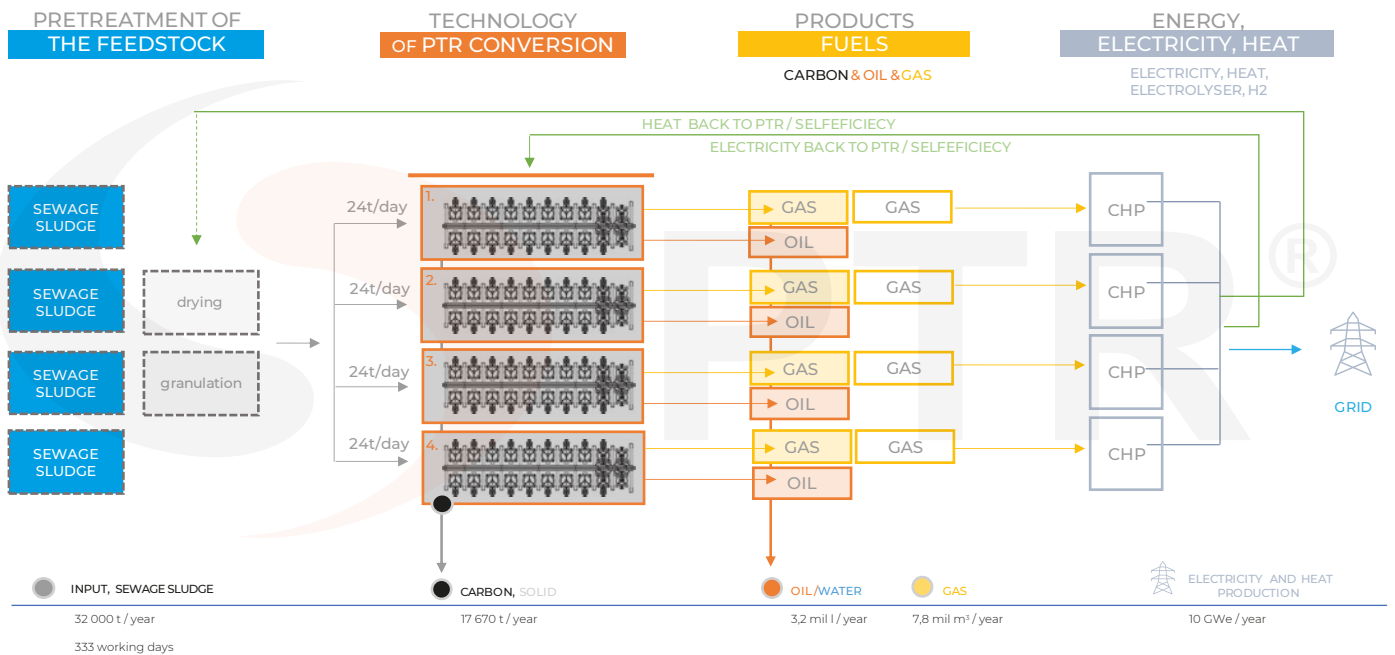
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The actual process of slow thermal decomposition (PTR) takes about 2-3 hours and is proceeded in a closed system without air access = Non-oxidative thermal process. The PTR process itself is thermally stable and during the operation it continuously generates from the input charge three output fractions: gaseous, liquid and solid. Depending on the end use of these fractions, the PTR process outputs are certified as products.



PTR TECHNOLOGY

PATENTED COMPLEX SOLUTION



PTR TECHNOLOGY

COMPREHENSIVE TURN-KEY SOLUTION



The intention of the PTR comprehensive energy solution is always to design for the future operator a turn-key utilization (disposal) of a particular input material (waste), as well as to simultaneously design an effective energetic arrangement within the current use of PTR products (fuels) to drive a power unit. The PTR comprehensive solution, extended by energy module - cogeneration, will enable to create a completely self-sustaining system, independent of external energy supplies.

ADVANTAGES OF PTR COMPREHENSIVE SOLUTION

- ✔ **Container arrangement** > which is capacitively modular.
- ✔ **Semi-mobile** > enables a continuous and temporary operation at various locations according to needs (e.g. near landfill sites), or to purposefully use it as a local source for production of electricity and heat for companies, municipalities and micro-regions.
- ✔ **Energy self-sustaining** > can be installed even where there is no assured supply of electric current.
- ✔ **Combinability of input raw materials** > operational and technological system PTR SMART HYBRID ENERGY | SOLUTION for ensuring the required product quality and sufficient energy.

PTR solution + Cogeneration unit =

TECHNOLOGY FOR WASTE TREATMENT AND FUEL AND ENERGY PRODUCTION



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WASTE TREATMENT AND FUEL AND ENERGY PRODUCTION



ENERKAL - SMART HYBRID PTR SOLUTION

SEWAGE SLUDGE AS A SOURCE OF BIOCHAR AND REUSABLE NUTRIENTS FOR FERTILIZERS

ENERKAL is an innovative technology solution, for using sewage sludge as a raw material, based on slow thermal decomposition (PTR process) of organic feedstock.

The PTR ENERKAL system represents a self-sufficient system not only for the elimination of pollutants in the sludge, but also for the direct recycling of important elements such as phosphorus, with simultaneous energy self-sufficiency.

Wastewater treatment plants thus essentially become producers of charcoal using PTR thermochemical decomposition of biomass = sewage sludge as the basis of smartly modified PTR fertilizers with a high content of minerals and carbon. This carbon allows the soil to increase its water retention in particular, making it more stable. Another ability of this charcoal is that carbon is stored in the soil as an element, possibly also the other nutrients it carries, thus creating a new impulse for depleted soils.

ENERKAL

= Sewage Sludge -> Charcoal/Biochar -> Increasing **RETENTION** of water in soil

= Sewage Sludge -> **ELIMINATION** of the Microplastic, Pharmaceuticals, Hormones, Nanostructure matter, Infectious matter - COVID19

= Sewage Sludge -> Charcoal -> Source of the carbon and other elements (N,K,...)

= Sewage Sludge -> Charcoal -> Source of the **PHOSPHORUS** effective system of recovery of PHOSPHORUS from sludge



ENERKAL®

