EMPYRIO

COMPACT ON-SITE INCINERATOR

for sewage sludge utilization

The utilization of sewage sludge entails high costs for wastewater treatment plants and has a negative impact on soil health if used as fertilizer for agricultural fields. Local on-site utilization of sewage sludge is a solution that allows wastewater treatment plants to avoid costly long-distance transportation, high gate fees and the potential spread of contaminated sewage sludge, including heavy metals, antibiotics, microplastics, PFAS, etc., to agricultural lands.

Our compact, cost-effective on-site sewage sludge incinerator provides independence to small and medium-sized wastewater treatment plants **(20.000 – 200.000 Population Equivalent)** by utilizing sewage sludge on-site without need for transportation and high gate fees payments, while ensuring long-term compliance with stringent environmental regulations.

Benefits

SIGNIFICANT SAVINGS
Up to 2x lower utilization costs (150-220 €/tDS)

COST-EFFECTIVENESS
Even for small volumes (>500 tDS/year)

AUTOMATED PROCESS
No need for additional personnel

COMPACT DESIGN
Minimizing space (20 and 40-foot containers) and seamless integration into existing facilities

AUTONOMY AND SELF-SUFFICIENCY
No need for additional energy resources and raw materials

PREDICTABILE EXPENSES
Limited to electricity and filters, immune to market fluctuations

EVEN FOR HIGH-MOISTURE SLUDGE AND DIGESTATE
Capable of dewatered sewage sludge containing 80% water

VERSATILITY FOR DIFFERENT AREAS
Suitable for use even in mountainous and remote terrains

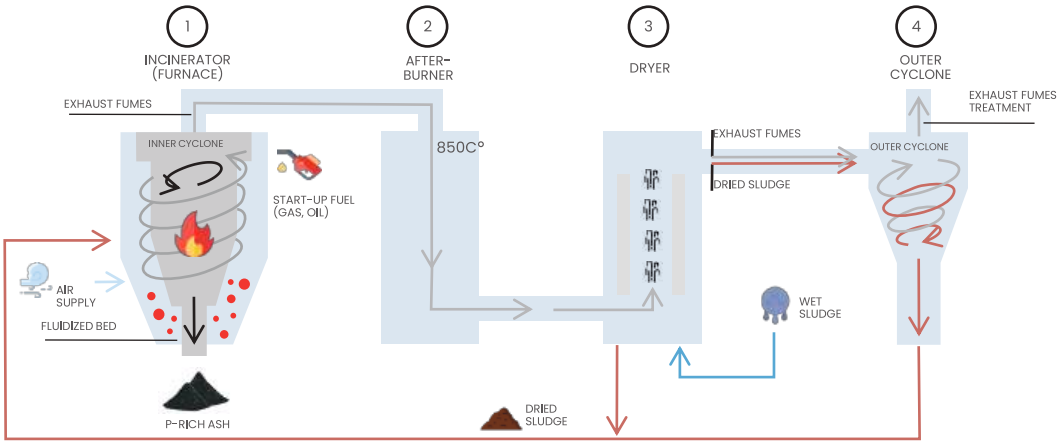
OPS CONTINUITY ASSURANCE
Localised maintenance support for reliable operation

SUSTAINABILITY AND LOW EMISSIONS
Guaranteed compliance with emission standards due to a custom-made flue gas treatment system

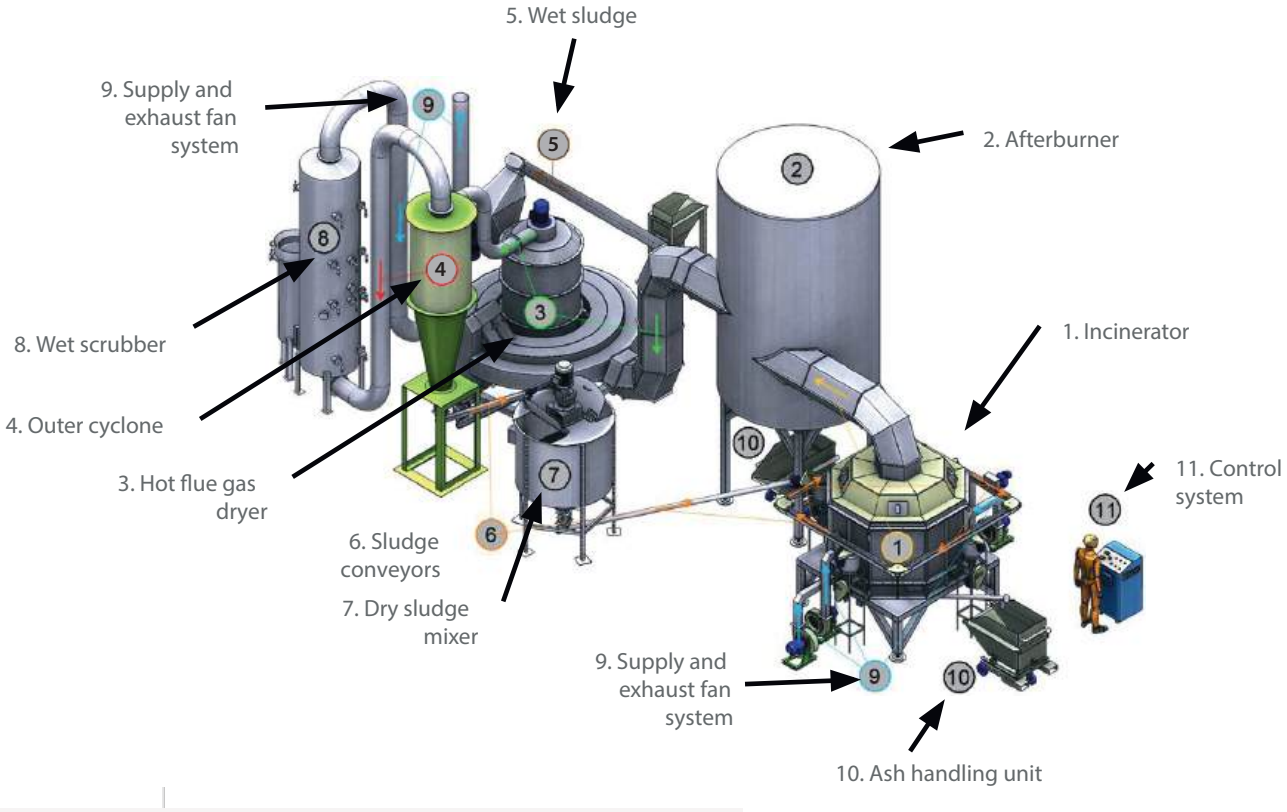
PHOSPHORUS RECOVERY
The potential for P-recovery from ash of mono-incinerated sewage sludge

HIGH-YIELD INVESTMENT
Low CAPEX and attractive pay-off period (avg. 5 years), depending on volumes operated

Our solution is based on an innovative patented energy-positive process.



Fuel (gas, oil, wood pellets, etc.) is fed to the patented incinerator (1) for the initial start-up of the combustion process. Hot flue gases from the incinerator pass through the afterburner (2) and are fed to the patented dryer (3), where wet sludge is also fed. The contact between them initiates the drying of the sludge. From the dryer, the mixture of flue gases, water vapor, and dry sludge enters an outer cyclone (4), where dry sludge is separated from the flue gases and water vapor. Dry sludge from the dryer (3) and cyclone (4) is fed to the incinerator (1) and the exhaust fumes are treated to meet the environmental legislation standards. The combustion of the dried sewage sludge is conducted in a rotating fluidized bed incinerator (1). From this moment the process becomes energy neutral and self-sufficient.



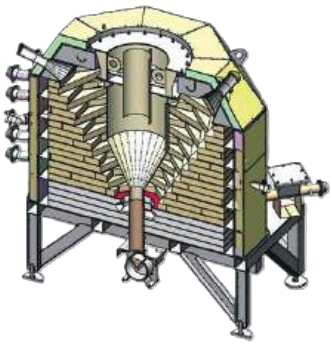
TECHNICAL SPECIFICATIONS:

Capacity: 400-2.000 tDS/year
~20.000 - 200.000 population equivalent WWTPs
~5-20 t/day of dewatered (20-25%DS)
sewage sludge or digestate

CAPEX: ~ EUR 1,0 million

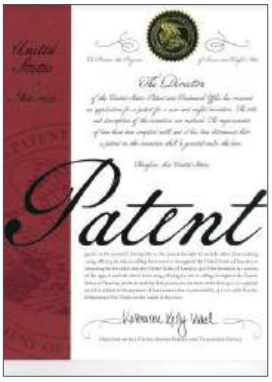
System footprint: ~60 m2

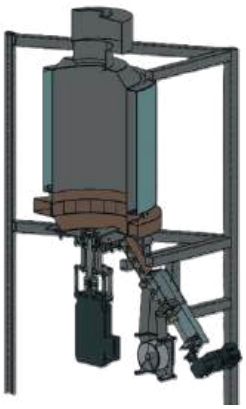
INCINERATOR



The Empyrio incinerator is an innovative device with a rotating annular spouted fluidized bed design.

- Its unique shape, combined with the tangential admission of fluidised and other gases, enables the creation of an adjustable toroidal fluidised bed within the reaction chamber,
- The toroidal fluidized bed allows for precise control over various process parameters, including the rotational speed of the material particles being treated in both the horizontal and vertical planes.
  It also facilitates the control of dwell time for particles of different sizes within the reaction zone and the intensity of material treatment,
- One of the notable advantages of this incinerator design is its ability to maintain stability over a wide range of flow rates. This stability is crucial for efficient operation,
- Additionally, the design eliminates the need for a separate inert bed material, as the sludge itself contains approximately 30% mineral matter. By adjusting the air inlets, the gas kinetics within the incinerator can be controlled, ensuring a balanced quantity of inert matter within the system,
- Furthermore, the special design minimizes the need for cleaning the bottom part of the incinerator, streamlining maintenance requirements,
- The incinerator's design has been secured by patents.





DRYER

The dryer's purpose is to use the flue gas from the incinerator to dry wet sludge as pre-treatment

- The patented hot flue gas dryer incorporates a mechanical macerator that plays a vital role in both crushing and drying the sludge using the flue gases from the incinerator.
- The macerator is designed to disintegrate the sludge mass and create a large contact surface between the hot gases and sludge particles.
- It also serves as an activator, imparting rotational movement to the drying sludge particles.

The technology has been tested in our industrial-scale pilot plant in Latvia

Partnership-driven Progress

Our technology has gained the trust and support from EIT InnoEnergy, Norway Grants and Commercialization Reactor, allowing us to build a pilot unit and test it at two wastewater treatment plants in Latvia.

Thanks to the container-based structure, the equipment could be easily integrated within the existing infrastructure and doesn't require any additional staff.

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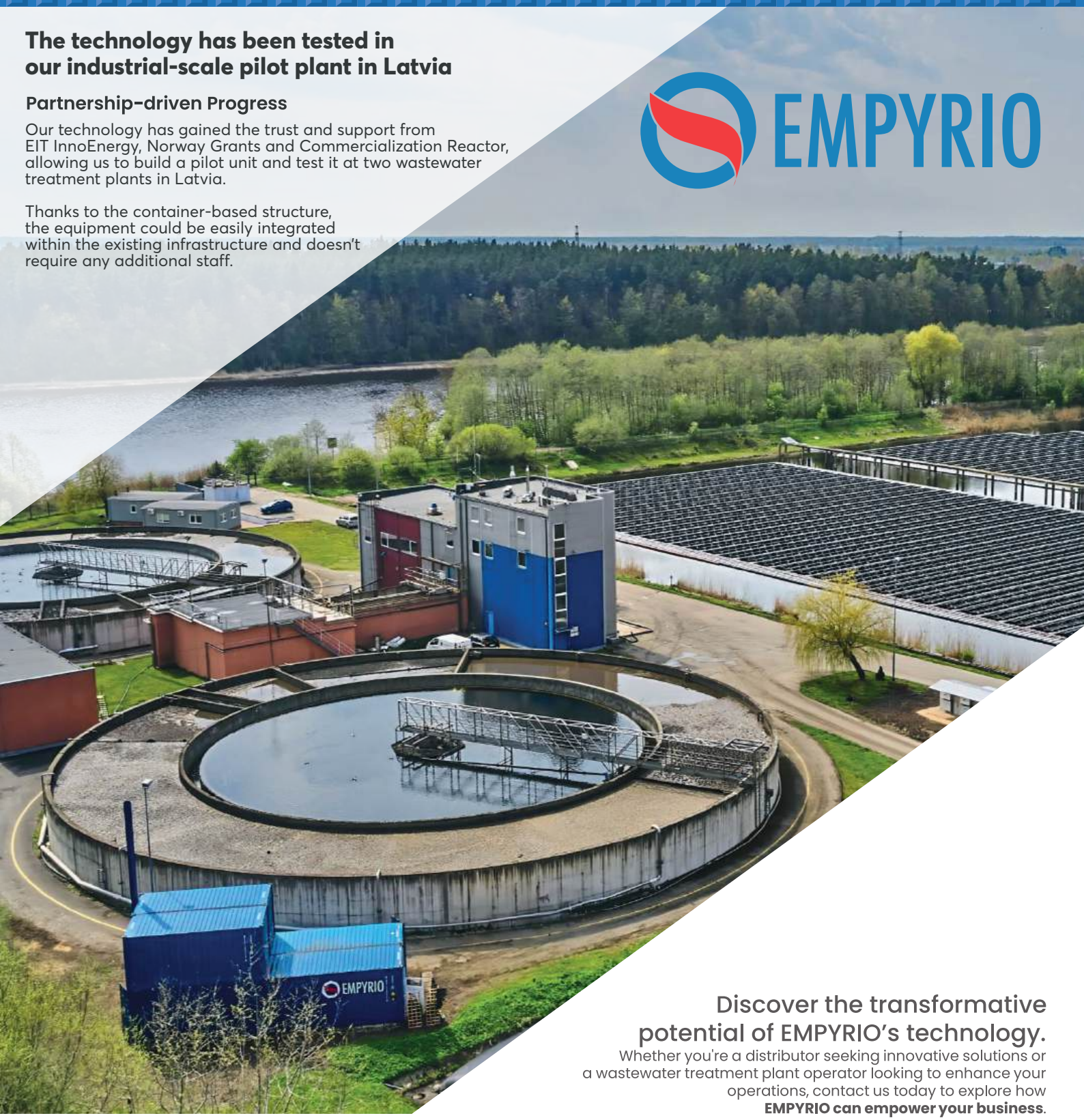

Discover the transformative potential of EMPYRIO's technology.

Whether you're a distributor seeking innovative solutions or a wastewater treatment plant operator looking to enhance your operations, contact us today to explore how **EMPYRIO can empower your business**.

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