# SEWAGE-SLUDGE RECYCLING

## ECO-FRIENDLY

SIZE
[sq.ft.]
807
= 4 CAR GARAGE

CARBON STORAGE
[t $CO_2$]
per year
1,052
= 200 ACRE FOREST

THERMAL ENERGY
[kWh]
per year
5,625,000
= 225 HOUSEHOLDS

PX1500 KS

Disposal or recycling of sewage sludge and industrial sludge is becoming increasingly demanding due to high environmental protection requirements and capacity bottlenecks.

PYREG CARBON TECHNOLOGY

## YOUR SLUDGE RECYCLING SOLUTION

### ADVANTAGES

**Up to 90 % final mass reduction.**

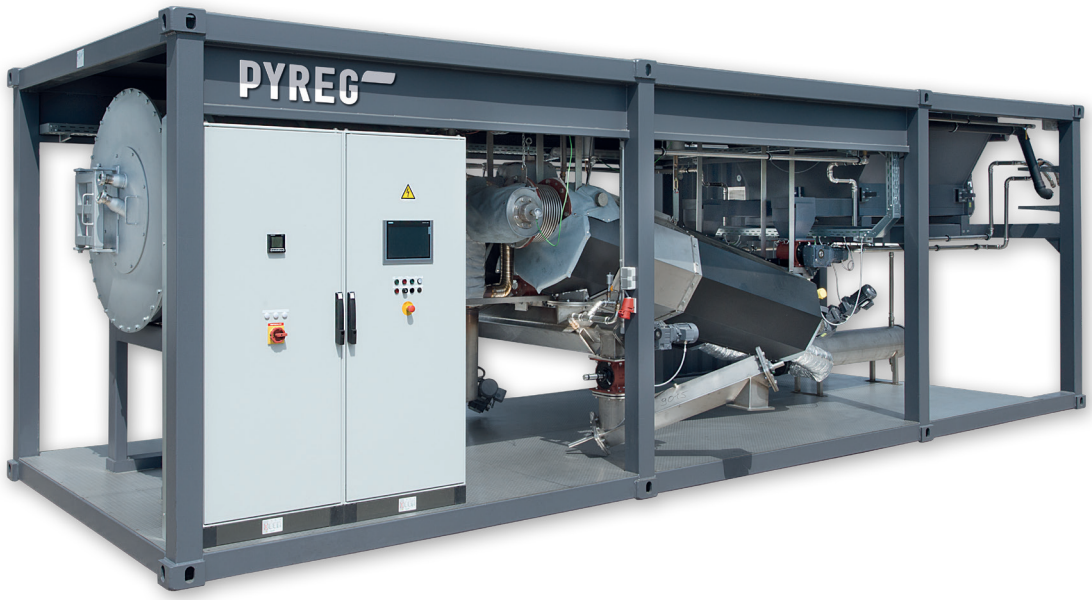
**Energy efficient:** The required energy is generated by the system itself, in addition, up to 750 $kW_{th}$ of maximum thermal capacity can be used for other purposes.

**Phosphorus recycling:** The phosphorous contained in the sewage sludge remains available to plants after carbonization and can be marketed directly as fertilizer substructure.

The sewage sludge is completely recycled, **no „residuals"**.

Carbonization process is compliant with **EU environmental standards**.

**$CO_2$ sequestration:** The process of carbonization binds carbon on a long-term basis. After insertion of the phosphorous fertilizer in the soil, the carbon contained is removed from natural cycles for centuries.




SLUDGE

PYREG
CARBON TECHNOLOGY
SOLUTIONS

# SYSTEMS

| | P500 STANDARD UNIT | PX1500 INDUSTRIAL UNIT |
|---|---|---|
| **Combustible rating** | 500 kW | 1,500 kW |
| **Annual throughput** DS, dry substance | up to 1,070 t | up to 2,870 t |
| **Annual production** | 540 t ± 5 % | 1,440 t ± 5 % |
| **Maximum thermal capacity** | up to 150 $kW_{th}$ | up to 750 $kW_{th}$ |
| **Annual excess thermal energy** | 1,125,000 kWh | 5,625,000 kWh |
| **Annual operation hours** | up to 7,500 h | up to 7,500 h |
| **Power consumption** | up to 16 $kW_{el}$ | up to 48 $kW_{el}$ |
| **Size** | l 9,000 mm<br>w 3,000 mm<br>h 9,800 mm | l 13,000 mm<br>w 3,000 mm<br>h 9,800 mm |
| **Additional technology module with flue gas cleaning system** flue gas scrubbers, activated carbon filters | l 6,000 mm<br>w 3,000 mm<br>h 5,800 mm | l 12,000 mm<br>w 3,000 mm<br>h 5,800 mm |

Based on sewage sludge, dried (90 % DS) >11 MJ/kg OS, approx. 60 % organics.

PYREG systems are designed as a compact, decentralized recycling technology that can easily be integrated into existing material cycles and infrastructures. The process is based on the principle of dry carbonization. That means, the sludge is not burned, but carefully degassed and then carbonized (500 - 700 °C), by admission of a tightly targeted air stream. The excess thermal energy can be used onsite (e.g. for drying) or fed into a local heating grid.

# REFERENCES

## WWTP LINZ-UNKEL, GERMANY

**Operation company:**
Zweckverband Abwasserbeseitigung Linz-Unkel
(Special purpose association for sewage disposal)

**Location site:** Unkel (near Bonn), Germany

**Waste Water Treatment Plant (WWTP), Service:** 30,000 PE

**PYREG unit in operation since 2015:** P500

**Sludge treatment:**

Stabilization of the sludge (2 stage compact digestion).

Dewatering and drying (60 % volume reduction, 100 % self sustainable process with excess thermal energy of PYREG plant and compact digestion).

Carbonization with PYREG unit P500 (90 % final volume reduction, 100 % self sustainable process).

The carbonizates are **EU-wide marketable** as phosphorus fertilizer.

## WWTP SILICON VALLEY CLEAN WATER, USA

**Operation company:** Bioforcetech Corporation

**Location site:** Redwood City, California, USA

**Waste Water Treatment Plant (WWTP), Service:** 200,000 PE

**PYREG unit in operation since 2017:** P500

**Sludge treatment:**

Drying (75 % volume reduction, 60 % less energy consumption vs gas dryer).

Carbonization with PYREG unit P500 (90 % final volume reduction, 100 % self sustainable process).

Marketing the carbonizates as natural soil conditioner to the customers in agriculture.

Further PYREG sewage sludge treatment plants:
Germany (1 in operation, 1 under construction), Sweden (1) and Czech Republic (1)

+ made in germany

Printed climate neutral sludge_flyer.EN.07.2021