



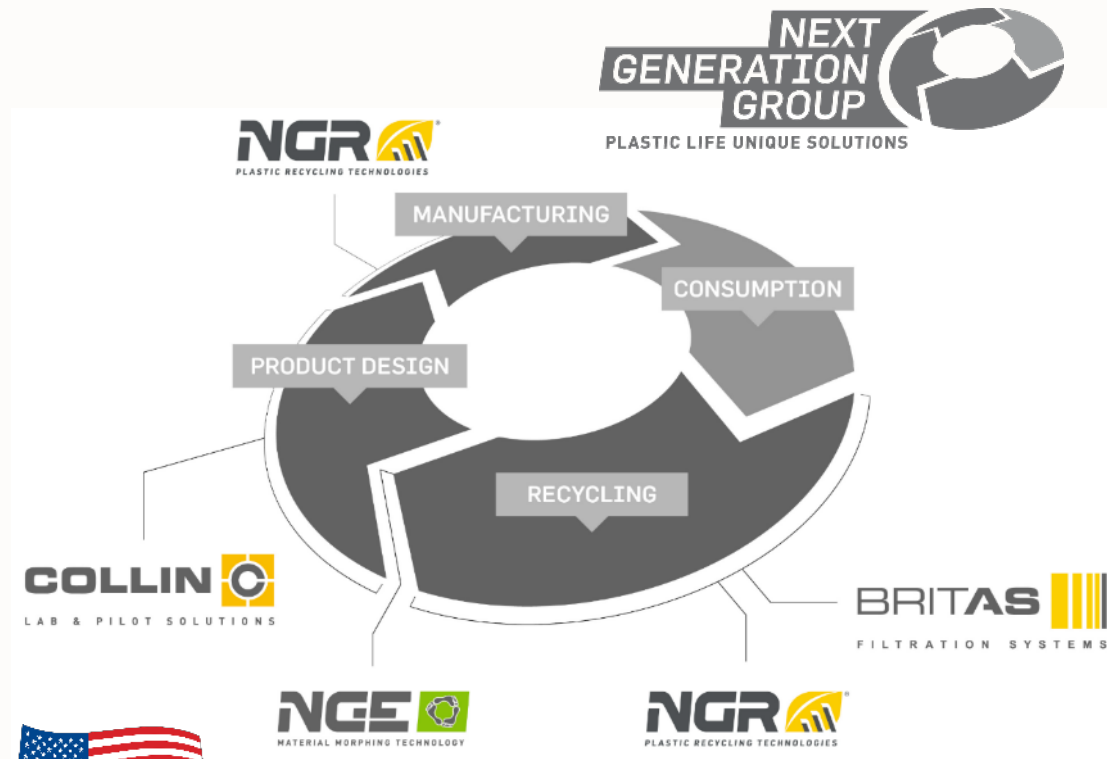
PYRODRY®

From (Bio)Sludge to Value...

Dr. Andreas Hackl (CEO)

Next Generation Elements GmbH

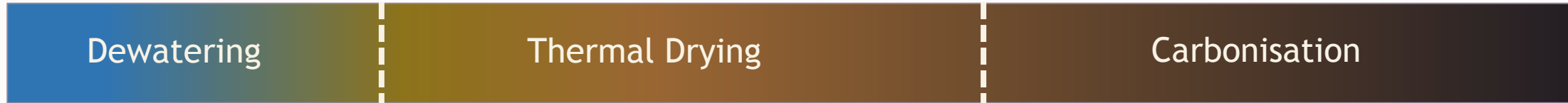
Company Overview – Who we are...



Presence in US - Next Generation Recycling Machines Inc. | 73 Southwoods Parkway, Suite 150, Atlanta, GA 30354



(Sewage) sludge treatment process chain



1-3% DM

20-25% DM

90% DM

-40% DM

Approx. 12 times

100%

Approx. 22-28%

Approx. 12-14%

decontaminated, P- and C-enriched valid material...

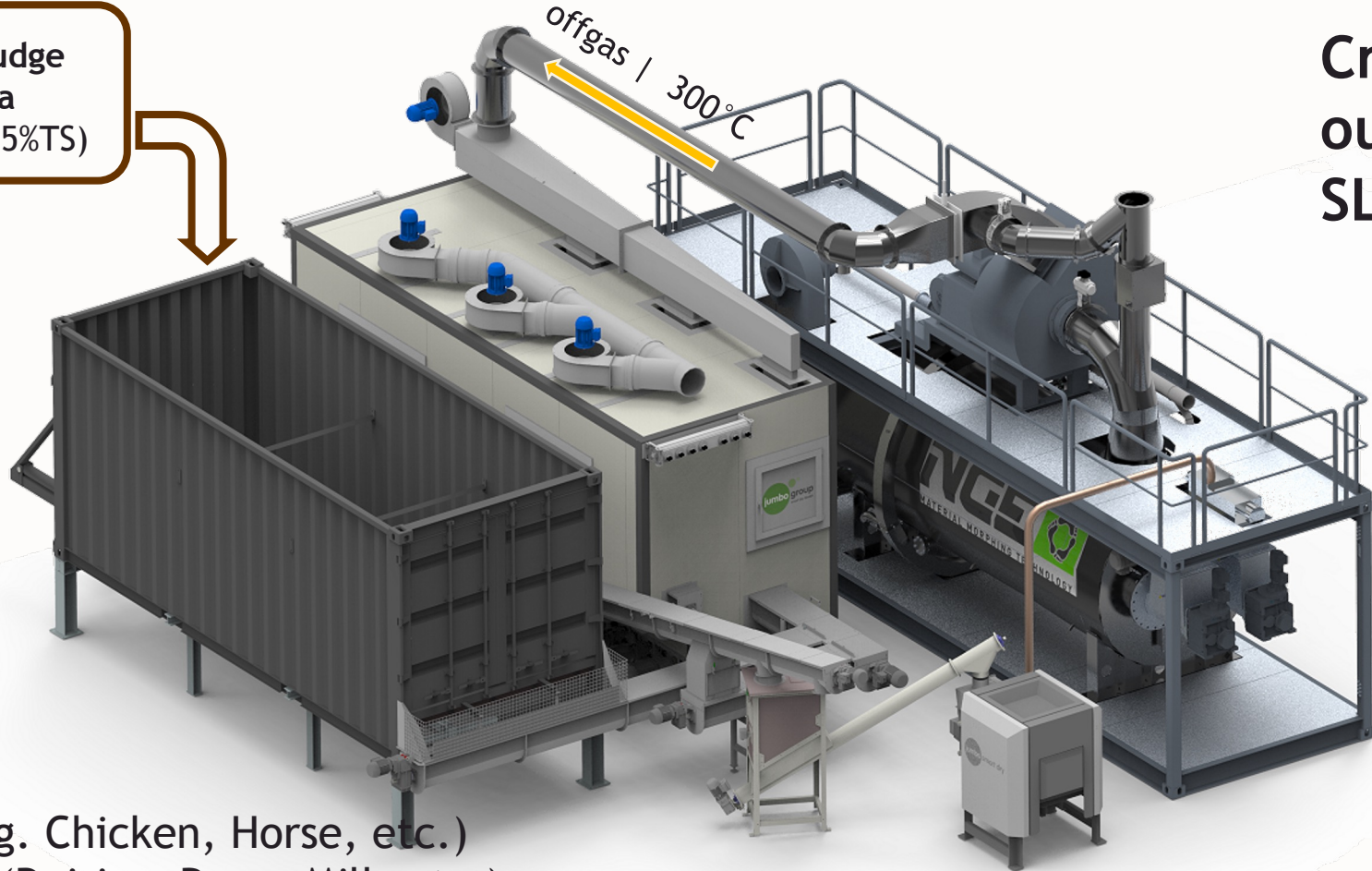
PyroDry® Process



System Overview – Explained @ *PyroDry 5000*



(Sewage) sludge
5.000 t/ a
(approx . 20-25%TS)



Creating value
out of
SLUDGES!



675 t/a Carbonisate
C-content approx.
20-30%

Further Inputs:

- Digestate
- Manures (e.g. Chicken, Horse, etc.)
- Bio-Sludges (Dairies, Paper Mills etc.)
- ...



PyroDry @ Sewage Sludge - set up and products

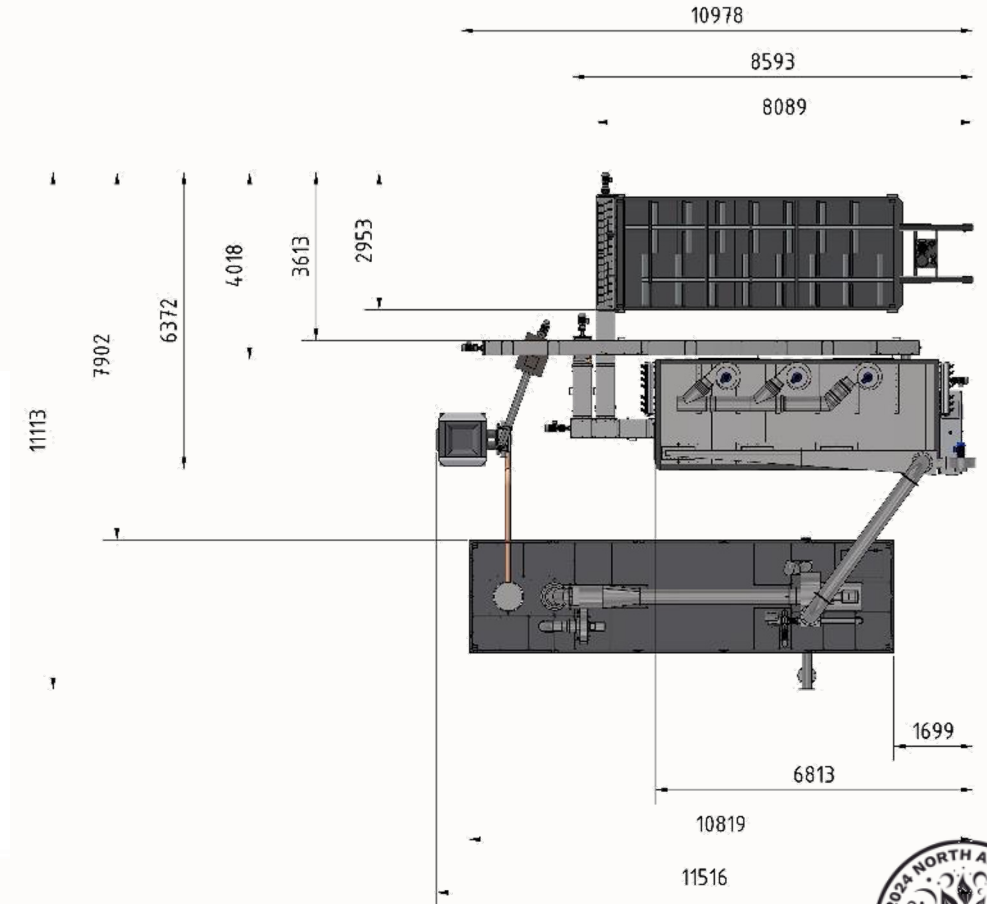
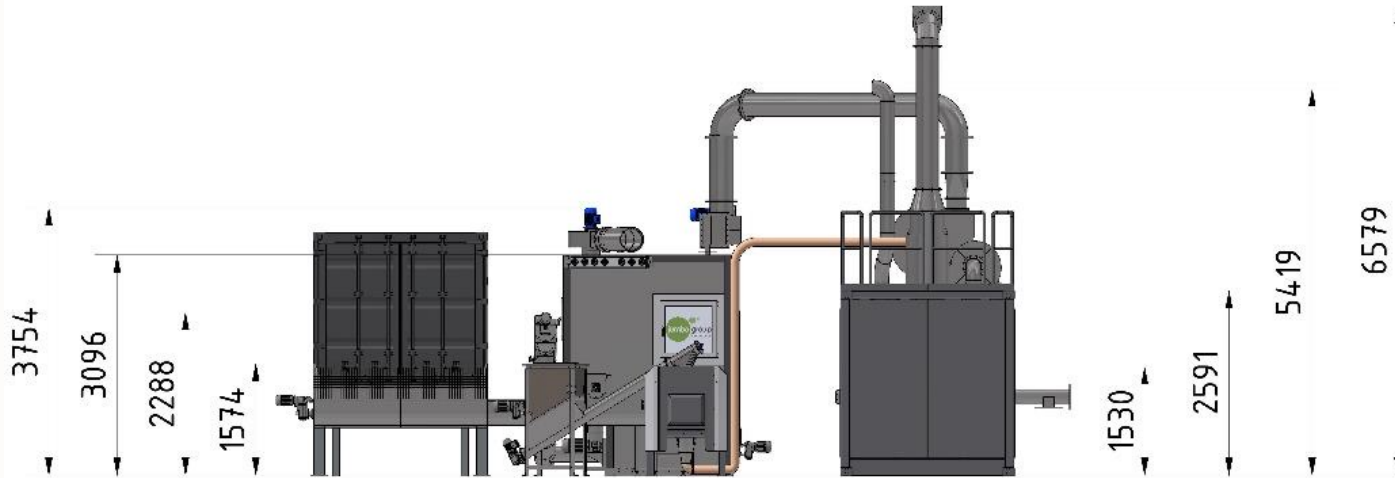


Modular Design for max. flexibility

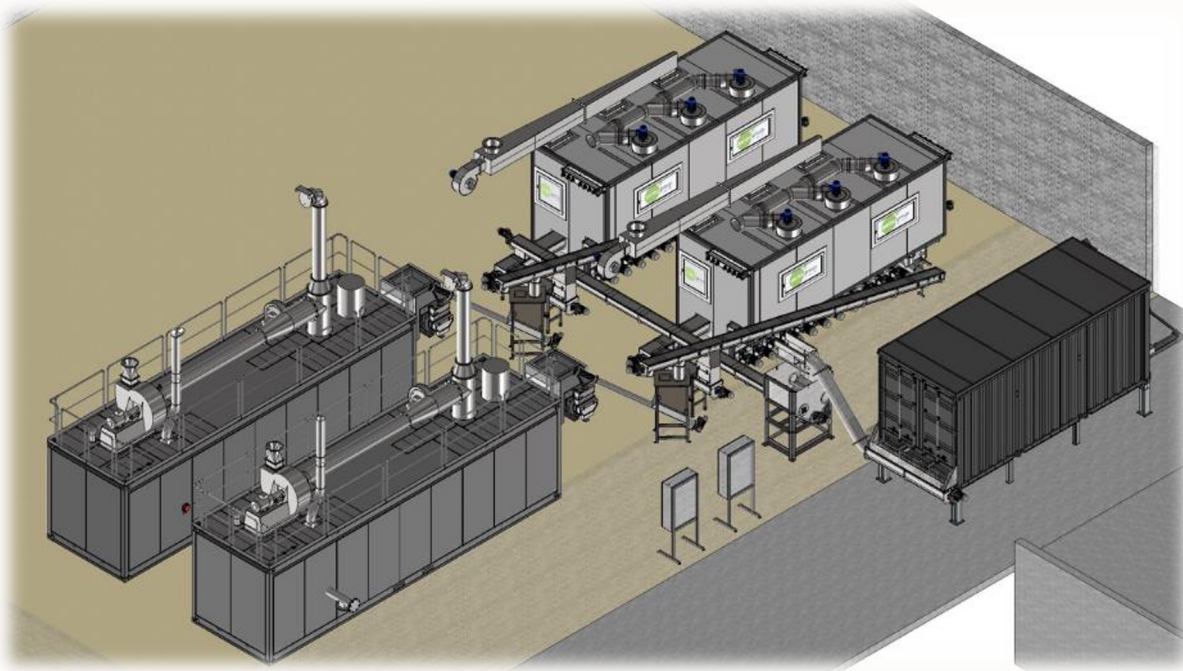


PyroDry Systems	Throughput [t/a]
5000	3000-5000
3000	1500-2500
1500	750-1400

Footprint of PyroDry 5000 | 15 x 15 x 5 m

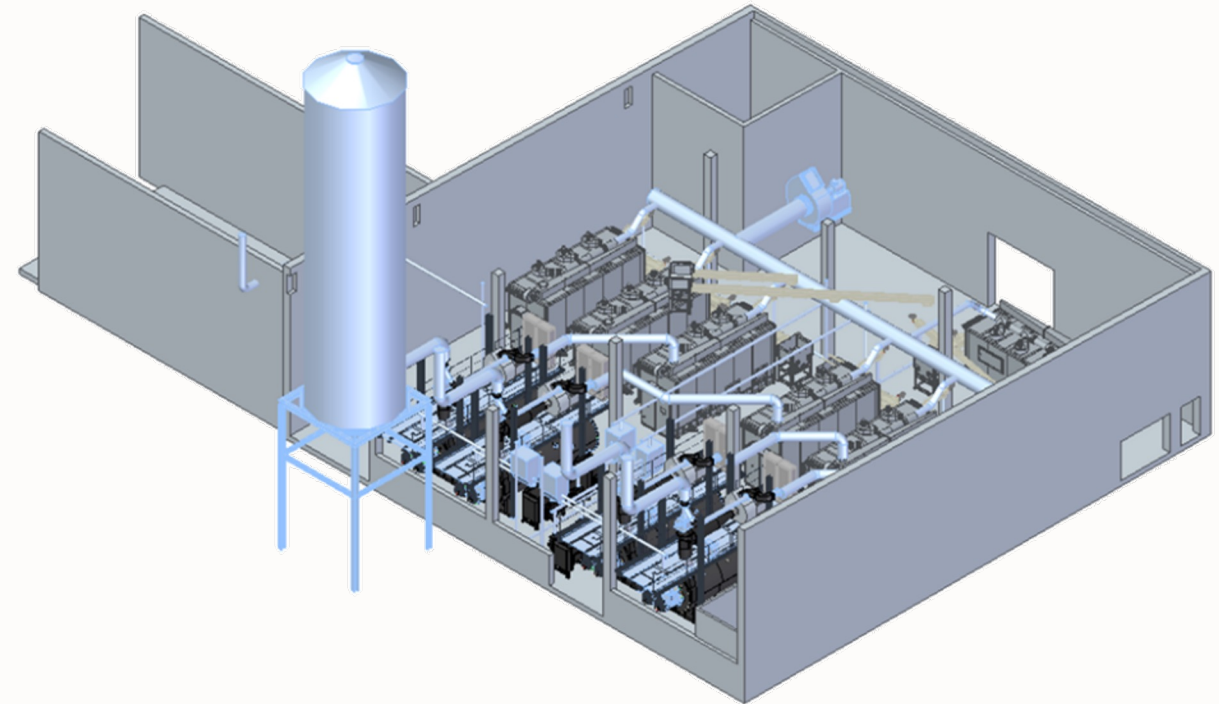


Examples of Multi-Line-Systems



Double line of PyroDry 5000 - for handling of 10.000 t dewatered sewage sludge

(showing main PyroDry equipment excl. sludge handling (right) and offgas system)



Industrial multi-line system - e.g. handling of 30.000 - 35.000 t/a of dewatered sludge

Summary - USP's



- **Complete treatment (drying and thermal treatment)** of dewatered sewage sludge to an intermediate or final product in the most compact and energy-efficient (**thermal self-sufficiency!**) form.
- Plant technology tailored to the **fully automated operation** of a modern wastewater treatment plant from 10,000 to 100,000 p.e. or a medium-sized waste disposal company.
- **Modular design** with stepwise unit size of up to **5,000 t/a dewatered sludge** or approx. $450 \text{ kW}_{\text{therm}}$ thermal power of the carbonization unit.
- **specific drying capacity at 0.7 kWh/kg water** due to the Jumbo system; paired with highest heat efficiency **due to direct flue gas utilization**
- **Utilization of process engineering synergies** in the area of exhaust air purification - the dryer simultaneously functions as a flue gas purifier with **chemical separation of SO_2** by reaction of existing NH_3 from the drying process. **Patent filed also in the US!** **US2023295516 (A1)**
- Carbon content of the Carbonisate enables a **CO_2 sink** in the range of **0.7-0.9 t CO_2 per t Carbonisate!**
- **Various possibilities of further use of the Carbonisate** adapted to the individual quality of the wastewater treatment plants (keyword: phosphorus recycling)



Logistic advantages – 1st CO₂ reduction opportunity



Dewatered sewage sludge
5,000 t/a (200-250 truck loads)

Carbonisate
675 t/a - approx. 1000 BigBags/a
(approx. 50 truck loads)



Valid Applications – 2nd CO₂ reduction opportunity



Soil and Substrate Products

- fertilizer/ structurer (Terra Preta)

Biogas Additive to stabilize gas production

- Process stability and increase of gas production

CO₂ sink for construction products

- CO₂ reduced concrete resp. construction materials

CO₂ neutral metallurgical char

- GreenCarbon - for GreenSteel production

CO₂ neutral fuel



References & Best Practices of 2023/24

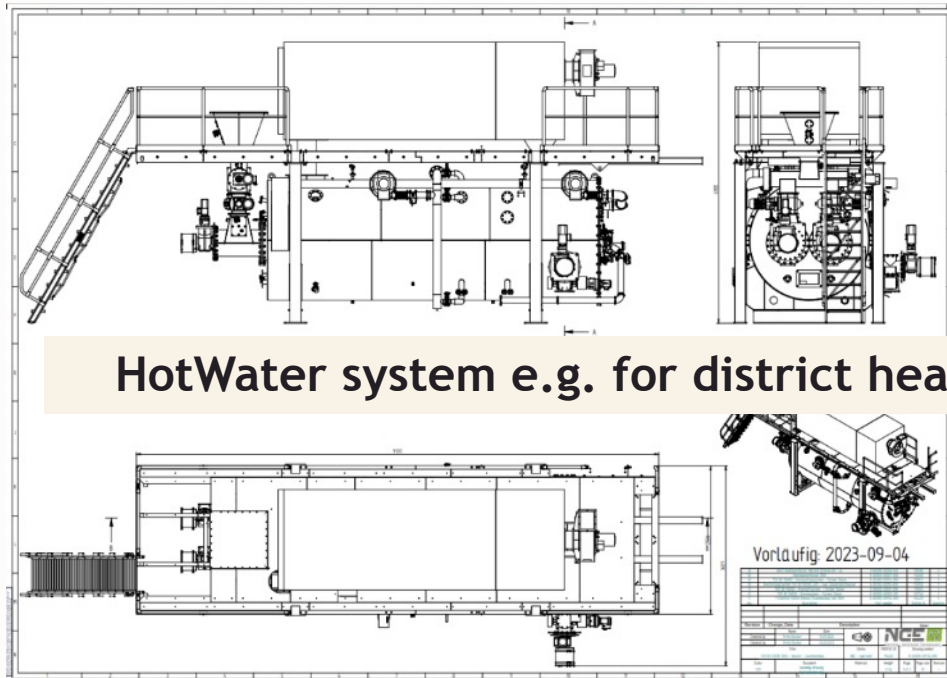


Freeburg / Illinois (USA)



Outlook – PyroPower®...

- Biomass → BioChar + CO₂ sink + power/heat
- Single Unit up to 800 kW_{thermal}
- CHP singleLine → 120kW_{el} / 600kW_{therm}
- CHP multiLine → 500kW_{el} / 2350kW_{therm}



Passion is our DNA!



Thank you
very much!!

