

# create 100% sludge reduction together

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# “Sludge treatment at the source, source of renewable products!”

**Organic waste is the perfect source for sustainable chemicals and fuel.**

By using TORWASH technology,  
our customers make valuable, circular products from their  
waste  
  
and help mitigate climate change.

**Within four years,**

the first wastewater treatment plant (WWPT), equipped with  
a TORWASH system,  
  
produces 100% reusable products  
instead of useless sludge and by that  
  
contributes positively to the customer’s sustainability goals

# Who is TORWASH?

Spin-off company (2020) from TNO

Experts in hydrothermal treatment

Focus on wet organic waste streams

Partnering with:

- knowledge institutes



- water authorities



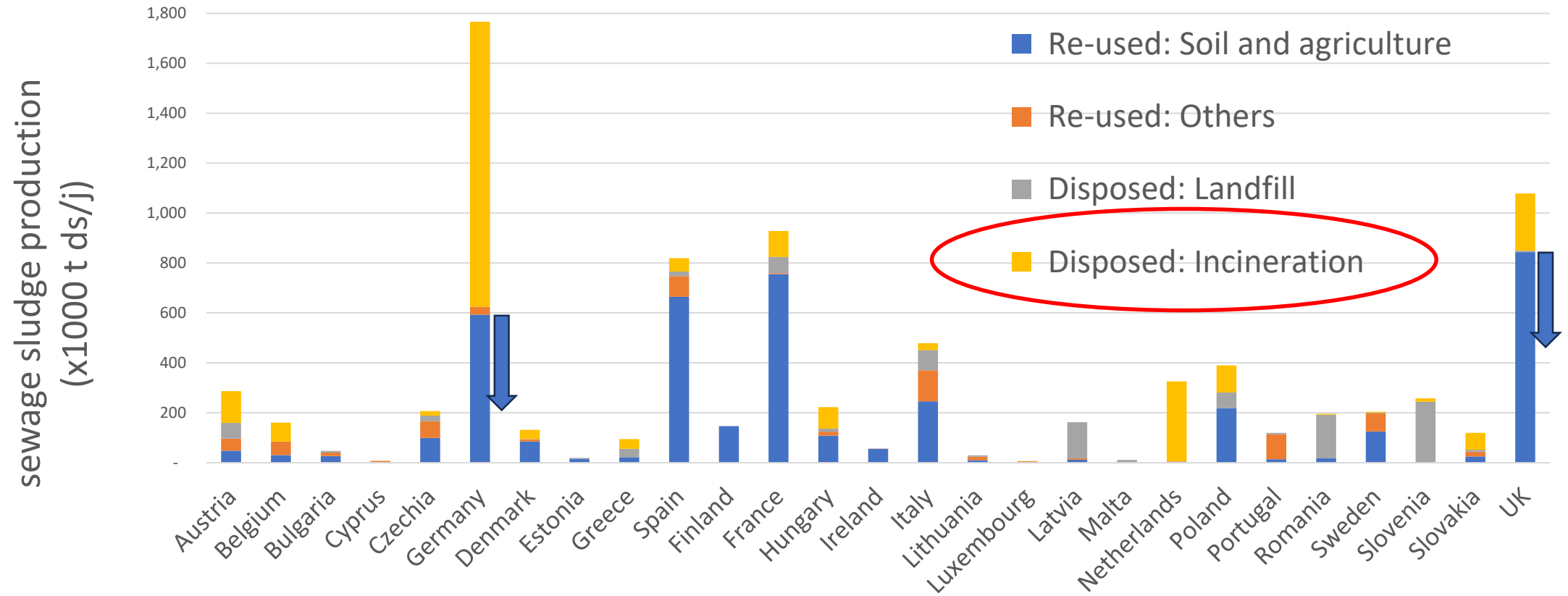
- large players in water treatment



## We are TORWASH!



# Production and application in EU



Source: Eurostat

# Limited disposal routes

## Current disposal routes:

Sludge from WWTP



**To**  
Incineration,  
agriculture  
or landfill

## Changing legislations:

Agro and landfill routes phased out

due to contamination with

- heavy metals,
- microplastics,
- PFAS and
- medicine residues



# Sewage sludge incineration: a global challenge

Valuable waste, no sustainable treatment

**Sewage sludge = (a lot of) waste ... 200.000.000 ton per year**

Worldwide insufficient incineration capacity, high prices

No circular products, no water recycling

Use of fossil chemicals, like flocculants

Extensive road transport



## Sludge Incineration:

Seen as waste, not as resource

Centralised treatment

Capital intensive

High OPEX

0% circular



# Torwash converts sludge into circular products

Towards a sludge-free future

Decentral approach: treatment at the source

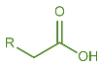
Each WWTP its own TORWASH system

Each WWTP sludge-free

Conversion from waste into source for bio chemicals:



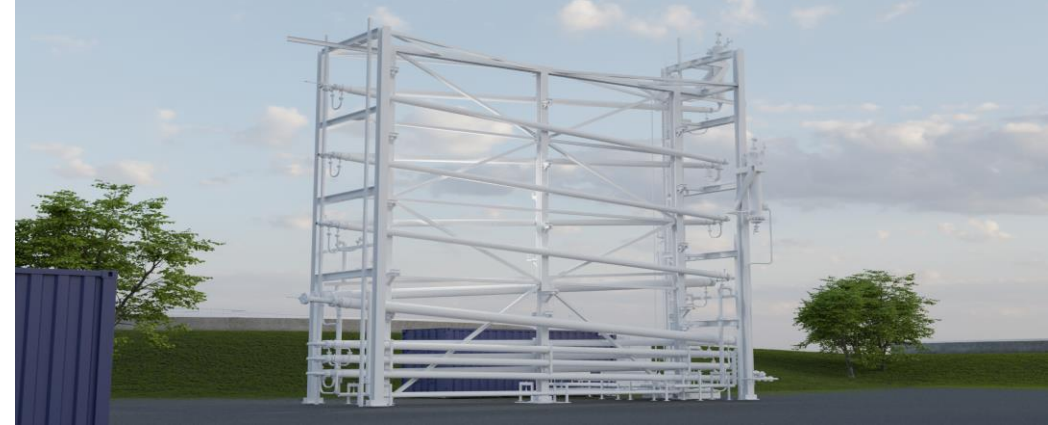
Carbon rich bio pellets, feedstock for gasification



Fatty acid concentrate, feedstock for fermentation



Phosphate, feedstock for fertilizer



Carbon rich bio  
pellets



# Market potential in launching countries: €4 – 8 bln

## Target markets

Owners of municipal and industrial WWTP's (NL)

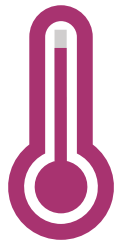
System Integrators (abroad)

Launching countries: Netherlands, Germany, UK

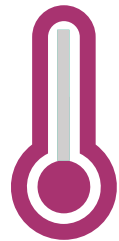
## Value proposition



80%  
lower  
OPEX



90%  
less  
transport



0%  
fossil  
chemicals



50%  
lower CO<sub>2</sub>  
emission



100%  
circular



100%  
energy  
neutral

## SAM (TAM)

(#TORWASH systems per target country)

D 500 (11.000)

UK 250 (3000)

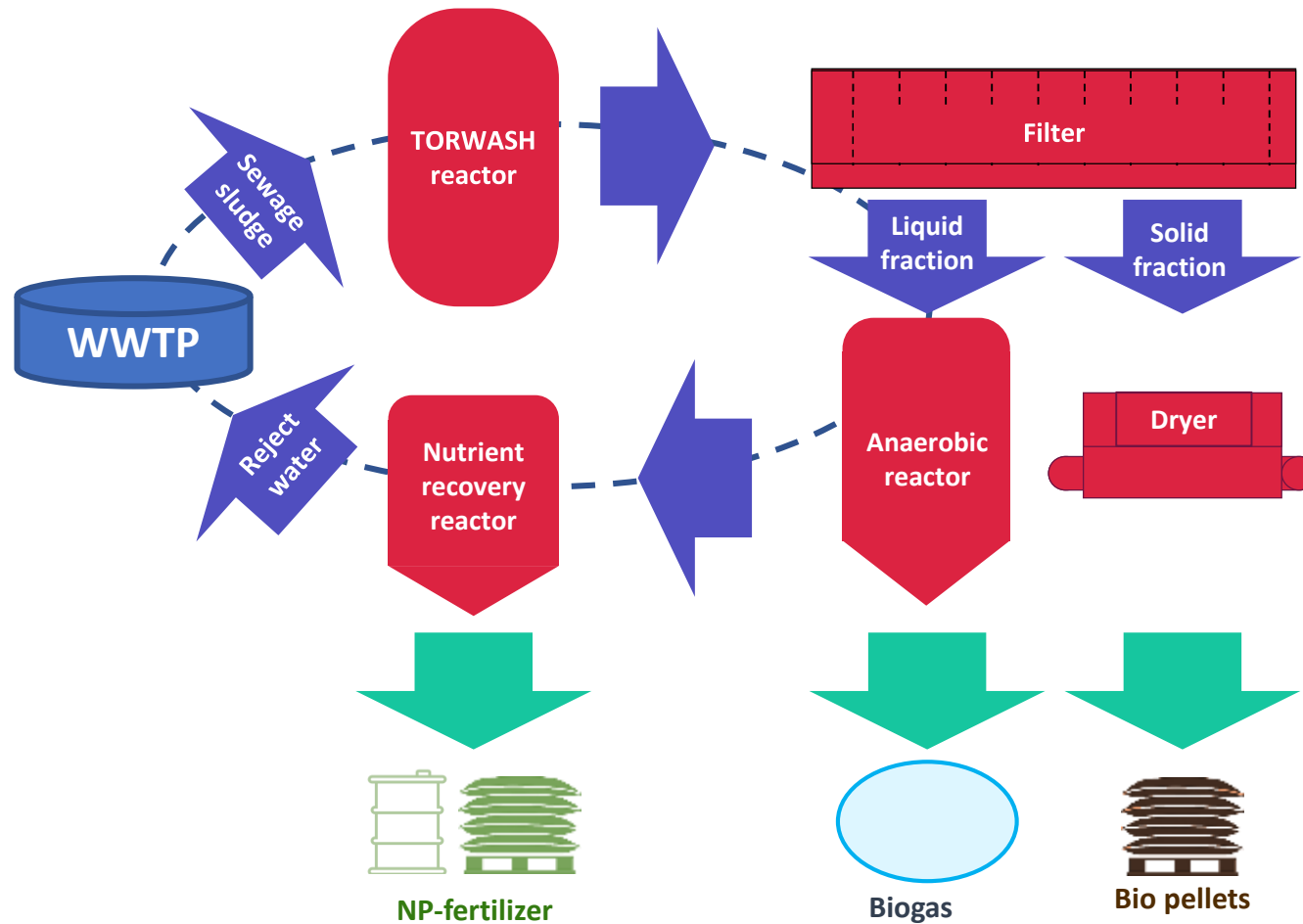
NL 125 (550)

*Criterion:  
increasing shortage  
of incineration capacity*





# Circular sludge treatment on local scale



# Pilot plant

at WWTP City of Almere (300.000 p.e.)



Rijksdienst voor Onderneming  
Nederland

## Results:

80% lower OPEX for sludge treatment

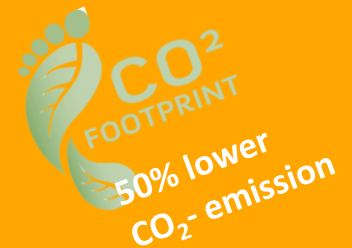
60% phosphate recovery

90% less sludge transport

no chemicals (PE) consumption

High calorific biofuel: HHV 20 GJ/t

Sufficient biogas for reactor heating



# Demonstration plant

at WWTP Land van Cuijk (150.000 p.e.)



## Partners:

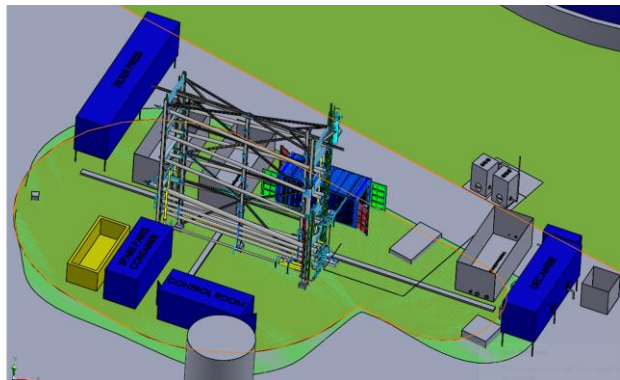


## Timeline:

- 2019 Pilot plant (50 kg/h; TRL6)
- 2021 Demonstration plant (1000 kg/h; TRL7)
- 2024 Full-scale plant (20 ton/hr; TRL8)
- 2026 Market introduction



# Some pictures from Cuijk



**Research topics demo project:**

**Integration in WWTP**

**COD and nutrient removal**

**Capex reduction**

**Maintenance strategy**

**Sufficient biogas production**

**Suitable fuel for SNB**



# TORWASH, a unique solution for sludge treatment



80% lower opex for  
sludge treatment



energy neutral  
process



60% phosphate  
recovery



solid biofuel approved  
for power plants



no chemicals (PE)  
consumption



90% less transport



50% lower  
CO<sub>2</sub>- emission



Thank you for your attention

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