

SLAMBEHANDLING OG RESSURSGJENVINNING PÅGÅENDE PROSJEKTER OG VEGEN VIDERE

Vannprisseminaret 2025

Oslo, 29. Oktober 2025

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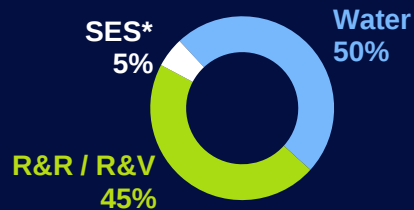


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9
billion €

BUSINESS MIX



40
countries with SUEZ operations

> 40,000
employees

9
R&D centers in Europe & Asia

+1,600
patents

160+
years of history

*: Smart Environmental Solutions

SUEZ in Nordics Our history



**Present in the Nordics
since 1980's**

**Previously known
as Degremont and Puritek**

**Reestablished in Denmark
in 2015 as SUEZ Water A/S**

**SUEZ Norway AS
established in October 2025**

Key figures and proven sludge treatment solutions

+ 3,200

**DRINKING WATER
plants**

designed and built by SUEZ

+ 260

**DESALINATION
plants**

designed and built by SUEZ

+ 2,800

**WASTEWATER
treatment plants**

designed and built by SUEZ
(including + 50 WATER REUSE references)

Thickening

DRAINIS GDE/GDD

DRAINIS TURBO

Dewatering

DEHYDRIS TWIST

DEHYDRIS LIME

DEHYDRIS ULTRA

Digestion

DIGELIS

DIGELIS FAST

DIGELIS BH/TH

DIGELIS SIMPLEX design

Drying

HELIANTIS

EVAPORIS LE

Incineration

THERMYLIS

THERMYLIS 2S

THERMYLIS 2R

Others

CLEARGREEN Sidestream

METHANIS

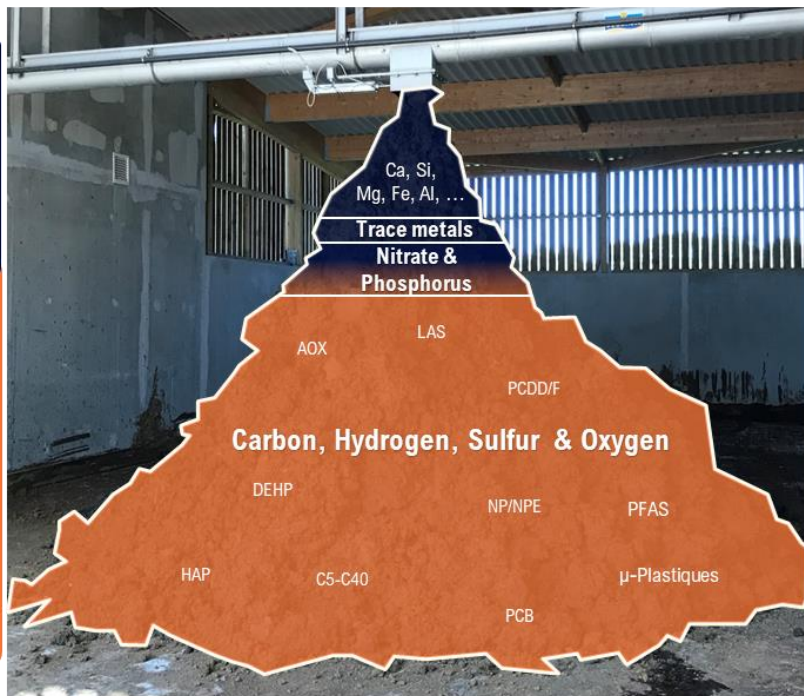




What is in the sludge?

Mineral Matter

Organic Matter



NITROGEN & PHOSPHORUS



Fertilizer

In case of new disposal route → try to maintain the recycling of nutrients

CARBON, HYDROGEN, SULFUR



Energy



Potential biogenic carbon (Carbon capture & storage)

HEAVY METALS

Well **controlled decreasing concentrations** in time (increasing constraints for usage in agriculture)

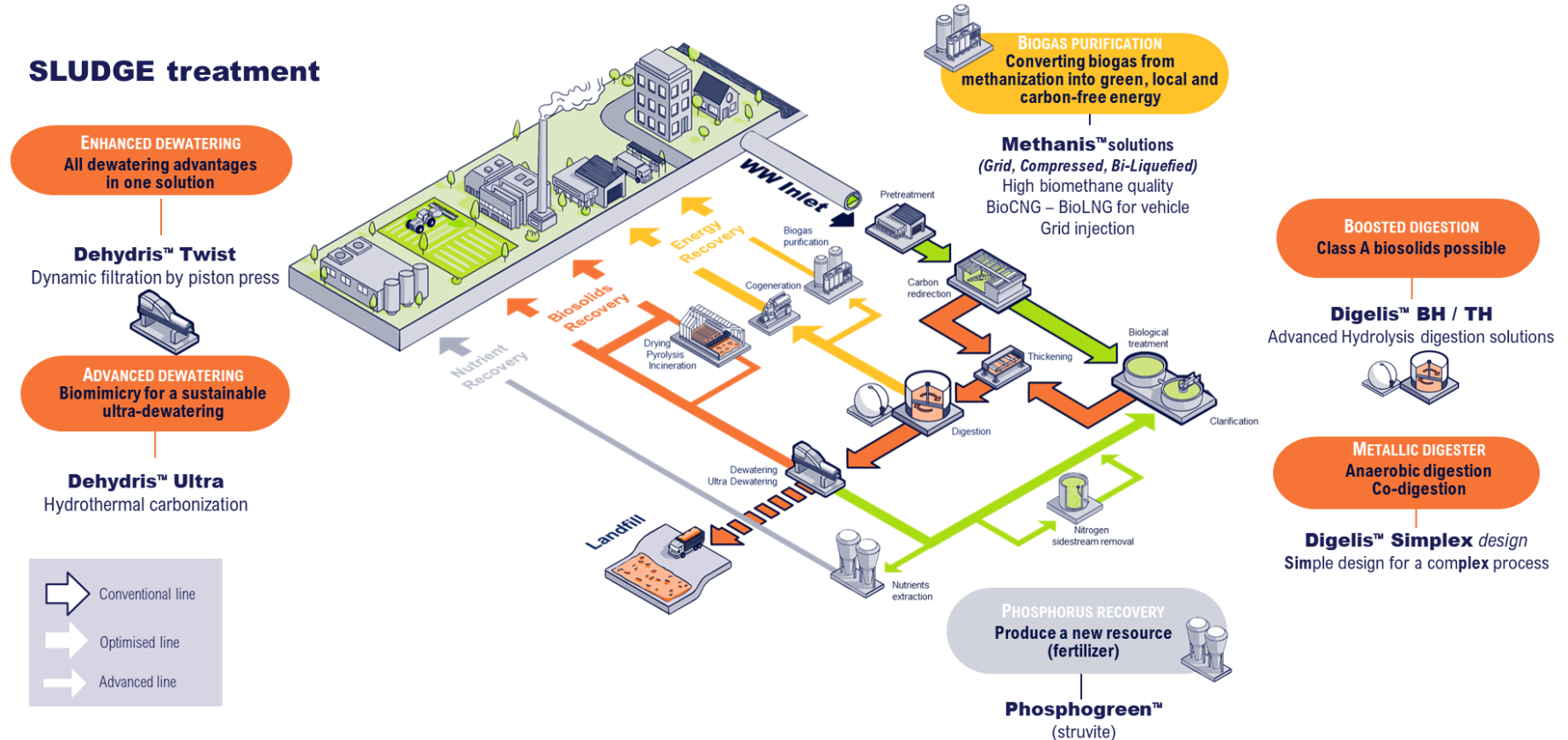
ORGANIC TRACE CONTAMINANTS (dispersed in matrix)

Rising concern & uncertainties about health implication increasing regulatory constraints (ban on agriculture in some countries)

New contaminants (PFAS)

Sludge treatment lines as of today with conventional and advanced treatment lines

SLUDGE treatment



Case: Marselisborg WWTP (200.000 PE)



Recovery of Phosphorus as struvite through precipitation of dewatering concentrates

The plant was commissioned in 2018

Producing a high-class fertilizer approved by EPA

But: Difficult to sell the product on the free market

What are the drivers for new solutions?

CURRENT DRIVERS & NEEDS OF COLLECTIVITIES



Disposal **costs** = **reduce waste** volume



Opportunity for **energy production**
(Directive energy neutrality & on biomethane in France)

ANTICIPATING FUTURE DEVELOPMENTS



Emerging market for CO₂ credit and opportunities for Carbon Capture use and storage



Increasing **constraints on micropollutants** and risk of "Media frenzy" → Need of alternatives to land application



Requirement for **nutrients recovery**

OUR ANSWER

INCREMENTAL INNOVATION ON MATURE PROCESSES to increase performances (more biogas, smaller footprint, digitalization for better operation)

INNOVATIVE TREATMENTS



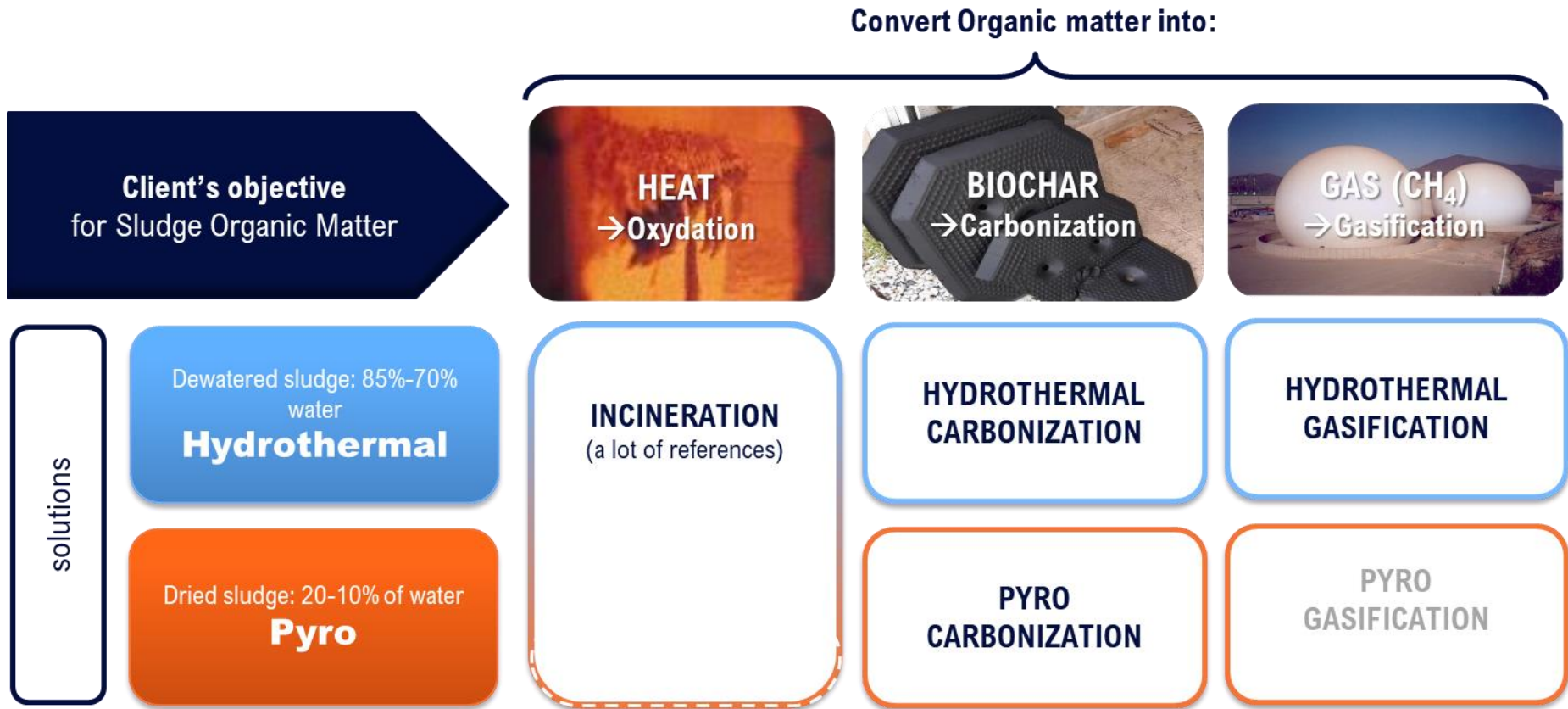
To transform **residual organic matter into energy** (eliminating organic contaminants)



To produce **new product eligible for carbon credits** (biochar)

RENEWED INTEREST FOR THERMAL TECHNOLOGIES (including incineration)

Thermal treatments are regaining focus



A case for Hydrothermal Carbonization: The BIOFACTORY concept in Pau Lescar WWTP

Context

Existing Pau Lescar WWTP built between 1980 and 2006).

Extended aeration activated sludge plant
Capacity: **190 000 PE**

Current sludge treatment = high cost and not sustainable

Upgrading of the sludge treatment proposed in Bid for O&M (at the same time BID for nearby Waste Incinerator)

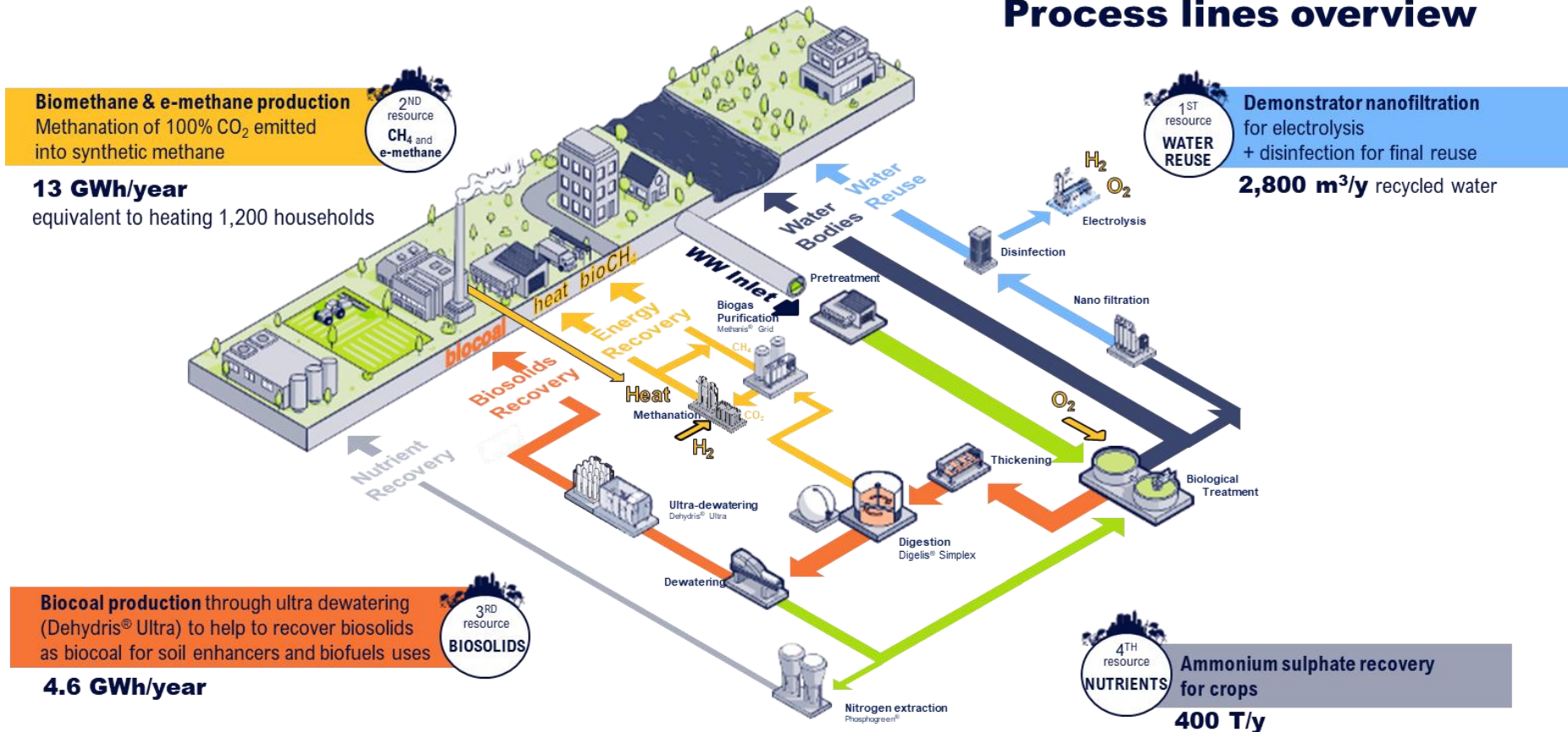
Client objective

Decarbonize the future sewage sludge facility, promote **resource recovery**



A case for Hydrothermal Carbonization: The BIOFACTORY concept in Pau Lescar WWTP

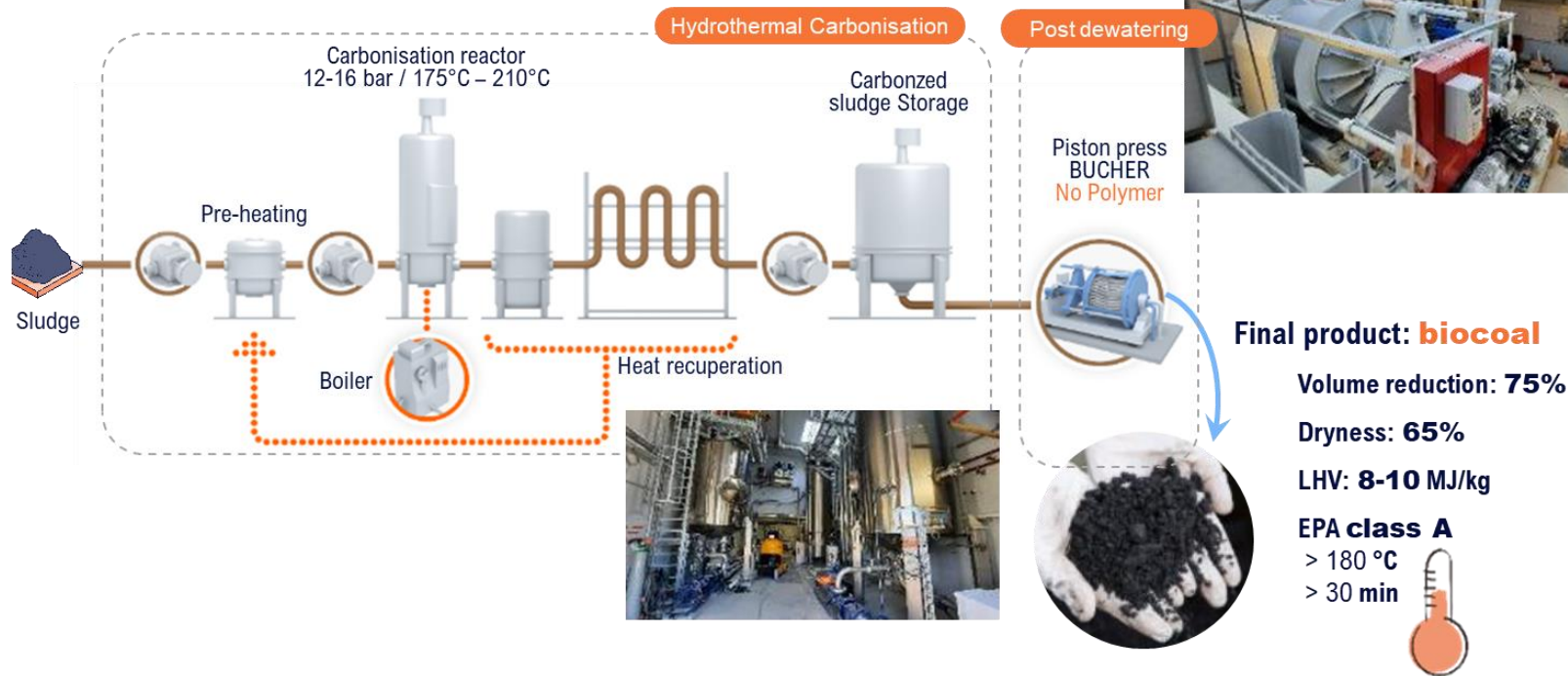
Process lines overview



A case for Hydrothermal Carbonization: The BIOFACTORY concept in Pau Lescar WWTP

Dehydri[®] Ultra

**Combination of hydrothermal conditioning and advanced filtration
to produce a hygienized, easily stored biocoal**





A case for Hydrothermal Carbonization: The BIOFACTORY concept in Pau Lescar WWTP

1. Water electrolysis

Water electrolysis to produce hydrogen



2. Methanation

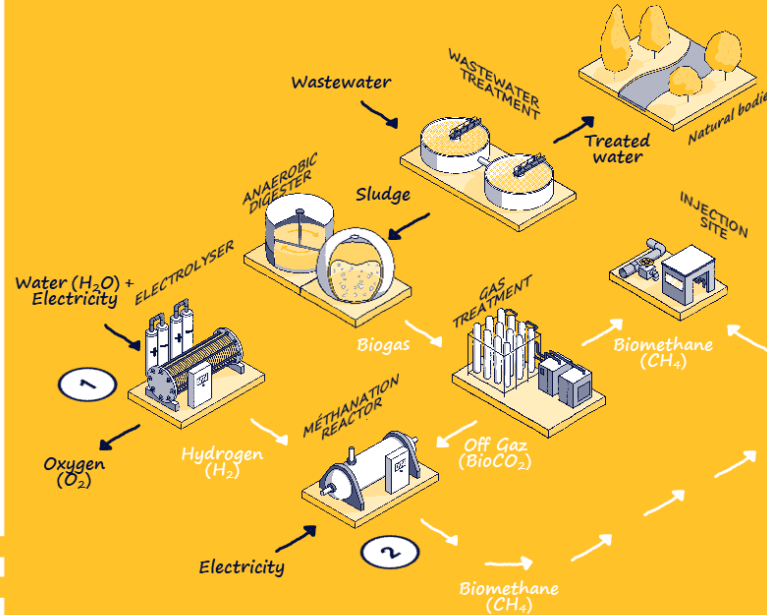
Combine hydrogen and BioCO₂ to produce biomethane to be injected in the gas grid



2 type of process

Catalytic / Biological

Methanation to increase biogas output

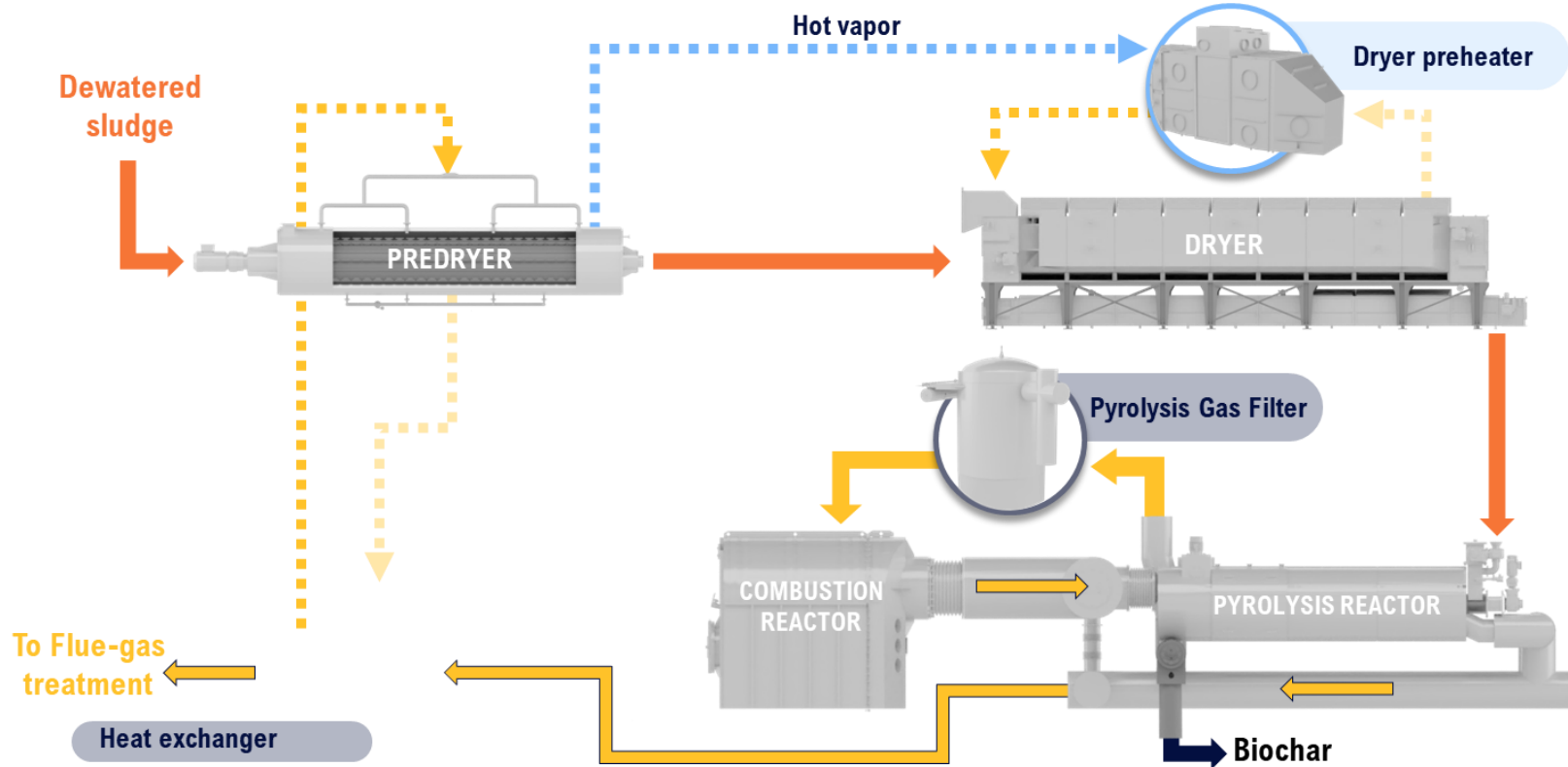




What's next?

Short term: Pyrocarbonization

Pyrolis® S2B : Sludge to Biochar





What's next?

Short term: Pyrocarbonization

More than
95%
of
contaminants
removal
(CEC)

Contaminants of Emerging Concern removal

100 %

Pathogens elimination.

Process conditions ($T^{\circ} > 500^{\circ}\text{C}$ for several minutes) are much more severe than approved hygienization conditions.



100%

Pharmaceuticals
destruction.



> 90%

**Per- and Polyfluoroalkyl
Substances (PFAS)**

destruction in biochar and flue gas.



100%

Microplastics
elimination.

Heavy Metals

2-9 times

less bioavailable
than in biosolids.



> 99% elimination of other CEC

PCB, PCDD/Fs, PAH, OPFRs, etc...

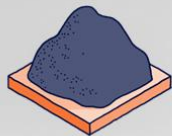
PCB: PolyChlorinated Biphenyls
PCDD/Fs: PolyChlorinated Dibenzo-p-Dioxins and Furans
PAH: Polycyclic Aromatic Hydrocarbons
OPFRs: OrganoPhosphate Flame Retardants
Endocrine-disrupting chemicals



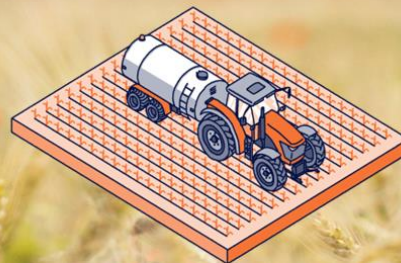
What's next?

Short term: Pyrocarbonization

X2
of phosphorus
in dry solid
VS dewatered
sludge



- **Biosolids Biochar can be used as P-rich fertilising product**
- **Up to 80% of Bioavailable Phosphorus**
- **Lower Cadmium/Phosphorus ratio than mined P fertilisers**
- **Already recognized as fertilizing product in some countries** (i.e. Czech Republic, Sweden)

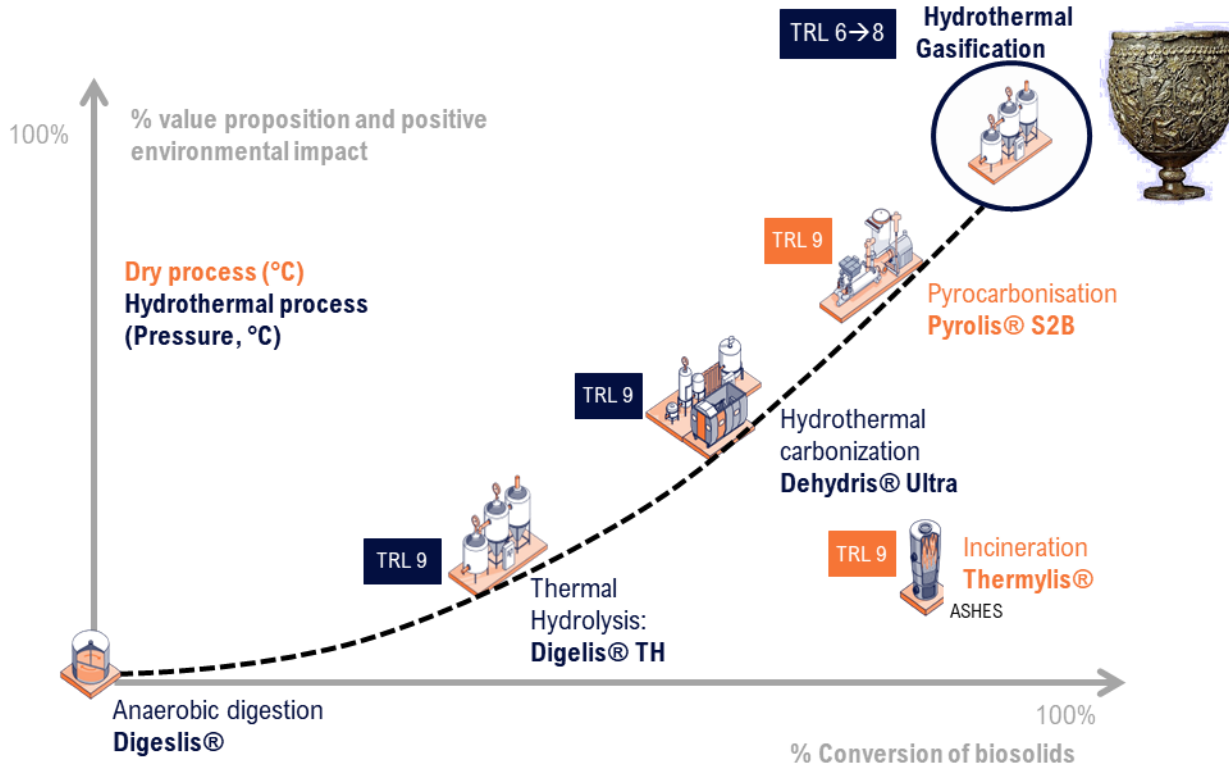


PYROLIS S2B



What's next?

Long term: Hydrothermal gasification?



Transformation of more than 80% of organic matter into combustible syngaz



Energy Balance +++



Recovery of Nitrogen, Phosphorus and Potassium as salts



No or almost no waste

(*) TRL: (Technical Readiness Level)

Spørsmål?

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