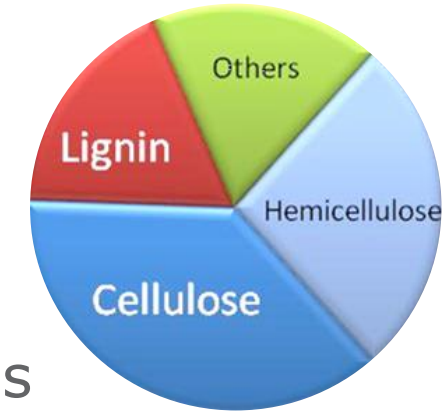
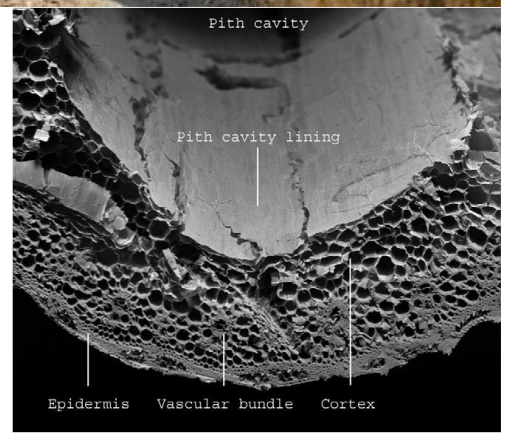
«Tool Box» and «Spritz Mix»
How to value straw in a biomethane plant

Straw – The Challenge

- ✓ High lignin concentration
- ✓ High dry matter content
- ✓ Non-standard supply systems
- ✓ High energy demand for pre-treatment
- ✓ Straw is swimming and creating floating layer
- ✓ Poor degradation in the digester



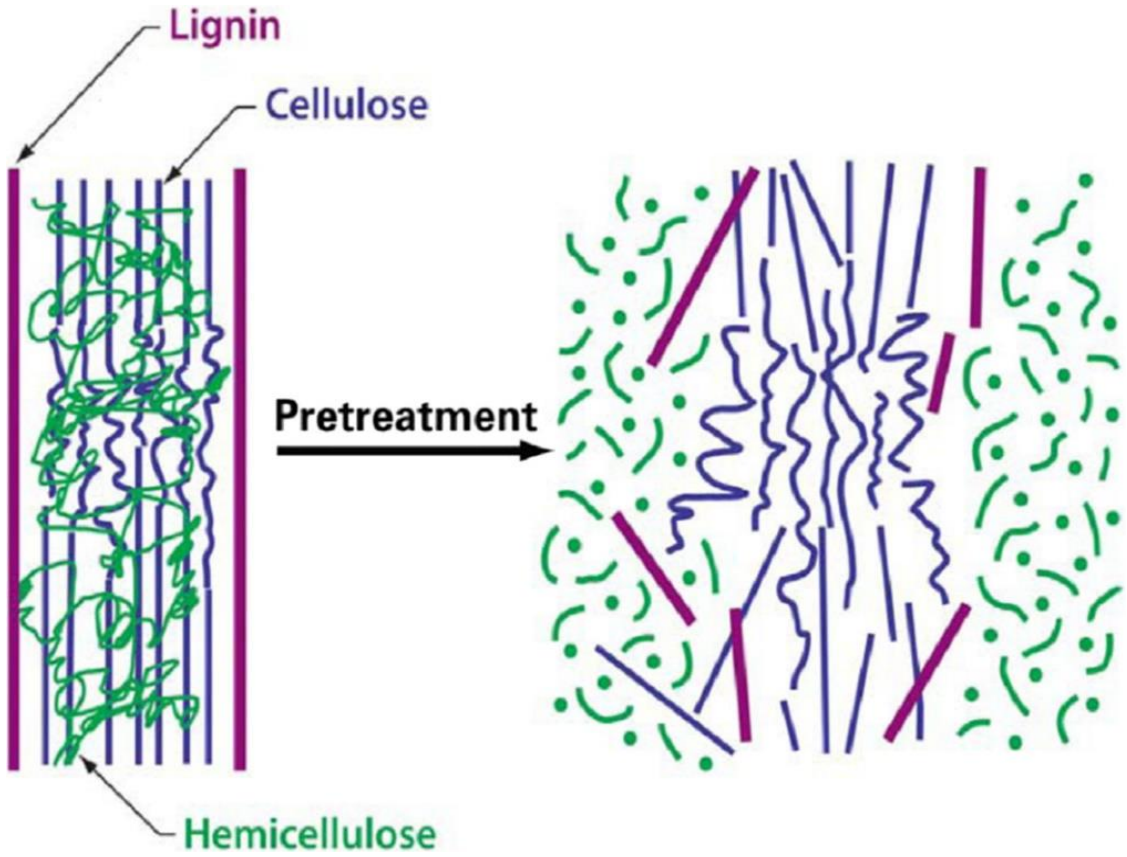


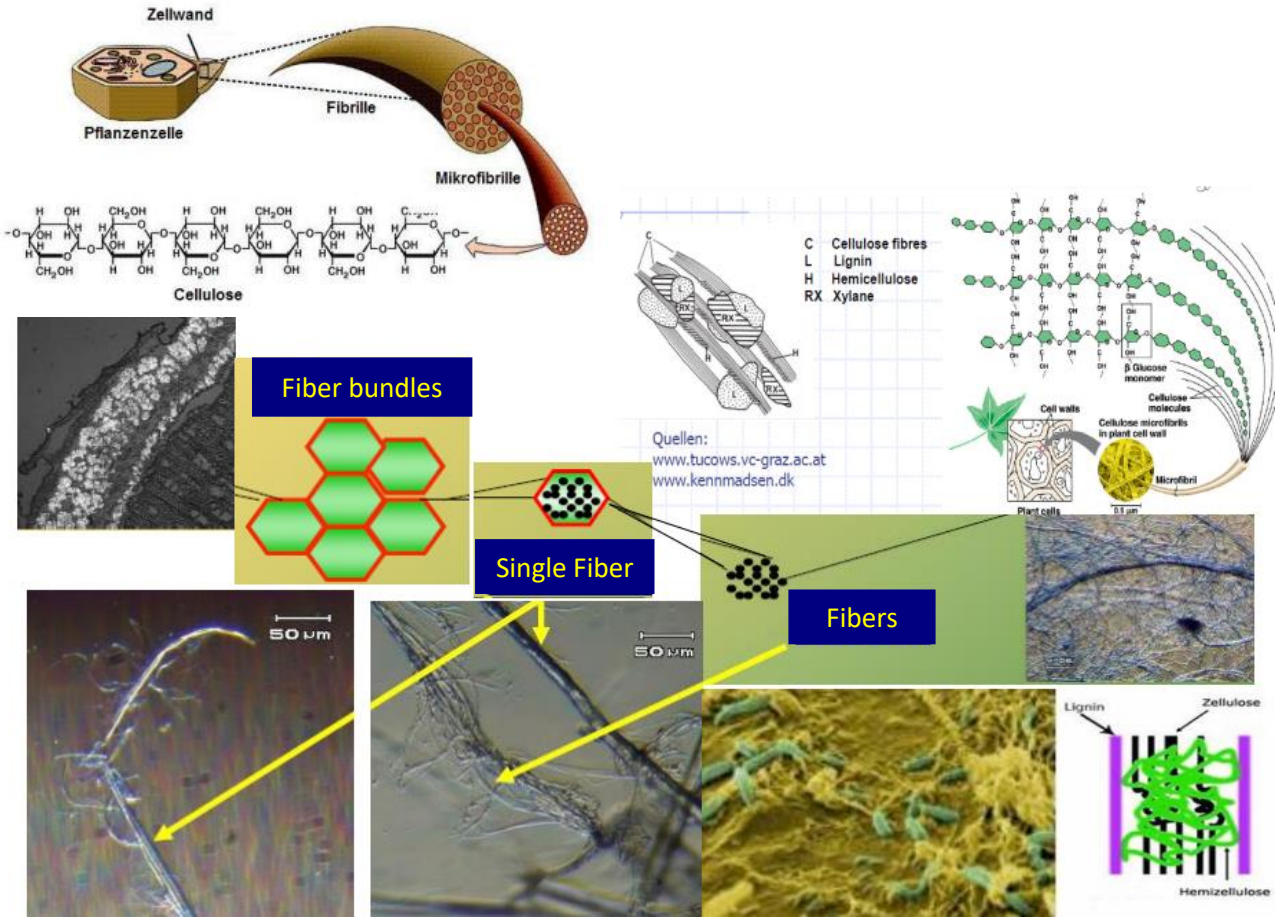
Without pre-treatment straw is porous and water repellent

Straw feeding – The Solution

- ✓ High Dry Matter => Need to add water, micro-nutrients and enzymes, digestate recirculation after separation and decanter,..
- ✓ Low azote => Add N-rich substrates
  - = Chicken manure / Cow manure
  - = Slaughterhouse Waste
  - = OFMSW (organic fraction of municipal solid waste
  - = Protein-rich plants (e.g. lucerne)
- ✓ High lignocellulosic parts => pre-treatment
- ✓ Formation of supernatant and crust => Installation of an improved mixing system;

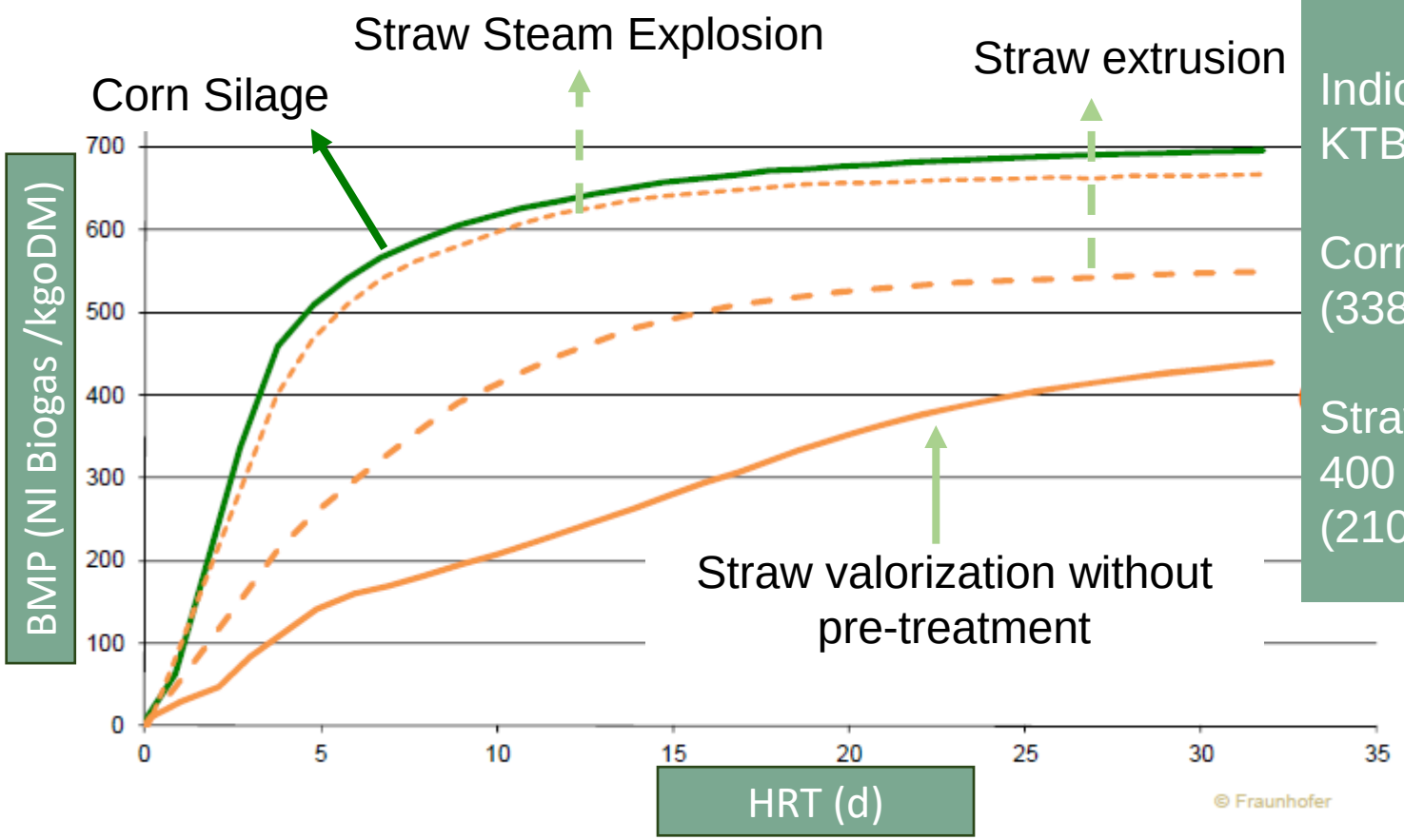
Why Pre-treatment: Desired Results





Destroy the protective structure

Desired Results - Biogas



Indicative values KTBL

Corn 650 l/kg oDM (338 l CH_4/kg)

Straw 400 l/kg oDM (210 l CH_4/kg)

BiHcon mechanical pre-treatment is comparable to the Straw extrusion one

Source: Frauenhofer

BiHcon pre-treatment = Mill + Reactor

This is the right pre-treatment for higher quantities of straw in the AD plant

Example of Mobile destringer

Mobile destringer (https://www.maiorsrl.it/forca-sfila-corde/)

Milling pre-treatment

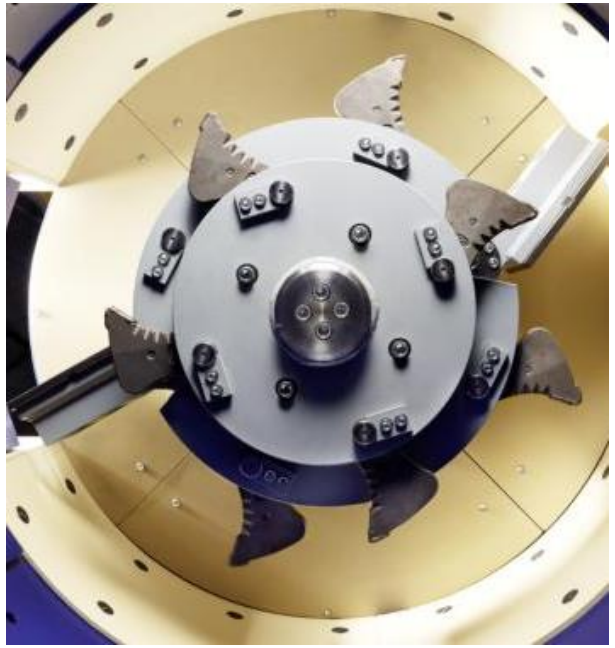
Selected to use the same line for the pre-treatment of the straw for the compost unit and the first pre-treatment of the anaerobic digestion before the Reactor one

REACTOR pre-treatment

External view

Discharge opening

Internal view of the defibration elements



This mechanical system allows the transformation of the straw from hydrophobic to hydrophilic. It is a perfect pre-treatment before insert the biomass in the anaerobic digestion process with a solid-liquid feeding system

REACTOR pre-treatment

Results

1 **Non treated straw**

2 **Milled + Moistened**

3 **Milled + Moistened + Reactor**

Pre-treatment effect

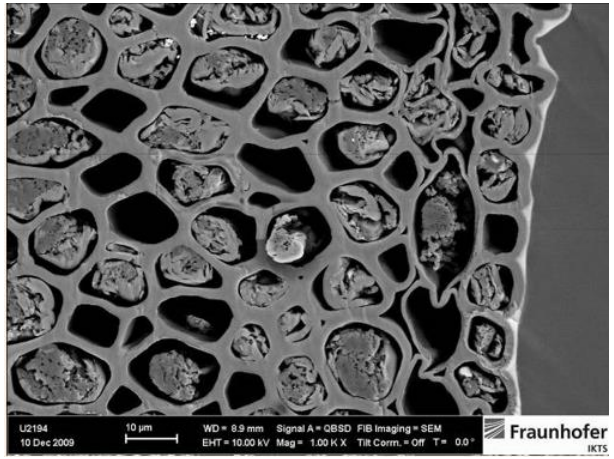
2 Milled + Moistened

3 Milled + Moistened + Reactor

Pre-treatment effect

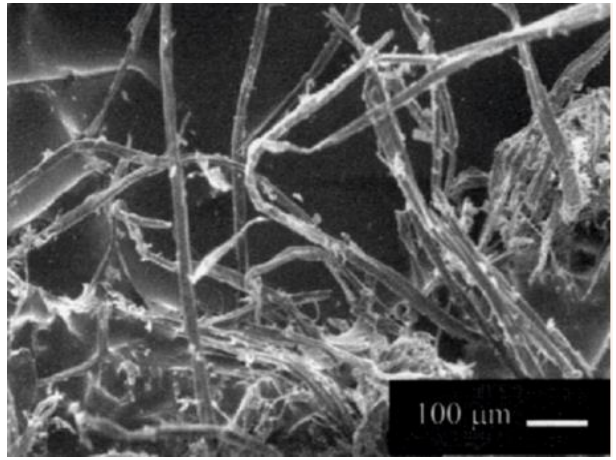
UNTREATED

Non treated straw

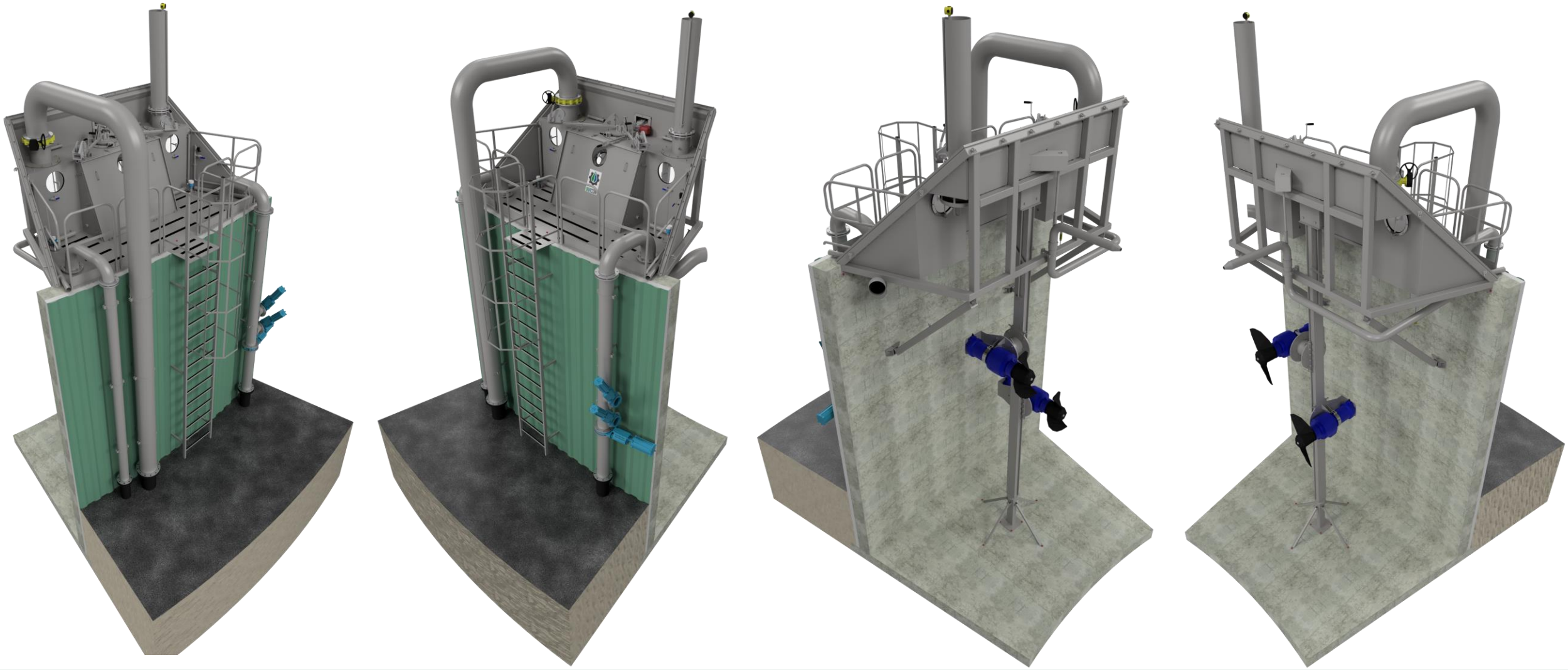


AFTER MILL+REACTOR PRE-TREATMENT

Treated straw



To concentrate all the activities in a single area: the «Tool Box» solution



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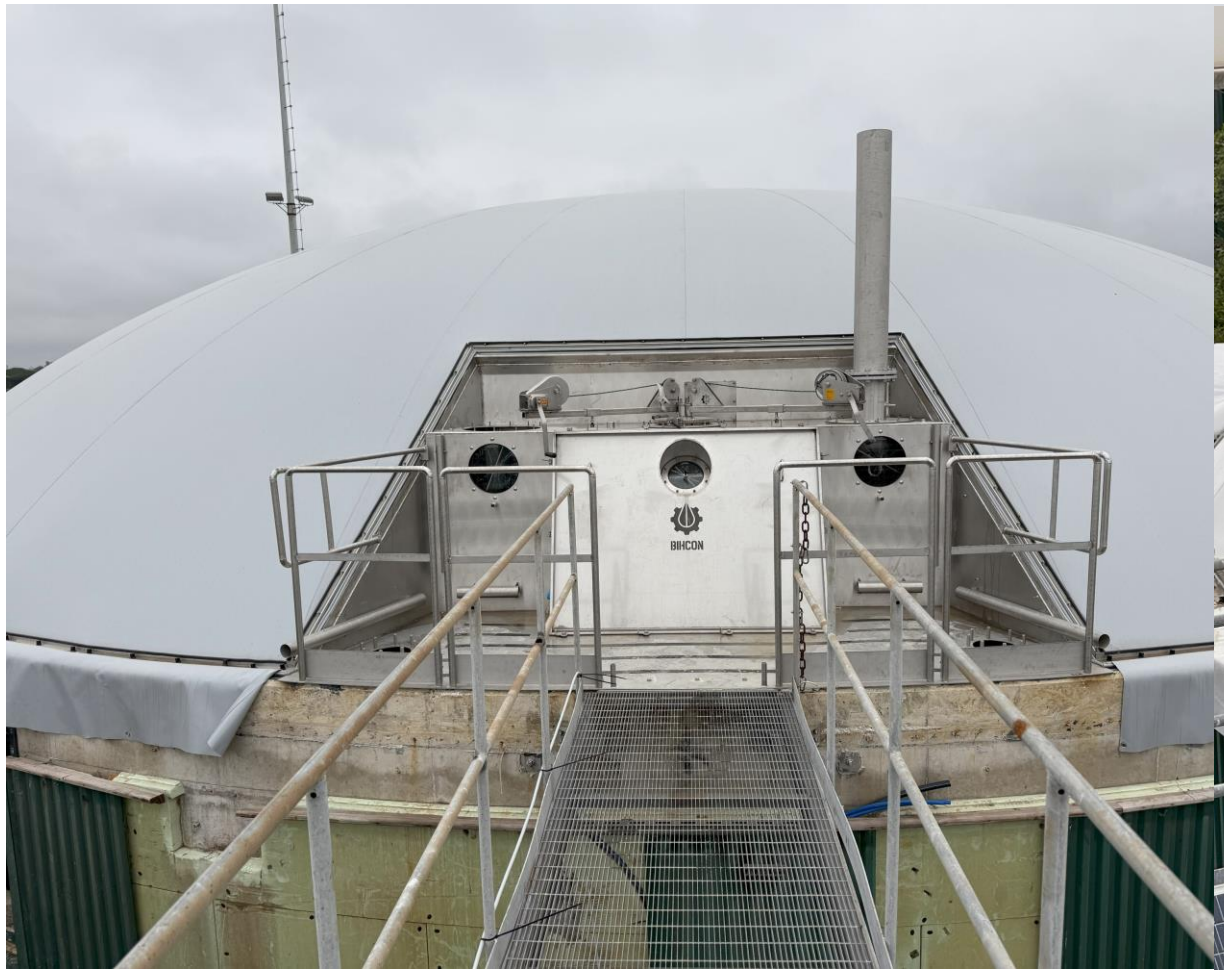
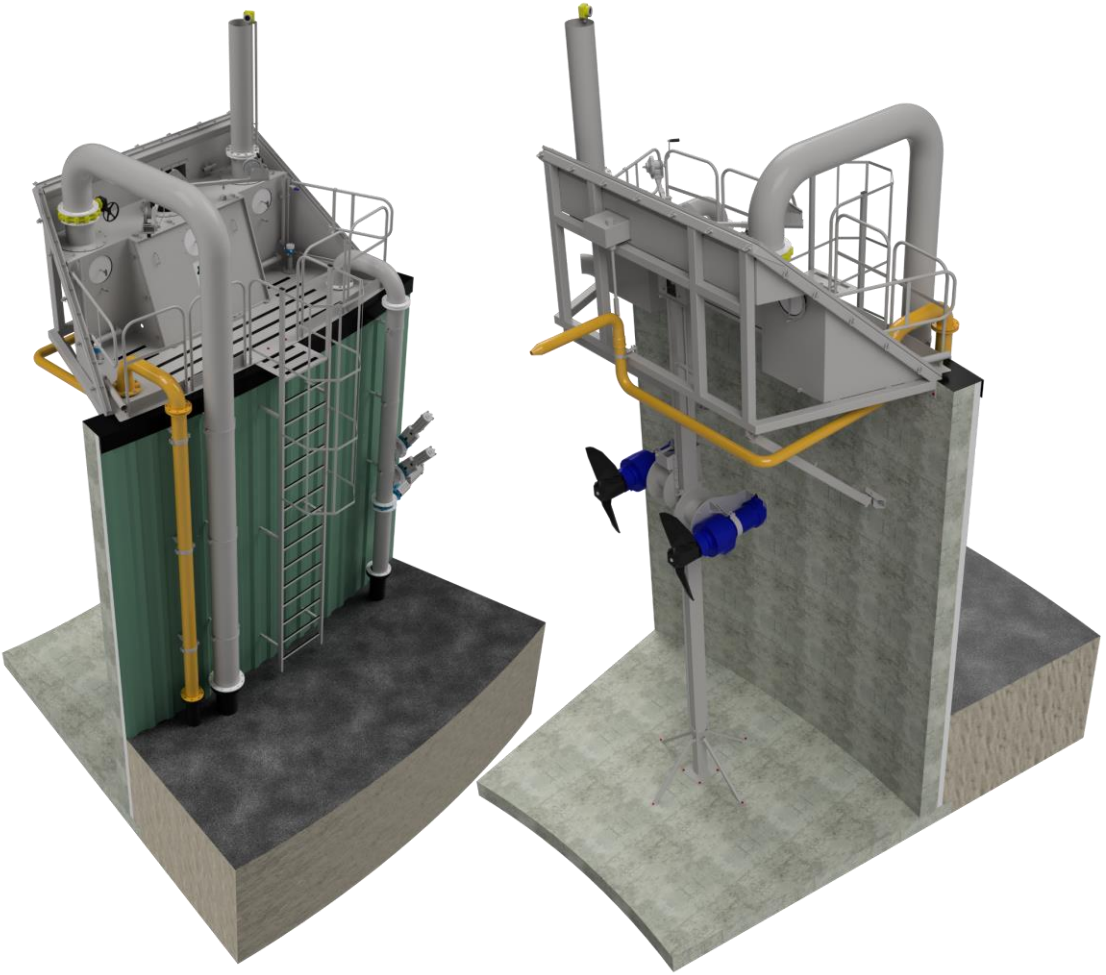


Formation of supernatant and crust: The «Spritz Mix» is the solution



Combined spraying and agitation system

Composed by:

- Digestate pumping system from the pumping station
- Mixing and nozzle

Advantages:

- Prevention and removal of crusts and floating layers
- Lower energy consumption
- Lower investment in mixing systems
- Homogeneous substrate

Collect the hidden value of your agrowaste!!

Thanks for your attention

BIHCON