



Bio ThelysTM batch thermal hydrolysis

- Reduces sludge volume
- Improves sludge quality
- Increases biogas production

WATER TECHNOLOGIES

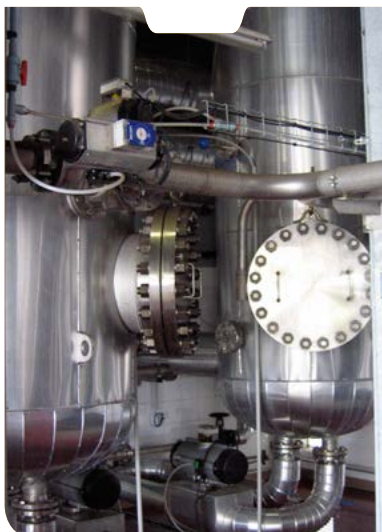
Bio Thelys™ is a complete sludge reduction solution that works in batch mode, combining thermal hydrolysis and anaerobic digestion.

By coupling thermal hydrolysis with anaerobic digestion, Bio Thelys™ offers better performance than conventional digestion and optimizes sludge treatment by producing:

- 25 to 35% less dry solids
- 30 to 50% more biogas
- No odours
- A pasteurised digestate, for full control over sanitation hazards and safe agricultural reuse

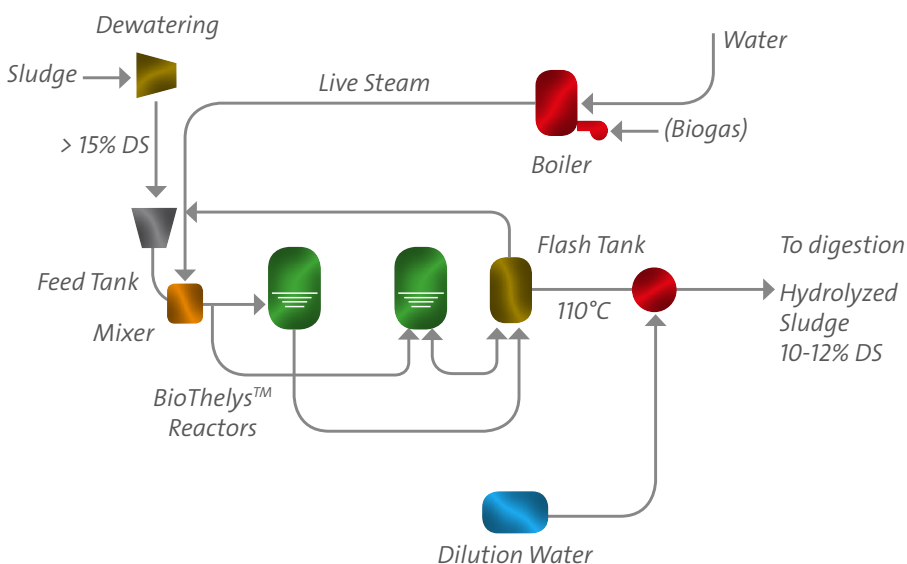
Bio Thelys™ handles all kinds of organic, industrial or municipal sludge and can also handle grease.

**Higher revenue,
lower expenditure**



Operating Principle

Dehydrated sludge first goes through a batch thermal hydrolysis phase during which steam is injected in reactors operating under specific pressure (9 bar) and temperature (165°C) conditions for approximately 30 minutes.



A flexible and safe solution

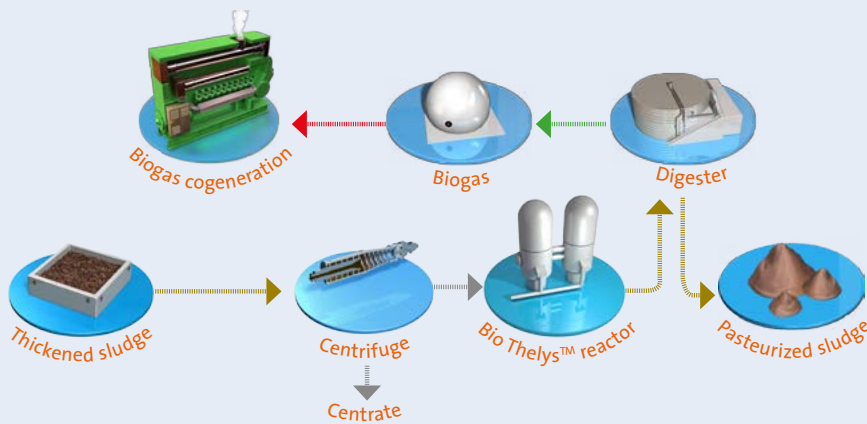
- Produces a pasteurised digestate that is compliant with international standards e.g.
 - EPA class A (USA)
 - ADAS Safe Sludge Matrix (UK)

Other benefits

- Reduced digester related investment for new installations
- Reduced operating costs:
 - Less sludge to remove
 - At existing installations, the digestion capacity can be increased by handling new input
- Income is generated from:
 - Either processing external input through co-digestion
 - Either selling the energy produced by co-generation or producing bio-methane

3 configurations

Lysis/Digestion (LD) Configuration

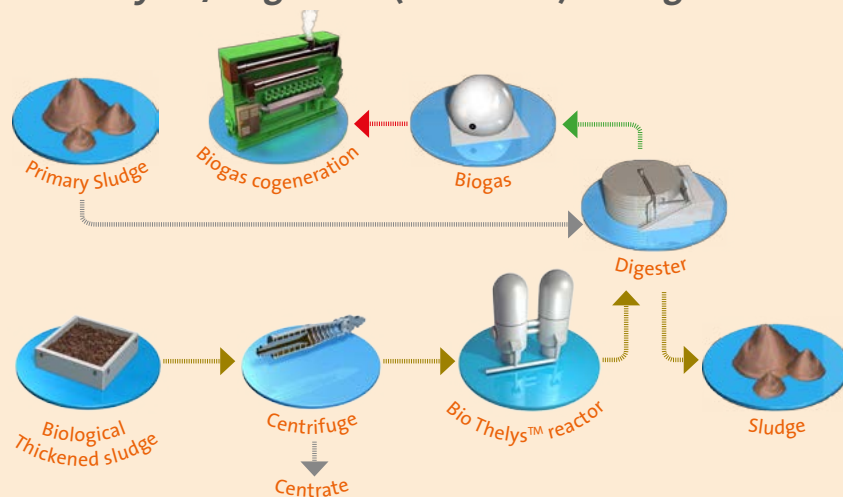


Thermal hydrolysis is performed on the whole or a part of the sludge stream prior to digestion.

This configuration reduces digester volume by a factor of 2 to 3, reduces the amount of sludge and guarantees that it is sanitized while increasing biogas production.

Using the LD configuration, the throughput of an overloaded digestion plant can be doubled, thus avoiding the need to build additional digestion capacity.

Partial Lysis / Digestion (Partial LD) Configuration

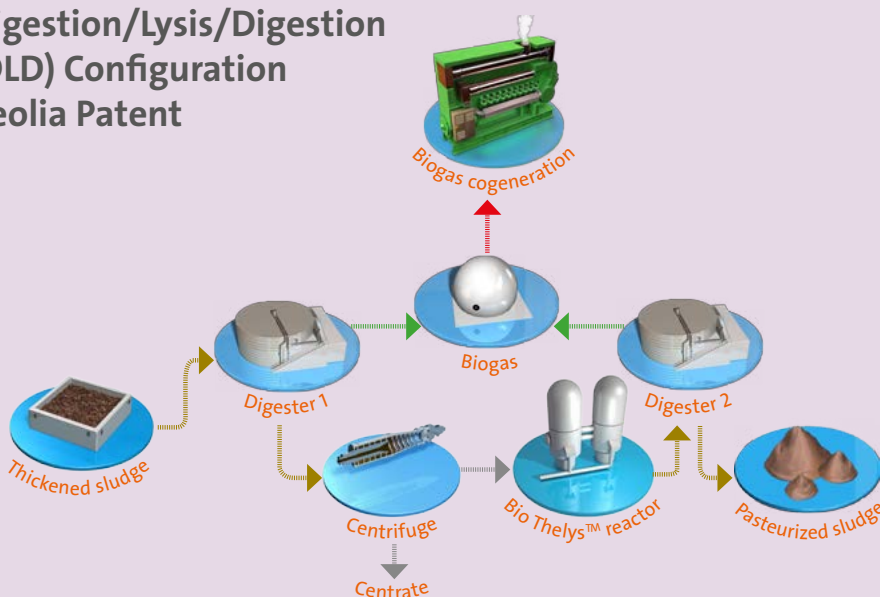


The Hydrolysis reactor may process only the biological (secondary) sludge with corresponding enhancement on biogas production.

This configuration gives the client the greatest savings in regards to reactor capacity and steam consumption.

Using the partial LD configuration, digestion capacity of an existing installation can be increased by a factor of 2.

Digestion/Lysis/Digestion (DLD) Configuration Veolia Patent



Thermal hydrolysis is applied to all of the digested sludge from digester 1. Then the sludge is cooled and diluted before breakdown continues in digester 2.

This is the optimum formula in energy terms as it uses less steam while producing more biogas and electricity.

It also enables the greatest reduction in the amount of sludge to be produced.

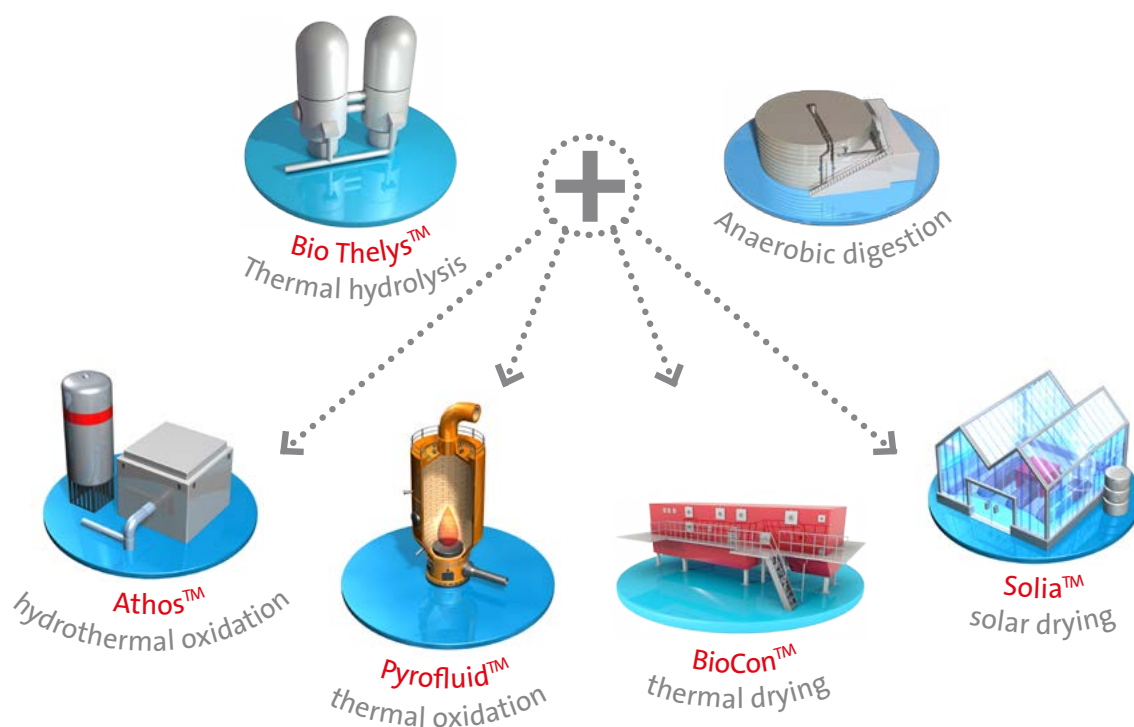
A solution that guarantees energy and environmental performance

Many possibilities for using biogas:

- > Conversion into 'green' electricity via co-generation
- > Bio-methane production (for injection into the network or as fuel)

With external input (co-digestion), energy self-sufficiency or even a positive energy footprint may be achieved by the plant.

Bio Thelys™ combines with other Veolia sludge treatment processes and completes them to offer even more sustainable solutions.



Reduced carbon footprint
of the facilities

Complete sludge
pasteurization

Our Bio Thelys™ References

| | | | |
|---------------------------|------|---------------|--------------------|
| Oxford, United Kingdom | 2013 | 1,400,000 PE* | 26,000 t DS/year** |
| Esholt, United Kingdom | 2013 | 2,100,000 PE | 32,800 t DS/year** |
| Tergnier, France | 2011 | 30,000 PE | 1,600 t DS/year** |
| Monza, Italy | 2010 | 750,000 PE | 15,800 t DS/year |
| Le Pertuiset SIVO, France | 2008 | 80,000 PE | 2,000 t DS/year |
| Château-Gonthier, France | 2007 | 38,000 PE | 1,000 t DS/year |
| Saumur, France | 2006 | 60,000 PE | 1,600 t DS/year |

* PE: Population Equivalent.

** including sludge external input.



