

DIGELIS Turbo

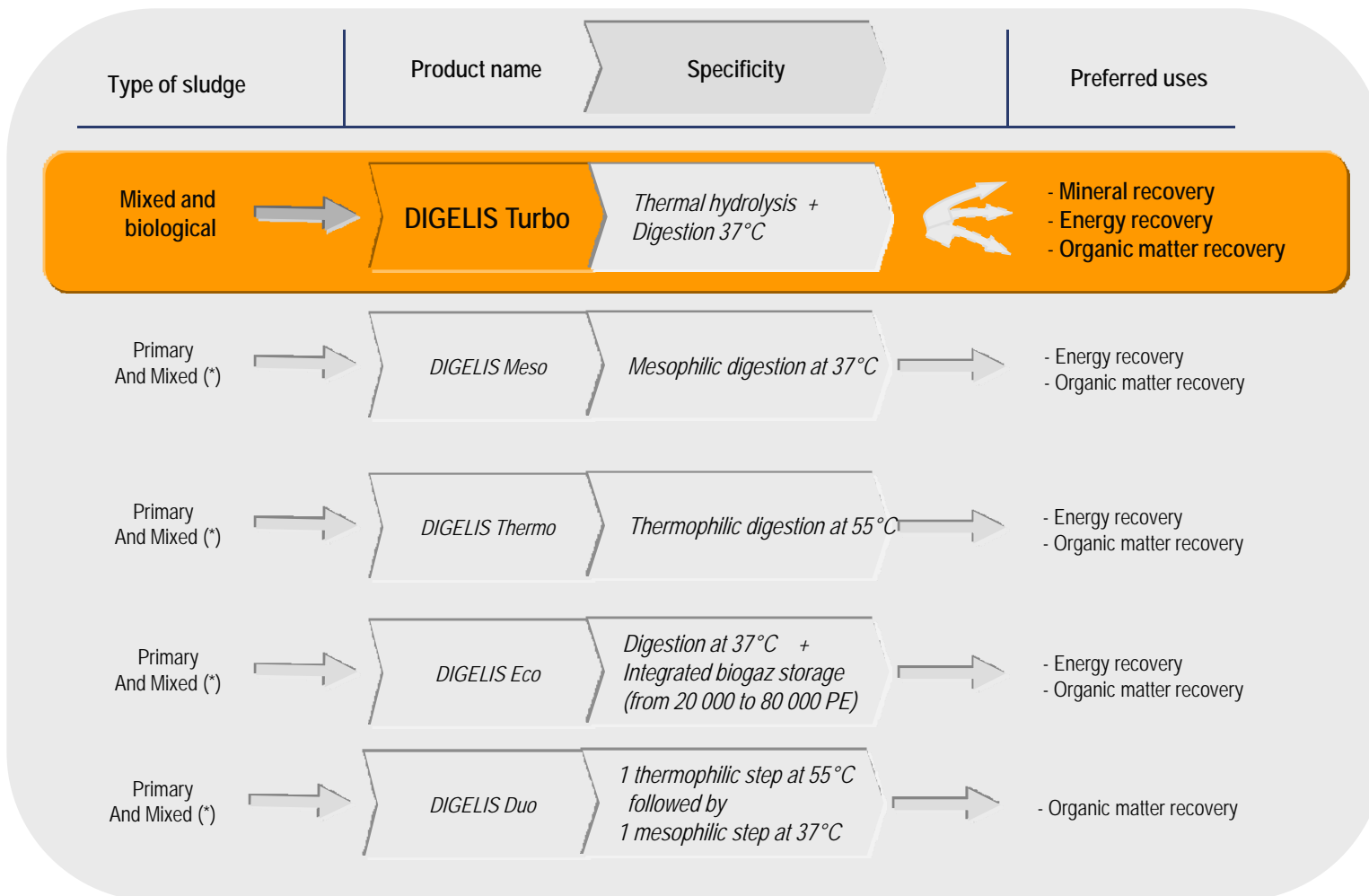
13 years of experience with Cambi THP system

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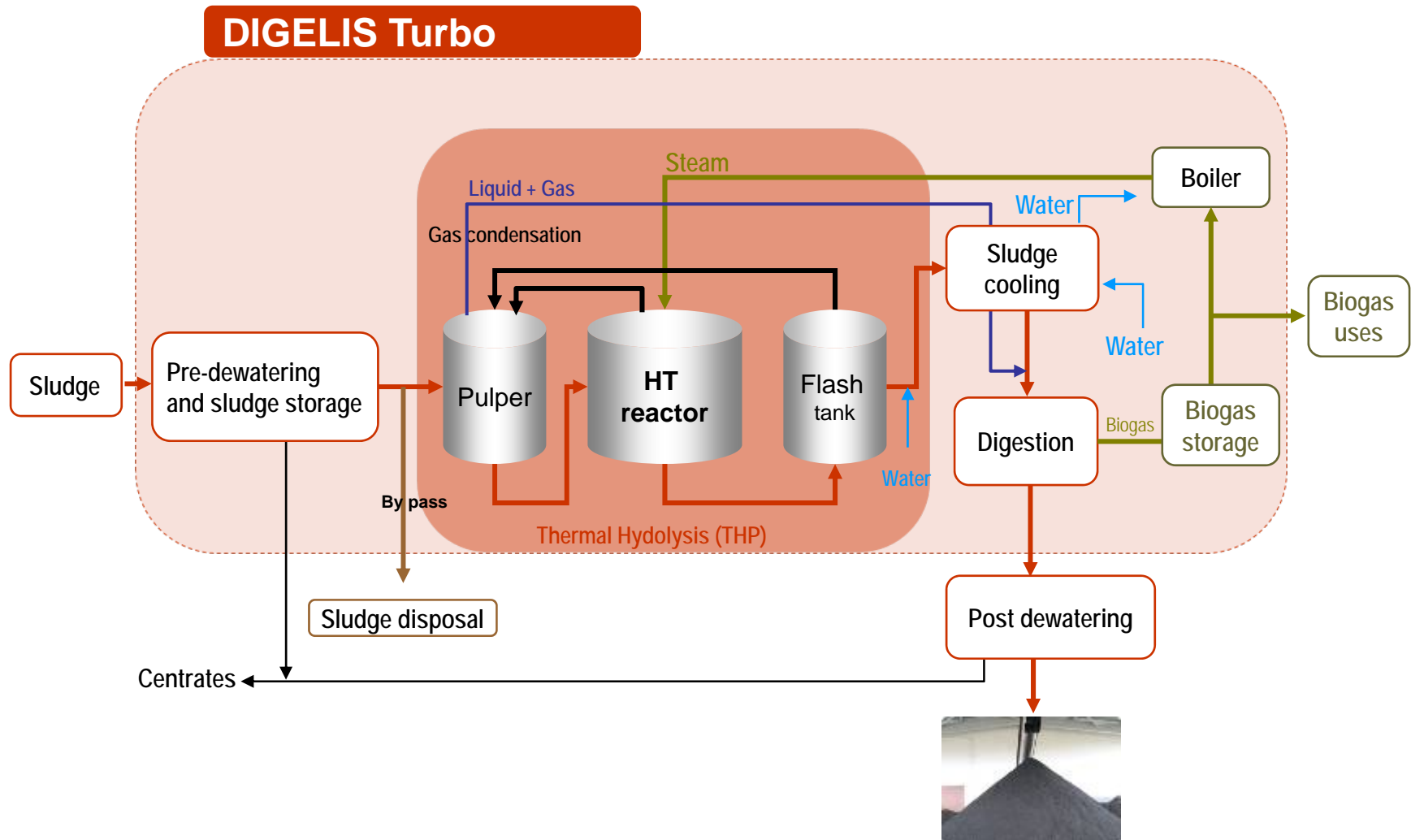
CAMBI®

DIGELIS Turbo in the Degrémont digestion line



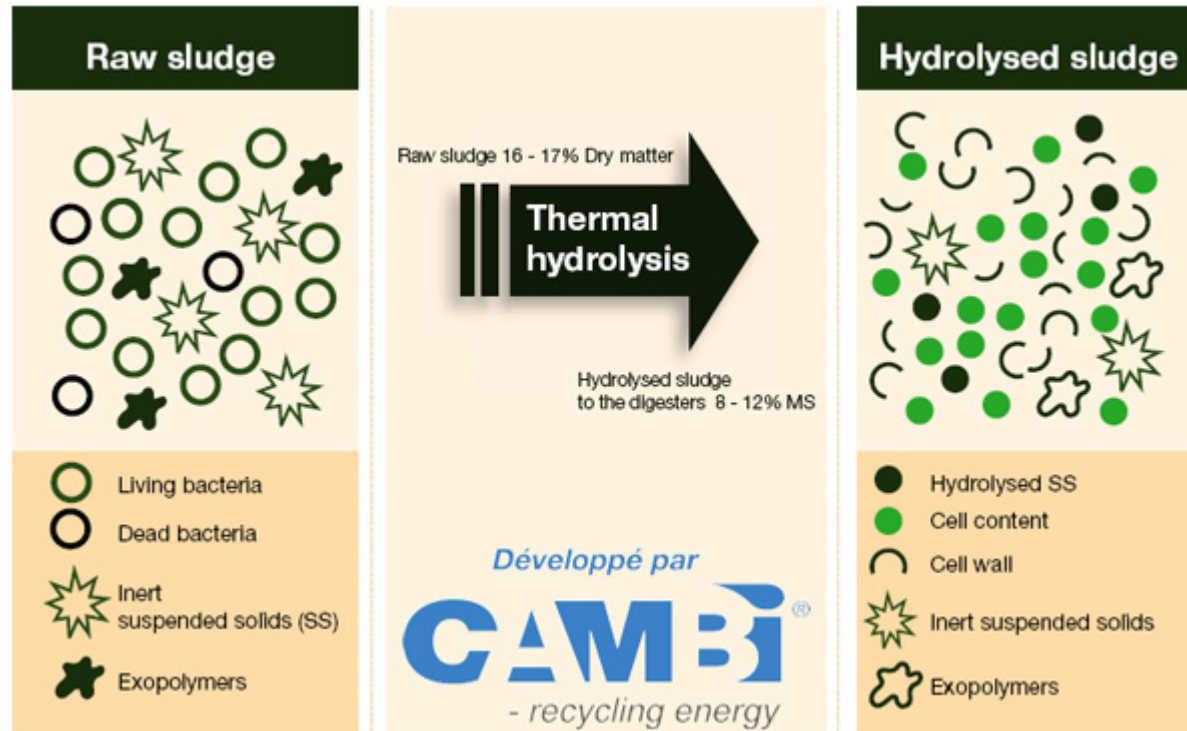
(*) The performances with biological sludge are inferior but their treatment is possible

What is Digelis Turbo ?

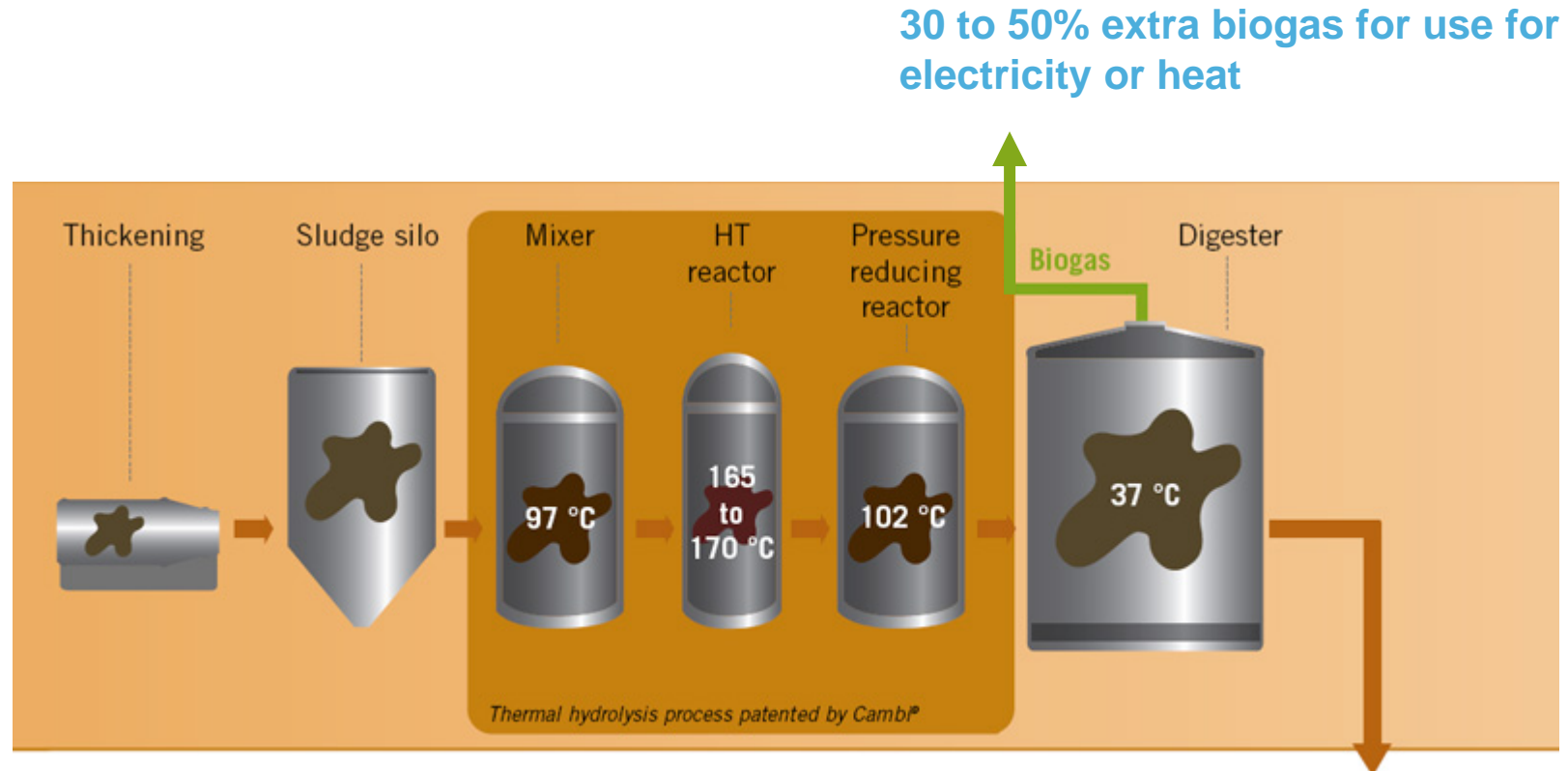


The specificity of DIGELIS Turbo: thermal hydrolysis process

- ▶ Thermal hydrolysis disintegrates the cellular structure of bacteria and solubilizes exopolymers to yield an easily digestible product



DIGELIS Turbo functional principle



Sanitized digested sludge
up to 30 to 40% TS after dewatering

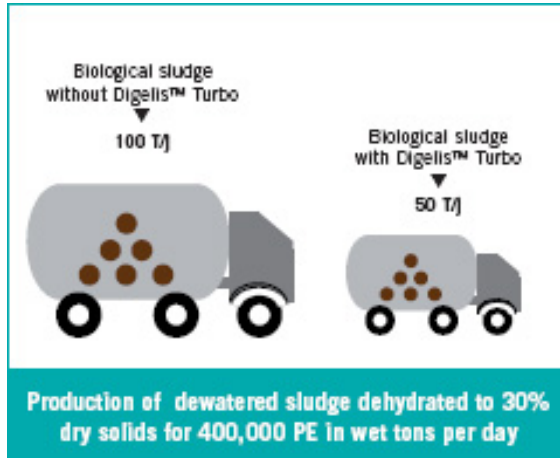
Digelis Turbo : performances

Parameters	DIGELIS Meso (37°C)	DIGELIS Turbo
Retention time	20 days	15 to 20 days
Ratio of digester volume	1	0.5
TS inlet concentration	4 – 6%	9 – 12%
VS Load	2-3 kg/m ³ /day	>5 kg/m ³ /day
pH	6.8-7.5	7.5-8
Extended aeration VS removal	30 to 35%	40 to 45 %
Mixed sludge	45 to 50%	50 to 55 %
Foaming	Possible presence of Nocardia, Microthrix	None

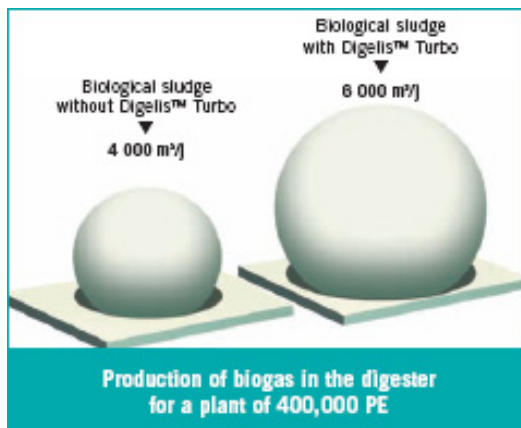
DIGELIS Turbo's main advantages

► The DIGELIS Turbo process:

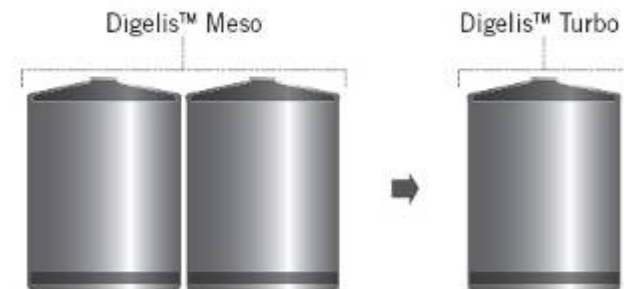
- Reduces the cost of sludge removal



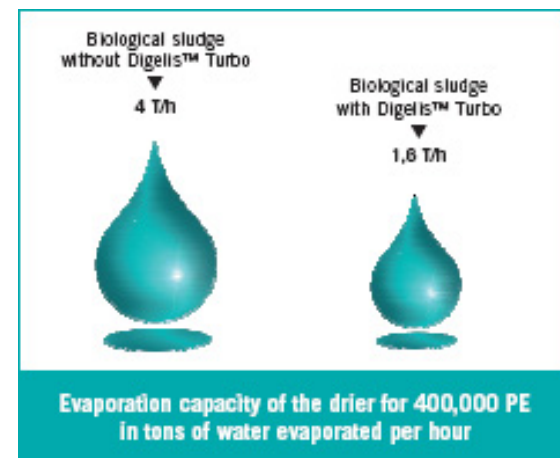
- Increases the production of usable biogas



- Doubles the capacity of digesters



- Reduces the capacity needed for the final drying step



CAMBI, a partner with more than 10 years of experience

Customer/project	Location		Capacity (TDS/year)	TYPE	Completed
HIAS (1)	Hamar	Norway	3,600 tonnes	WWTP	1998
Thames Water (2)	Chertsey	UK	9,600 tonnes	WWTP	1999
Borregaard Industries	Sarsborg	Norway	4,000 tonnes	PAPER	2000
The Municipality of Næstved*	Næstved	Denmark	1,600 tonnes	WWTP*	2000
Nigg Bay	Aberdeen	UK	16,500 tonnes	WWTP	2001
"Mjøsanlegget", Biowaste Plant	Lillehammer	Norway	4,600 tonnes	OFMSW	2001
Ringsend Sewage Treatment Works	Dublin	Ireland	36,000 tonnes	WWTP	2002
The Municipality of Fredericia	Fredericia	Denmark	8,000 tonnes	WWTP	2002
Kobelco Eco-Solutions	Niigata	Japan	1,200 tonnes	WWTP	2002
Spolka Wodna Kapusciska	Bydgoszcz	Poland	8,000 tonnes	WWTP	2005
Thames Water	Chertsey	UK	Included in (2)	Operations	2005 - 12
HIAS, thermophilic digester	Hamar	Norway	Included in (1)	New digester	2005
Oxley Creek	Brisbane	Australia	12,900 tonnes	WWTP	2007
Bruxelles Nord	Bruxelles	Belgium	20,000 tonnes	WWTP	2007
Amperverband, Cambi THP-C*	Geiselbullach	Germany	2,000 tonnes	WWTP	2007
HIAS-Upgrade	Hamar	Norway	3,600 tonnes	WWTP	2007
Cotton Valley (Anglian Water)	Milton Keynes	UK	20,000 tonnes	WWTP	2008
Ecopro, multi-waste** plant	Verdal	Norway	8,000 tonnes	OFMSW**	2008

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Ordered Plants / Under design/construction

Whitlingham WWTW (Anglian Water)	Norwich	UK	19,000 tonnes	WWTP	2008
Bran Sands (Aker-Kværner/NWL)	Tees Valley	UK	37,000 tonnes	WWTP	2008/9
Nigg Bay, upgrade	Aberdeen	UK	4,000 tonnes	WWTP	2008
Biovakka Oy	Åbo/Turku	Finland	14,000 tonnes	WWTP	2008
Palm Jumeirah /Degremont (LOI)	Dubai	UAE	25,000 tonnes	WWTP	2009
Vilniaus Vandenyys/Vilnius Water Co.	Vilnius	Lithuania	23,000 tonnes	WWTP	2009

CAMBI Digelis Turbo : new developments /early design

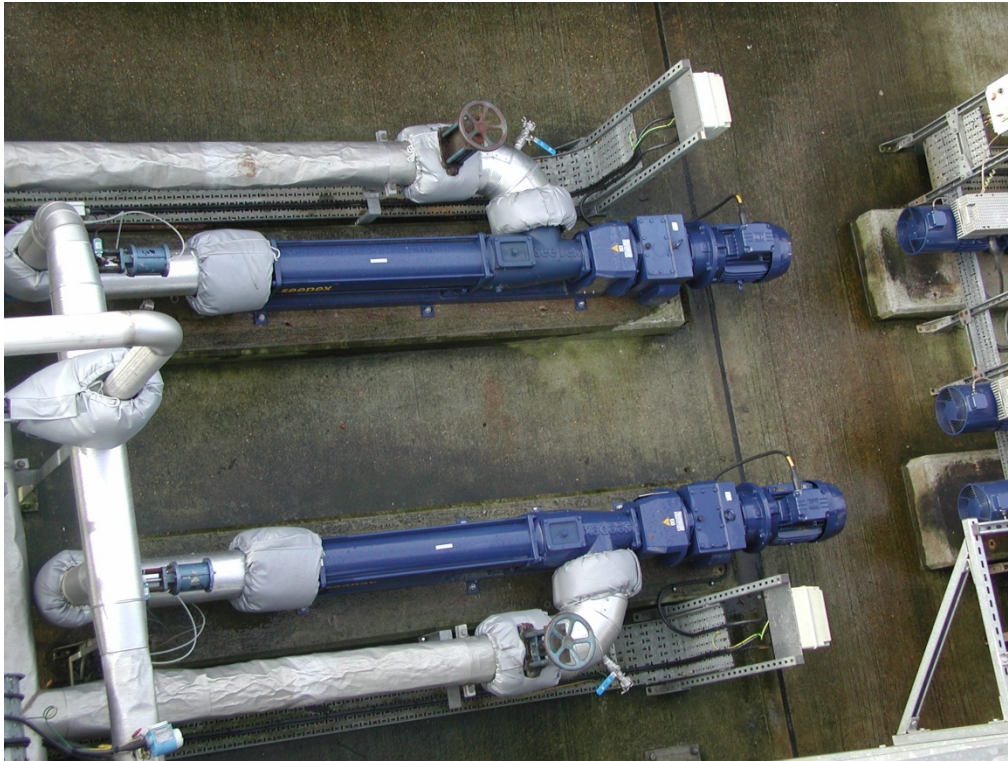
- ▶ **Over 12 years of continuous and ongoing developments since the starting of the first Cambi systems : for more reliable plants**

Main modifications of the early design :

- Handling of hot sludges : choice of material for pumps
- Odour treatment : to avoid any harmful effect
- Heat exchangers before digester : to avoid scaling
- Safety equipments to protect the vessels
- Vessel design (pulper / reactor / flash tank) to avoid abrasion or to operate at higher temperature and pressure
- Digester design and operation to treat concentrated sludge

Reliable hot sludge pumping,

Upgrade of all pumps to avoid swelling/shrinkage due to heat cycles

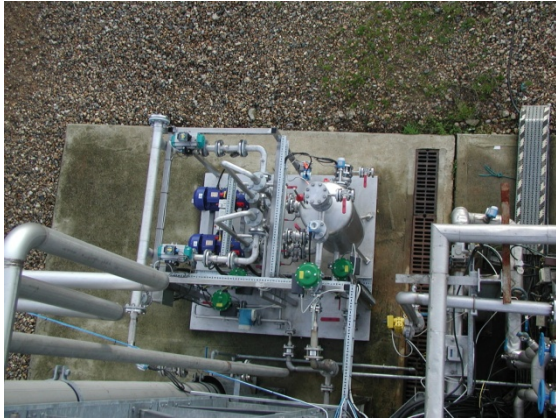


- **Slow running pumps with H5 stators**

- **Duty standby digester feed pumps**

- **Extension of the lifespan of the pumps to more than 8000 h**

Simple and reliable odour control system



**Foul gas
injection skid**



New compact skid to quench the foul gas before sending the liquid and incondensable gas back to the digester

Cambi /Digelis Turbo optimisation : heat exchangers



Installation of a digester recirculation line to main cooling unit to reduce the viscosity, to increase the pH and to maintain constant flow

Leak proof and tamper proof safety devices

All vessels are full vacuum rated : gives extra safety

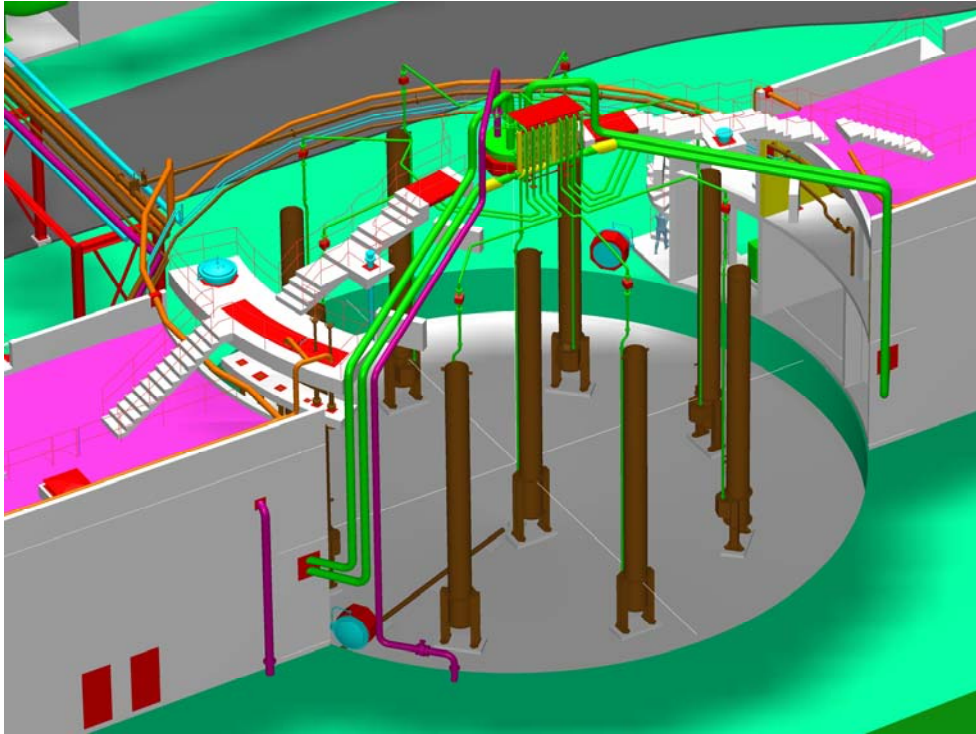


**Vacuum break valves with
bursting discs, in locked
position**



**Pressure relief valve
with bursting discs**

Digelis Turbo : digester design



Higher organic loads and concentrated sludge :

- implementation of an effective mixing system
 - Cannon mixers for large volumes
- control of ammonia concentration

Strict control of the process parameters to produce a very easily dewaterable sludge and optimize the energy balance

DIGELIS Turbo with Cambi THP system

- **An opportunity for reduction of fossil energy consumption inside the plant**
 - Enhance the production of green energy with biogas
- **An opportunity to make reliable downstream files**
 - Strong / High stabilization and sanitization of sludge
 - Solid matter reduction
- **An opportunity for optimization of the plant design**
 - Increasing of digesters capacity
 - Reduction of equipment size on the downstream technologies (thermal drying, ...)

**A symbiotic process : no optimum dewaterability
without optimum digestion and thermal pre-
treatment**