



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691911



## Technology Description (TD) for Substrate Pre-Treatment Technologies

### Contact Information:

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	<i>Date (of filling the TD):</i>	2018-01-15		

### Technology Description:

<b>NAME OF TECHNOLOGY</b>	Hyperthermophilic fermentation		
<b>ASSIGNMENT OF TECHNOLOGY</b>	Pre-treatment of substrate for AD		
<b>TECHNICAL READINESS LEVEL</b>	<p>TRL 1 - basic principles observed</p> <p>TRL 2 - technology concept formulated</p> <p>TRL 3 - experimental proof of concept</p> <p>TRL 4 - technology validated in lab</p> <p>TRL 5 - technology validated in relevant environment (industrially relevant environment in case of key enabling technologies)</p> <p>TRL 6 - technology demonstrated in relevant environment (industrially relevant environment in case of key enabling technologies)</p> <p>TRL 7 - system prototype demonstration in an operational environment</p> <p>TRL 8 - system completed and qualified</p> <p>TRL 9 - actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies, or in space)</p>		
<b>What is the core innovation? (Please explain here what is innovative on this</b>	High speed, high efficiency fermentation and hygienisation of biomass at hyperthermophilic temperature range by dedicated		

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technology and which problem does the technology solve.)		microorganisms with optimum growth at 80 °C.
<b>Vision of the innovation</b> (Please describe here what impact you see for the future)		Significantly increase profitability of fermentation in general and specifically biogas production
<b>What are the R&amp;D needs for your technology?</b> (Are there any barriers or challenges which still need to be overcome?)		Additional R&D on different substrates and substrate combinations
<b>TECHNOLOGY/EQUIPMENT AVAILABILITY</b>		
<b>PATENT RIGHTS</b>		
<b>METHOD OF MAKING THE TECHNOLOGY AVAILABLE</b>		YES
<i>Licence selling</i>		YES
<i>Licence granting</i>		YES
<b>POSSIBLE END USERS OF TECHNOLOGY</b>	<i>Please name end users/ contacts that should be invited to project workshops</i>	AD plant operators and owners

**Description of the technology/equipment:** (Pls. describe the technology. You may include pictures or graphics.)





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Pretreatment of substrate in AD process by hyperthermophilic fermentation. Pretreatment is done in a dedicated reactor as a first fermentation step before the substrate is fermented in the AD mesophilic or thermophilic main reactor.

The core of the patented technology is use of hyperthermophilic organisms that grow at an optimum of 80°C. At this temperature, the process speed is significantly higher than fermentations at mesophilic or thermophilic conditions. Due to the high process temperature, the requirements for hygienisation of type 3 biomass is met.

Key fermentation products of the pretreatment are hydrogen and VFA that significantly increase the total biogas yield of the combined process.

The technology can be scaled to any capacity.





### Technical Data:

Parameter		Value (please fill or tick) If value not available, please give estimate (and indicate with *).	Comments (e.g. which condition does the entered value correspond to?)
Current technology	Flow rate of technology at current TRL-level (Mg/h)	Any	
Data basis for following data list	1.: market ready stage of technology (based on test runs of current techn.)	1 <input checked="" type="checkbox"/> (preferably)	
	<b>Please only use 2. or 3. if 1. not at all possible.</b>		
	2.: market ready stage of technology (based on estimate)	2 <input type="checkbox"/>	
	3.: current level (TRL) of technology	3 <input type="checkbox"/>	
Technical efficiency	Increase in biogas production through pre-treatment technology (%)	20 – 100 %	
Capacity	Flow rate (range) (Mg/h)	Any	
	Possible range for upscaling	Any	
Data for assessment of economical added value, possible contribution to GHG-reduction and availability	Electricity demand (kWhel/Mg Substrate)		Dependant on application.
	Heat demand (kWh/h/Mg Substrate)		Dependant on application.
	Chemical/additives demand (kg/h)	None	
	Demand of other substances (kg/h)	None	
	Full load hours (h/a)	Full year	
	Dry matter content (range) (%)	Up to 15%	Dependant on application.



	Space requirement (m <sup>2</sup> )	Typically 25	
	Staff requirement (excluding maintenance) (h/a)	2-300h/y	Dependant on application.
	Specific capital costs (excluding project development, planning, permission and additional building costs) (€/Mg nominal capacity)	Please give exact specific cost if possible, if not please specify range. <input type="checkbox"/> < 5.000 €/Mg <input type="checkbox"/> 5.000 - 10.000 €/Mg <input type="checkbox"/> 10.000 k€ - 15.000 €/Mg <input type="checkbox"/> > 15.000 €/Mg	Dependant on application.
	Maintenance costs (including spare parts, staff) (€/a or €/operating hour )		Dependant on application.
	Production costs (€/Mg)		Dependant on application.
	Expected lifetime of unit (years)	20	
	Types of substrate (solid and liquid)	Liquid	
	Start-stop-flexibility	Yes	
	Part-load possibility	<input checked="" type="checkbox"/> Yes, ...% of full capacity <input type="checkbox"/> No	
Flexibility	Is self-maintenance of technology possible?	<input checked="" type="checkbox"/> Yes, 100 % of total maintenance hours per year that can be done by operator himself <input type="checkbox"/> No	
	Necessity for adaptations of other parts of the plant	<input type="checkbox"/> No	Dependant on application.



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	Advantages/disadvantages of technology	Hygienisation and increased yield	The technology represent a general fermentation technology that can be applied in a wide range of areas.
	Special application area of technology		

**Data Usage:**

I agree that the above data can be published on the "Biomethane Map" [www.biomethane-map.eu](http://www.biomethane-map.eu) and to the further use for other possible scientific purposes.

Signature: