



Technology Description (TD) for Anaerobic Digestion Technologies

Contact Information:

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<i>Date (of filling the TD):</i>	13.09.2017 (Update)			

Technology Description:

NAME OF TECHNOLOGY	Sludge co-digestion
ASSIGNMENT OF TECHNOLOGY	Enhanced biogas production at municipal WWTP
TECHNICAL READINESS LEVEL	<p>1 2 3 4 5 6 7 8 9</p>
<p>TRL 1 - basic principles observed TRL 2 - technology concept formulated TRL 3 - experimental proof of concept TRL 4 - technology validated in lab TRL 5 - technology validated in relevant environment (industrially relevant environment in case of key enabling technologies) TRL 6 - technology demonstrated in relevant environment (industrially relevant environment in case of key enabling technologies) TRL 7 - system prototype demonstration in an operational environment TRL 8 - system completed and qualified TRL 9 - actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)</p>	
What is the core innovation? (Please explain here what is innovative on this	Combination of substrates allows for greater amounts of biogas



technology and which problem does the technology solve.)		
Vision of the innovation (Please describe here what impact you see for the future)		Give possibility of energetic use of waste
What are the R&D needs for your technology? (Are there any barriers or challenges which still need to be overcome?)		It need to be tested in semi and full technical scale
TECHNOLOGY/EQUIPMENT AVAILABILITY		
PATENT RIGHTS		YES /NO IP of Aquanet S.A., Poland
METHOD OF MAKING THE TECHNOLOGY AVAILABLE	<i>Licence selling</i>	YES /NO
	<i>Licence granting</i>	YES /NO
POSSIBLE END USERS OF TECHNOLOGY	<i>Please name end users/ contacts that should be invited to project workshops</i>	Municipal wastewater treatment facilities

Description of the technology/equipment:

The aim of the technology was a full utilization of the capacity of full-scale digesters at the municipal WWTP by the addition of poultry industry waste and co-digest them with primary and waste activated sludge. The procedure included description of short laboratory trials which could be used to prepare full-scale trials. The detailed description can be found in: Budyh-Gorzna M., Smoczynski M., Oleskowicz-Popiel P.: Enhancement of biogas production at the municipal wastewater treatment plant by co-digestion with poultry industry waste. Applied Energy 2016, 161:387-394.



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?)
<i>Current technology</i>	Biogas production rate of technology at current TRL-level (Nm ³ /h)	998	depending on the size of the installation
<i>Data basis for following data list</i>	1.: market ready stage of technology (based on test runs of current techn.) Please only use 2. or 3. if 1. not at all possible. 2.: market ready stage of technology (based on estimate) 3.: current level (TRL) of technology	1 <input type="checkbox"/> (preferably) 2 <input type="checkbox"/> 3 <input checked="" type="checkbox"/>	
<i>Technical efficiency</i>	Methane content in biogas (%)	65%	
<i>Capacity</i>	Flow rate and type per substrate (Mg/h)	60 t/d (poultry waste) ca. 1300 m ³ /d (sludge)	
	Biogas production rate (range) (Nm ³ /h)	998	
	Possible range for upscaling	Full scale operational in limited period of time	
<i>Data for assessment of economical added value, possible contribution</i>	Fermenter and biogas process technology (e.g. continuously stirred reactor, plug flow digester, box or garage type)	CSTR	
	Electricity demand (kWhel/Nm ³ biogas)	N/A	
	Heat demand (kWhth/Nm ³ biogas)	N/A	



to GHG-reduction and availability	Chemical/additives demand (kg/h or kg/Nm ³ biogas)	-	
	Demand of other substances (kg/h or kg/Nm ³ biogas)	-	
	Temperature in fermenter (°C)	35	
	Pressure of biogas at exit of fermenter (bar _{abs})	N/A	
	m ³ fermenter volume used	Full scale 6 x 4900	
	Full load hours (h/a)		
	Hydraulic retention time (days)	23	
	Max. dry matter content (%)	4%	
	Organic loading rate (kg VS/m ³ d)	1.66	
	Space requirement (m ²)	N/A	
	Staff requirement (excluding maintenance) (h/a)	N/A	
	Specific capital costs (excluding project development, planning, permission and additional building costs) (€/Nm ³ /h)	<p>Please give exact specific cost if possible, if not please specify range.</p> <p><input checked="" type="checkbox"/> < 5.000 €/Nm³/h</p> <p><input type="checkbox"/> 5.000 - 10.000 €/Nm³/h</p> <p><input type="checkbox"/> 10.000 € - 15.000 €/Nm³/h</p> <p><input type="checkbox"/> > 15.000 €/Nm³/h</p> <p>N/A</p>	
	Maintenance costs (including spare parts, staff) (€/a or €/operating hour)	N/A	



	Production costs (€/Nm ³ biogas)	N/A	
	Expected lifetime of unit (years)	N/A	
<i>Flexibility</i>	Types of substrate (solid and liquid)	Liquid	
	Start-stop-flexibility		
	Part-load possibility	<input checked="" type="checkbox"/> Yes, 1% of full capacity <input type="checkbox"/> No	depending on the size of the installation
	Is self-maintenance of technology possible?	<input checked="" type="checkbox"/> Yes 1% of total maintenance hours per year that can be done by operator himself <input type="checkbox"/> No	depending on the size of the installation
	Necessity for adaptations of other parts of the plant	no	No necessity for adaptations of other parts of the plant
	Advantages/disadvantages of technology	Advantages: Easy to scale up/ Disadvantages: Possibility of use with selected substrates	
	Special application area of technology	yes	