WATERWORKS 2017 RDI FUNDED PROJECTS BOOKLET

Title of the project: Sustainable technology for the staged recovery of an water from of high moisture fermentation products

Acronym: RECOWATDIG

Outcomes and expected impact:

- Containerised (transportable) system for the purification of the water from digestate, utilizing drying and condensation, that will allow quick and efficient deployment and integration with an existing infrastructure, thus achieving CAPEX at a competitive level, by reducing the required assembly time.
- Modular technology designed as a PnP solution, allowing straightforward integration with an existing infrastructure of the plant, with a possibility of further integration of modules, achieving their commercial readiness (HTC).
- Cost efficient purification of water, which will involve optimization of OPEX by utilization of membranes requiring lower pressure (in comparison with state-of-the-art solutions) and utilization of a part of the hydrochar stream and magnetic hydrochar for filter columns.
- The unique solution to make the hydrochar as magnetic biochar for waste water application, with a high potential for patentability, will be developed by KTH basing on KTH's exiting knowledge and facilities.
- Zero waste and zero liquid discharge technology, thanks to recirculation of the reject liquid back to the anaerobic digestion and turning solids into a sellable product (soil amendment, magnetic hydrochar - sorbent).

List of deliverables expected:

D2.1Physico-chemical properties of liquid fraction from HTC of the digestate
D2.2Multistage purification of liquid fraction from HTC of the digestate: optimal configuration and parameters of MF, UF, NF and FO membranes
D2.3 Multistage purification the post-condensation water after drying of the solid digestate fraction: optimal configuration and parameters of NF membranes.
D2.4The use of advanced carbon materials (hydrochars, magnetic hydrochars, nanotubes) for purification of water recovered from the digestate
D3.1Optimization of HTC process for maximum dewatering of the hydrochars produced from the digestate
D4.1Drying and vapour condensation: comparison of results for two variants of dryer and optimization of drying of hydrothermally carbonized digestate for maximum water recovery from condensation.
D5.1Physical, structural and chemical properties of HTC treated and dried hydrochars
D5.2Physical, structural and chemical properties of magnetic hydrochars
D6.1The use of post-HTC reject liquid reject and hydrochar in the anaerobic digestion

D6.2Hydrothermally treated digestate as a fuel for pyrolysis, gasification and combustion D6.3Optimized production of the magnetic hydrochars. D7.1Detailed mass, energy and exergy balance of the installation for water recovery from hydrothermally treated digestate D7.2Techno-economic, environmental and sustainability assessment of the installation for water recovery from hydrothermally treated digestate D8.1Technical design of the containerised installation for water recovery from hydrothermally treated digestate: retrofitting possibilities and economic feasibility (internal report – not for publication due to possible IP restrictions) D8.2Retrofitting possibilities and economic feasibility of the installation for water recovery from hydrothermally treated digestate (executive summary of D8.1, without information that cannot be disclosed - publishable) D9.1 Dissemination activities report

Expected research results to communicate and disseminate (in very general terms)	**Target groups for communication and dissemination activities:**
1. Conference publications	Conference participants: scientists, engineers, business representatives, decision makers, NGOs
2. Open Access publications in Scientific Journals	Scientists, engineers, business representatives, decision makers, NGOs, activists and interested citizens. *note: Open Access enables free and uninterrupted access to the article*
3. Publications in Scientific Journals	Scientists, engineers, business representatives, decision makers, NGOs, activists and interested citizens. *note: Articles in subscription based scientific journals typically have embargo period of 12 months. During this time articles are behind a paywall and are freely available only for members of institutions that paid for subscription. After the embargo period articles can be made available by putting in a repository (see point 4 and 5).*
4. Research Gate	Research gate is a social media for Scientists that also can serve as a repository after the embargo period.
5. Repositories	Repositories enable dissemination after the embargo period. Repositories such as Figshare and Research Gate will be used.

6. Social media	Business, professionals working in the field, NGOs, activists and general public.
Experiments / Case studies (if any): location, type of experiments:	The Netherlands: Experiments on hydrothermal carbonization of digestate, its dewatering and energy properties (potential use as fast pyrolysis feedstock). Poland: Experiments on the composition of HTC effluent, after hydrothermal carbonization, as well as its subsequent purification using ultra, micro and nano-filtration membranes as well as other novel purification techniques. Determination of chemical, structural, physical and energetic properties of hydrochars. Sweden: Experiments on magnetization and pyrolysis of hydrochars.
Water Policy context / project contribution to policies (National, European, International – UN SDGs):	International