

Turning agricultural anaerobic digesters into multiproduct biorefineries

More than 18,000 anaerobic digestion (AD) plants are currently operating in the EU. As the incentive schemes for power generation come to an end in several European countries, the exploitation of anaerobic digesters needs to be reconsidered. Eighty per cent of digesters are rural; turning crop residues and manures into energy and fertilisers. These agricultural digesters have the potential to be reconfigured into sustainable multi-feedstock and multi-purpose biorefineries that can transform agro-waste into valuable bio-based products.

Project activity

The AgriLoop project has designed and tested a complete, AD-based biorefinery at pilot scale where agro-wastes are transformed into bioproducts in a real farm environment. The platform is comprised of the following main areas:

- agro-waste pre-treatment and preparation
- acidogenic fermentation
- mixed microbial biomass selection and natural polyesters (PHA) storage
- PHA extraction and purification
- anaerobic digestion of the solid part of the fermentation effluent
- recovery of nutrients
- microbial protein production.

When 1m³ of slurry at 20% dry matter was treated every day, up to 2 m³ of hydrogen and 18 m³ of methane could be produced. Forty kg of volatile fatty acids (VFA) and up to 8 kg of PHA could also be extracted, as well as 0.6 kg and 0.05 kg of N and P.

Key findings and recommendations

There is an urgent need for reconfiguring agricultural anaerobic digesters into biorefineries that convert agro-waste into valuable bio-based products.

This study has demonstrated a pilot-scale biorefinery using agri food wastes to produce mainly; biofuels (methane and hydrogen), volatile fatty acids (VFAs), PHAs and microbial mass proteins. However, the process is highly flexible, allowing the operator to opt for different bioproduct outputs.

The practical set up of this platform will be further studied and its applicability analysed. Environmental, social and economic benefits will also be assessed.



References

Toward the Transition of Agricultural Anaerobic Digesters into Multiproduct Biorefineries. David Bolzonella, Davide Bertasini, Riccardo Lo Coco, Miriam Menini, Fabio Rizzioli, Anna Zuliani, Federico Battista, Nicola Frison, Aleksandra Jelic and Giovanna Pesante.
<https://www.mdpi.com/2227-9717/11/2/415>

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For more information about the AgriLoop Project, visit:

agriloop-project.eu



Funded by
the European Union



中华人民共和国科学技术部
Ministry of Science and Technology of the People's Republic of China



UK Research
and Innovation

Project funded by



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
State Secretariat for Education,
Research and Innovation SERI

This project has received funding from the European Union's Horizon Europe research and innovation programme under the grant agreement No. 101081776, the UK Research and Innovation (UKRI) fund under the UK government's Horizon Europe funding guarantee, the Swiss State Secretariat for Education, Research and Innovation (SERI) and from the National Key Research and Development Program supported by the Ministry of Science and Technology of the People's Republic of China (No. 2023YFE0104900). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of neither of the aforementioned Funding authorities. Neither the European Union, the United Kingdom, the Swiss Confederation or the People's Republic of China nor the European Commission, UKRI, SERI or NKRDPC can be held responsible for them.