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Creating value from residual streams via algae cultivation

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This summer, a new study commissioned by the European Climate, Infrastructure and Environment Executive Agency (CINEA) explored key barriers and opportunities to scaling up algae production and outlined a strategic path to unlock its environmental, social, and economic potential, particularly for Europe's coastal and rural areas. As part of the consortium conducting this study, Ghent University led the report on "Algae potential for (waste)water treatment and fertilisers/plant biostimulants production", which can be found here, together with the full study.

By conducting a desk study on current and past European projects using residual streams for algae cultivation, 4 streams were found to have the most potential for producing algae to be used as fertilising products: urban wastewaters, manure-based digestate, and effluents from horticulture and aquaculture facilities.

While it has been demonstrated that algae can grow on these effluents, the area requirements for installing an algae treatment system can be significant, as calculated in the report. For instance, aquaculture effluents are produced in high volumes, while digestate has high nutrient concentrations, which results in the need for large algae systems to effectively treat these effluents. For urban wastewater, the implementation of algae seems more feasible for small agglomerations.

Additionally, the type of effluent can influence the legal status of the resulting algal biomass. Algae grown on urban wastewaters have sewage sludge status, and their use as a fertilising product is restricted in the European market, e.g., in Flanders, this application is currently prohibited. Algae grown on the other effluents could be components of fertilising products to be commercialised in the European market within the current legal framework (Fertilising Product Regulation). Therefore, an introduction in the Belgian market should also be a possibility. However, when dealing with manure-based digestate, a special permit is required by OVAM as algae growth is not included in the current legislation regulating the processing of manure (Animal By-products Regulation).

When the intention is to grow algae for food applications, it is also possible to integrate it with effluents for increased sustainability. In this case, the use of food-grade effluents is recommended, such as the ones generated by the beer and dairy industries.

Integrating algae cultivation with recycled nutrients from effluents is a key step in making this biomass more economically attractive and sustainable to feed our growing bioeconomy.