

## DEMONSTRATING MORE EFFICIENT ENZYME PRODUCTION TO INCREASE BIOGAS YIELDS

Nowadays, the transition from an economy dependent upon fossil resources to a sustainable bio-based economy is becoming a priority for the society. One of the most promising developments in this regard is the conversion of biomass into energy sources (biofuels, biogas), making the optimization of these conversion strategies an essential step to reach such transition.

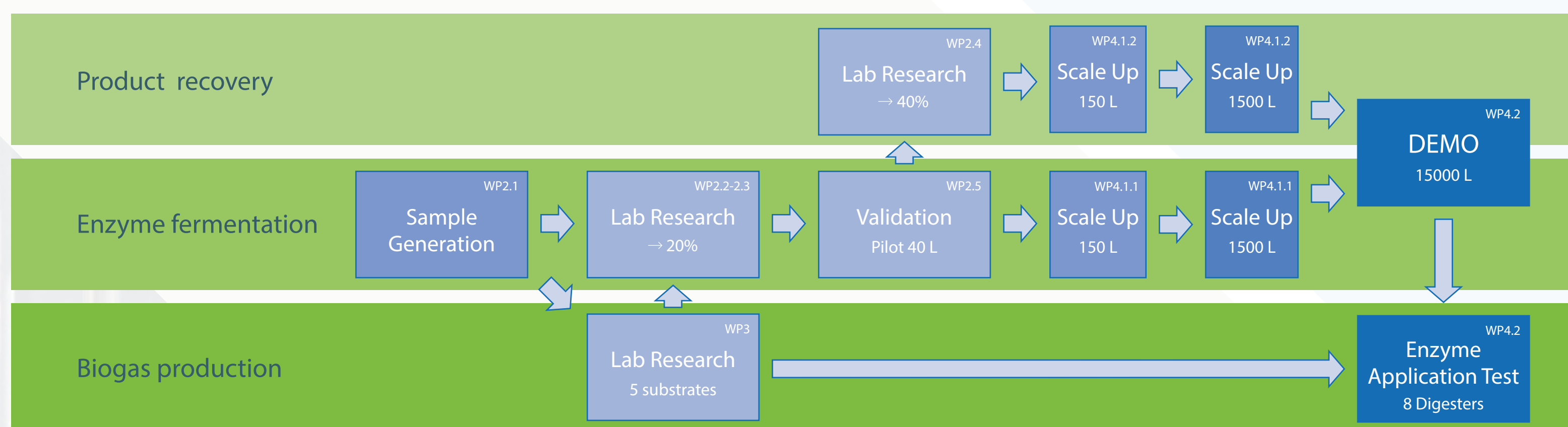
For the efficient conversion of biomass or agricultural, industrial and municipal waste into fermentable sugars, chemical building blocks or bio-based materials, enzymes play an indispensable role. However, enzymes are not being specifically developed for the biogas production so far, but enzymes efficiency is largely evaluated by trial and error. Thus far, the use of enzymes has not lived up to the expectations as little or no effects could be observed. Hence, efficient enzyme-enabled biomass conversion requires the availability of enzymes that have proven to be effective in practice and can be produced at an industrial scale.

Genencor International BV has recently developed a new enzyme product derived from the fungus *Myceliophthora thermophila* C1, that has proven to have the potential to increase biogas production by at least 10%. Although the efficacy of the enzyme has clearly been shown, the current fermentation process does not provide sufficient yield in industrial production to be cost-effective for large-scale application.

### THE DEMETER PROJECT

The DEMETER project, funded in the frame of Horizon 2020 Public-Private Partnership Bio-Based Industries Joint Undertaking (topic BBI.D7-2015) aims to optimise the fermentation process of the C1 product and demonstrate this on industrial scale.

The objective of DEMETER project is to increase the yield of this industrial fermentation process by at least 20%, improve the product recovery process by 40%, and reduce overall product cost by at least 15% while increasing the productivity of the process. In addition, DEMETER will demonstrate the efficacy of the enzyme in eight field trials in biogas plants throughout Europe. To reach these goals, DEMETER will follow a multi-scale approach. First, the enzyme productivity will be improved on lab- and small pilot-scale, while obtaining insights for further scale-up. In parallel, the effect of enzymes on biogas yield will be quantified, using five commonly used biomass substrates. The improved fermentation and downstream process will be scaled up and demonstrated in a 15 000 L pilot plant. Finally, the improvement of the biogas production process due to the use of the enzyme will be demonstrated in practice in 8 field trials. The results of these field trials will be fed back to further improve the production process and its yield.



DEMETER will bring innovation to both the fermentation process used for production of the enzyme, and to the use of enzyme-enhanced fermentation in production of biogas. The ambitious results of DEMETER will be obtained through the collaboration of 7 partners from 4 European Countries. The Consortium includes the entire value chain: enzyme producer Genencor International B.V. (part of the DuPont Industrial Biosciences Group) - the project coordinator - ; enzyme retailer MIAVIT, the pilot plant BioBase Europe Pilot Plant, anaerobic digester expert OWS, independent biogas research centre DBFZ, Ciaotech (100% PNO Innovation B.V.) for independent economic and environmental evaluation, and 2 MW biogas plant BioMoer, for field trials.

### PARTNERS

