H2020-NMBP-SPIRE-2018 CE-SPIRE-02-2018 "Processing of material feedstock using non-conventional energy sources (IA)"

PowerPlatform: Establishment of platform infrastructure for highly selective electrochemical conversions

D7.6: PowerPlatform Use Arrangements

Date : 29/12/2023

This document is the PERFORM's project (contract no. 820723) deliverable D7.10 (M60) led by TNO

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Final review and quality approval				

Document History			
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December 2023	V1	Erwin Giling	First Issue

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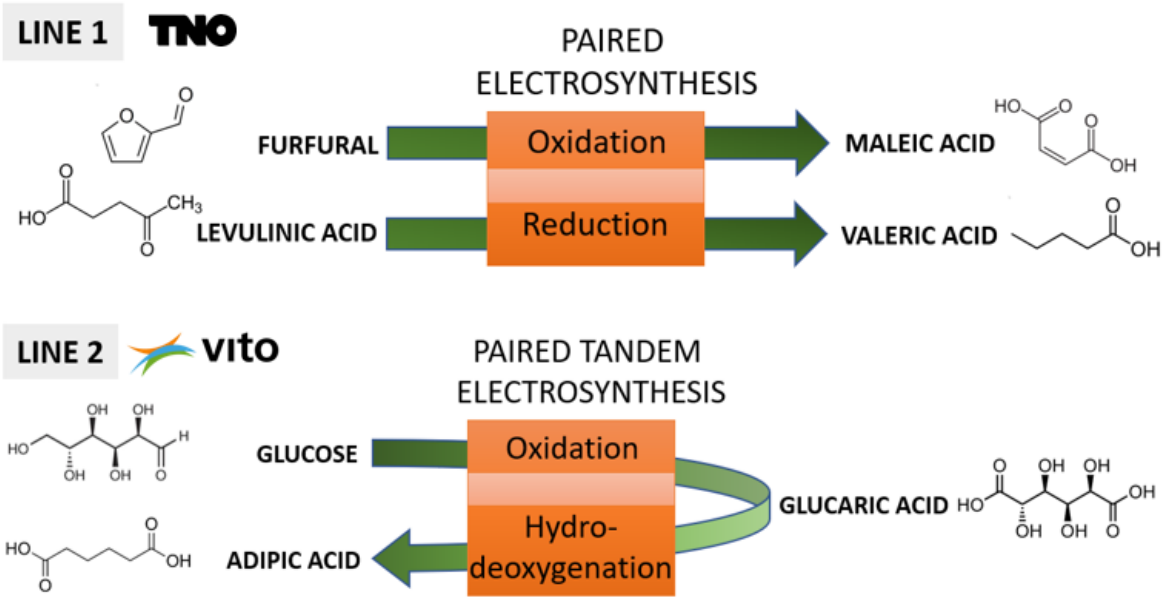
1 Introduction

The pilot equipment developed in the PERFORM project, denoted to as a whole as "PowerPlatform", consist of several processing units. The units have been designed and constructed in order to demonstrate the two biobased conversion lines researched in the PERFORM project. However the aim is to keep the equipment available after the project to the PERFORM project partners, but also to 3rd parties that want to execute research projects using the equipment; it will be "Open Access". This document describes the available units, the ownership and the arrangements that need to be made to use the units after the project.

This document is a PUBLIC document.

2 Background

The technologies that have been researched and demonstrated are the paired- and parallel electrolyses of bio-based industrial feedstocks to chemical building blocks. The project has developed new concepts for industrial electrochemical processes based on electrical energy input and scaled them up. The two demonstration cases are depicted below:



Starting from low TRL 3-4, the electrochemical process is scaled-up to TRL 5-6, by realizing a pilot installation including downstream purification and processing. The core technology is based on efficient in-situ electrochemical conversion of the feedstocks. Two showcases ("lines") are being demonstrated. The reaction products of the lines to be demonstrated in this project are the carboxylic acids: maleic acid, valeric acid, glucaric acid (product and intermediate) and adipic acid, which are representative chemical building blocks applied in performance products like coatings, resins,

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adhesives. However, the implication of successful demonstration has a far broader outreach for the selective production of chemicals from biobased feedstock in general.

3 The PowerPlatform

The equipment developed and used in the project consists of the unit operations summarized in the following table:

#	Acronym	Name	Description	Owner
1	UPS	Upstream Electrochemical Pilot System	Electrochemical pilot with stack reactor, 1m² electrode surface area (see picture below)	Hysytech
2	ED	Electrodialysis Unit	Electrodialysis unit with stack reactor for salt removal / product concentration (see picture below)	Hysytech
3	NF	Nanofiltration	Filtration unit for product separation and concentration	VITO
4	LLS	Liquid-Liquid separator	Separator equipment for liquid-liquid product separation and purification	TNO
5	CRY	Crystallizer	Product separation and purification by cooling crystallization	TNO
6	FCRY	Filter reactor crystallizer	Integrated crystallizer and filter reactor for product separation and purification	TNO
7	VDES	Vacuum distillation	Distillation equipment for product purification	TNO

The scale of the integrated process that has been demonstrated is 1kg of product per hour. All equipment has been dimensioned towards this production scale. For the UPS unit, the current stack has 10 cells of 1000 cm² electrode area, total 1 m². The maximum voltage over the stack is 60 V (in a bipolar configuration). Total max power of the unit is 12 kW. The unit is highly flexible and can run with smaller or larger stacks as desired.

For more details and specifications please contact the owners of the equipment:

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Picture - Pilot equipment in the TNO laboratories, designed by the partners in the PERFORM project and constructed by HYSYTECH. On the left the UPS electrochemical pilot with a 1m² surface area reactor. On the right: Electrodialysis unit.

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4 Use arrangements

The use arrangements for Open Access after the project depend on the owner of the equipment.

4.1 Use arrangements HYSYTECH

HYS will keep their equipment available after the project for use by 3rd parties, for the duration of at least 3 years. For the part of the equipment that has been funded by the PERFORM project, no depreciation costs will be budgeted. For the part that has been funded by HYS themselves, depreciation costs may be budgeted, in the form of rental fee.

HYS is not planning to carry out research with their equipment themselves, but will partner with a party from the PERFORM project like TNO or VITO. For any new project using their equipment, a separate more detailed use arrangement with the parties involved will be made, to be included in the project plan.

The variable costs related to keeping the equipment in its original state will be budgeted. This involves maintenance, service and repair costs. In addition, the personnel costs of the service engineers will be budgeted.

4.2 Use arrangements TNO

TNO will keep their equipment available after the project for their own internal use and for use by 3rd parties, for the duration of at least 3 years. For the part of the equipment that has been funded by the PERFORM project, no depreciation costs will be budgeted. For the part that has been funded by TNO themselves, depreciation costs may be budgeted, in the form of a rental fee.

The variable costs of running all pilot equipment will be budgeted. In particular this involves costs for electricity use, chemical feedstocks, materials that are consumed like membranes and electrodes, maintenance, service and repair costs. In addition, the personnel costs of the operators will be budgeted.

4.3 Use arrangements VITO

VITO will keep their equipment available after the project for their own internal use and for use by 3rd parties, for the duration of at least 3 years. For the part of the equipment that has been funded by the PERFORM project, no depreciation costs will be budgeted. For the part that has been funded by VITO themselves, depreciation costs may be budgeted, in the form of a rental fee.

The variable costs of running the equipment will be budgeted. In particular this involves costs for electricity use, chemical feedstocks, materials that are consumed like membranes and electrodes, maintenance, service and repair costs. In addition, the personnel costs of the operators will be budgeted.

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