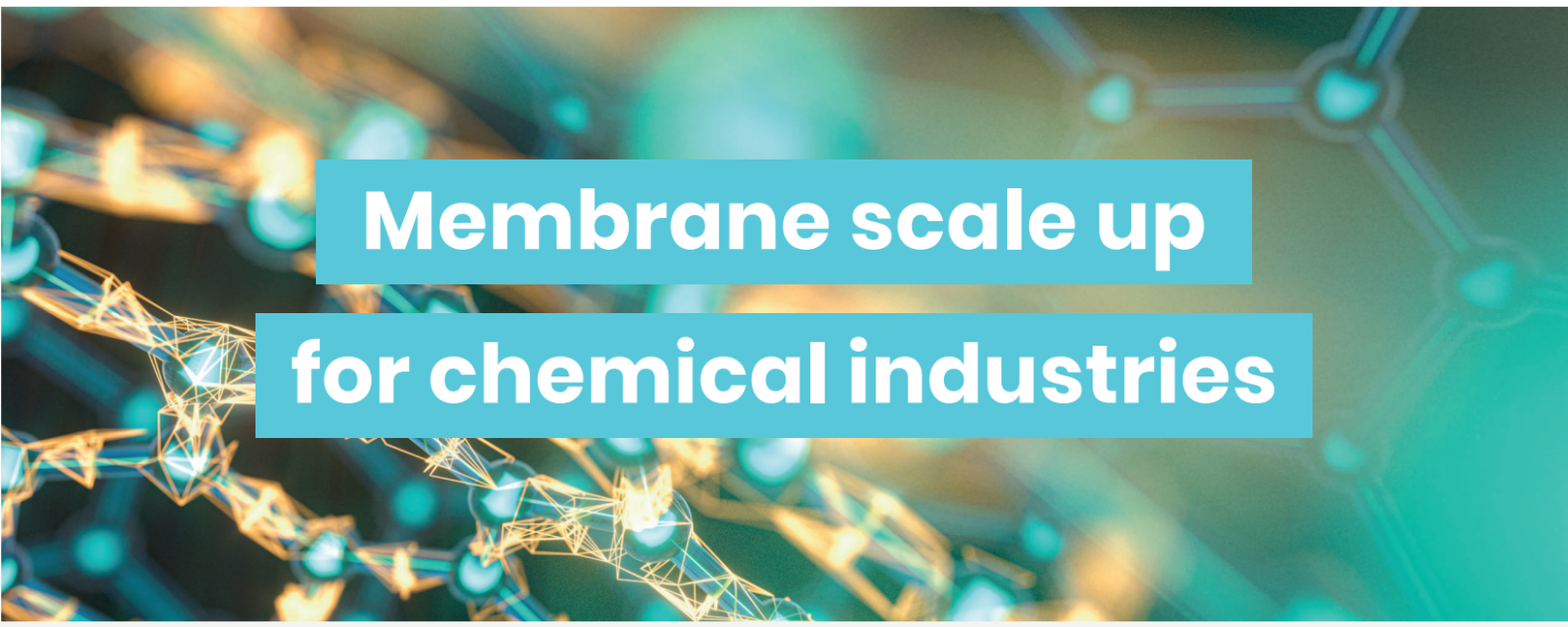
MEASURED



Membrane scale up for chemical industries

RESULTS OF THE FIRST YEAR OF PROJECT IMPLEMENTATION

The MEASURED Project is approaching its second year of implementation, and the first 12 months have seen numerous accomplishments! Delve into this newsletter to uncover the strides made by the consortium and to gain insights into the forthcoming milestones. Stay in the loop with the latest updates by following MEASURED on LinkedIn and Twitter!

EXPLOITATION & BUSINESS PLAN

After the first year of MEASURED activities within the WP 1 "Exploitation and Business plan" the market and stakeholder analysis and a preliminary business model have been carried out. Market and stakeholder analysis provided both an overview of the markets and an outlook on the main innovation trends in the field of the three MEASURED's business cases (Gas Separation, Pervaporation and Membrane Distillation). The follows outcomes have been obtained:

- Market size, potential growth, trends and segmentation where the project focuses - Gas Separation (GS), Pervaporation (PV) and Membrane Distillation (MD).
- Market drivers and barriers.
- Research, development, innovation and investing trends.
- Current EU key players in the three project's business cases.
- Target customers and their needs.
- Competing solutions.

Preliminary Business Model to laying the foundation for a succeeding go-to market strategy for each Case Study (membrane distillation (MD), gas separation (GS) and pervaporation (PV)) at the end of MEASURED project, a Data-Driven Business Model Canvas (BMC) was carried out. BMC was based on techno-economical knowledge obtained from state of art and by means of an internal evaluation in which MEASURED technological and industrial partners have been involved.

MEMBRANES DEVELOPMENT AND SCALE-UP

Development of low-cost membranes for the three lines (pervaporation, gas separation, membrane distillation) has started successfully with the synthesis and testing of first-generation membranes. Polymeric membranes for membrane distillation have been developed and tested by CNR, Unical and GVS, molecular sieve carbon membranes for gas separation by Technalia, Rauschert and Eindhoven University and HybSi membranes for pervaporation by TNO and CTI. The last 6 months the focus was on improvement of the performance of the membranes (flux and acid resistance) to deliver the 2nd generation of membranes.

ENGINEERING AND CONSTRUCTION

During the first year of MEASURED project, Engie, Orelis and CWT respectively goes through the Basic Engineering of the 3 demonstrations of the project: Gas Separation, Pervaporation and Membrane Distillation. The objective is to finalize the basic engineering study and integration study by the middle of 2024. In the Gas Separation case, the objective for Engie is to adapt an existing device for the methane upgrading from the exhaust of a CO2-methanation reactor. This reactor will integrate the innovative CSMS membranes developed during the MEASURED project. In parallel, Engie is moving towards the integration of this pilot into the R&D GAYA platform located near Lyon. At this stage, the aim is to consider the utilities needed for the pilot, the connection needed as well as safety assessments and implantation studies.

For the Pervaporation case, Orelis has fixed with Arkema the operating conditions of the pervaporation pilot: temperature, pressure, expected flowrate and the technical requirements for the adaptation of its existing pilot. Orelis undertook a list of modifications to do on the pilot with a first version of PFD and PI&D.

Many changes have been identified as:

- the change some material in order to resist to the acrylic acid and be in line with Arkema requirement (part of the piping need to be replaced in SS316L),
- the adaptation of 2 new modules to increase the capacity,
- the modification of the PLC to be connected with Arkema equipment.

The list of the modification and equipment have been finalized and the budget of the modification is in progress. Finally, for the Membrane Distillation line engineering, CWT in collaboration with GVS, investigated two options: first one including Solar thermal collectors and Solar PV and the second one including Solar PV and Heat Pump. Second option with the heat pump and Solar PV was selected. CWT worked on the basic engineering of this solution including heat and mass balance, P&ID and 3D Scheme. A quotation of the pilot is ongoing and then a cost optimization work will be undertaken to suit the budget project.

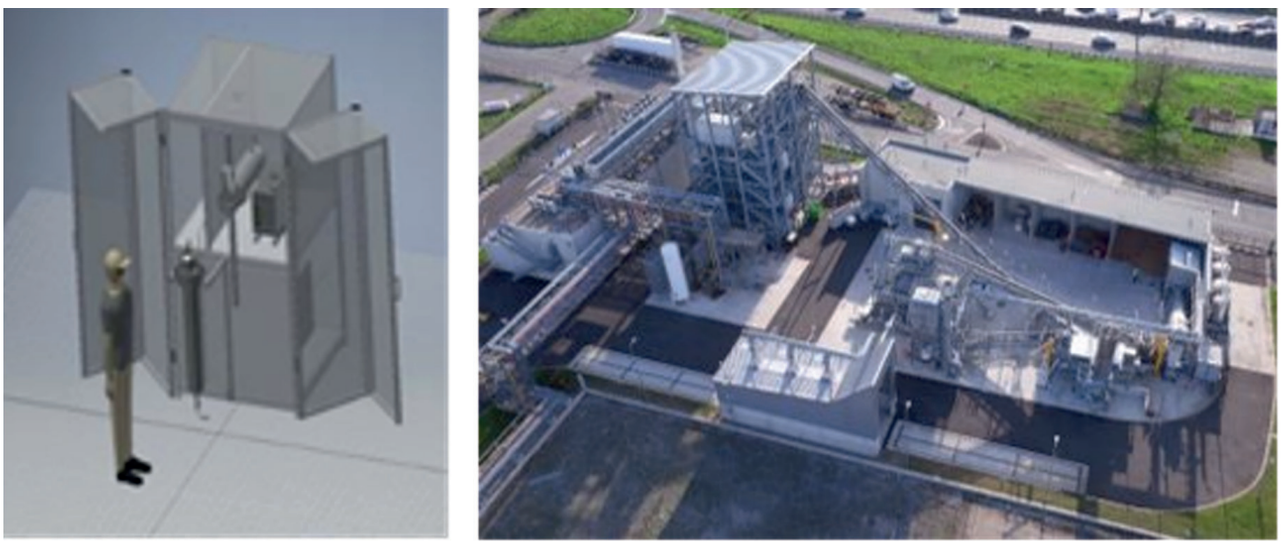


Figure 1: from left to right: Gas Separation Pilot, Gaya R&D Demonstration plant – St Fons/Lyon – France | CWT owns sole proprietorship of the above 3D graphic sketch of Membrane Distillation Line and provides an estimated outline of the pilot.

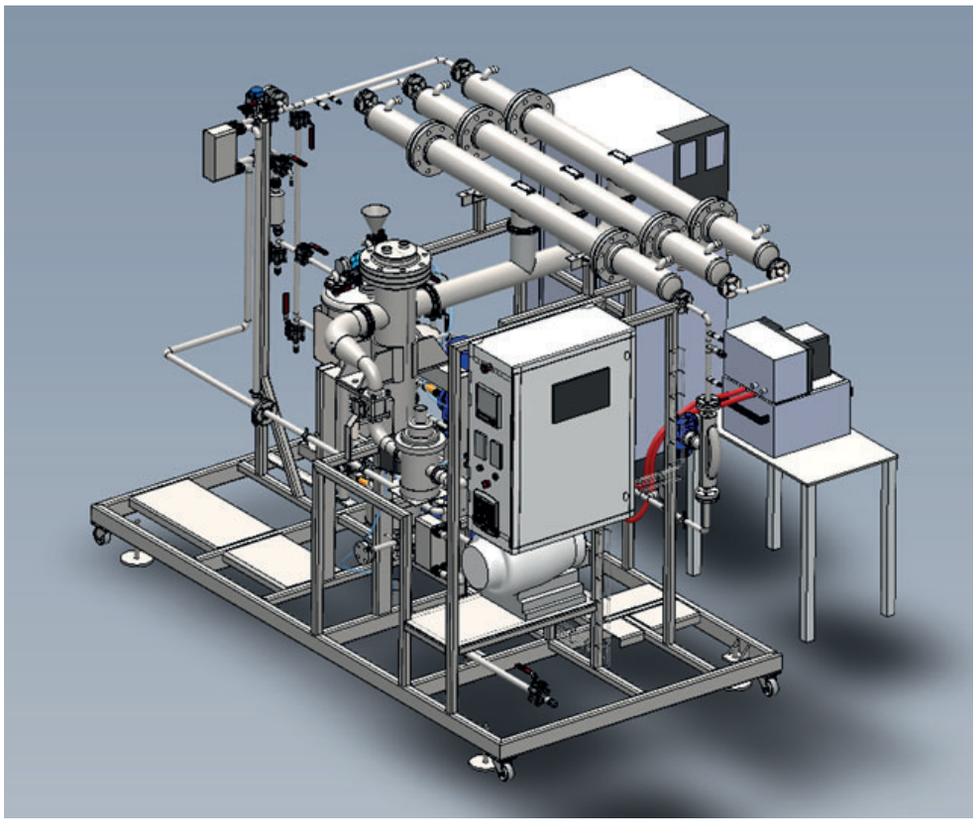


Figure 2: 3D scheme of the Pervaporation Pilot | CWT owns sole proprietorship of the above 3D graphic sketch of Membrane Distillation Line and provides an estimated outline of the pilot.

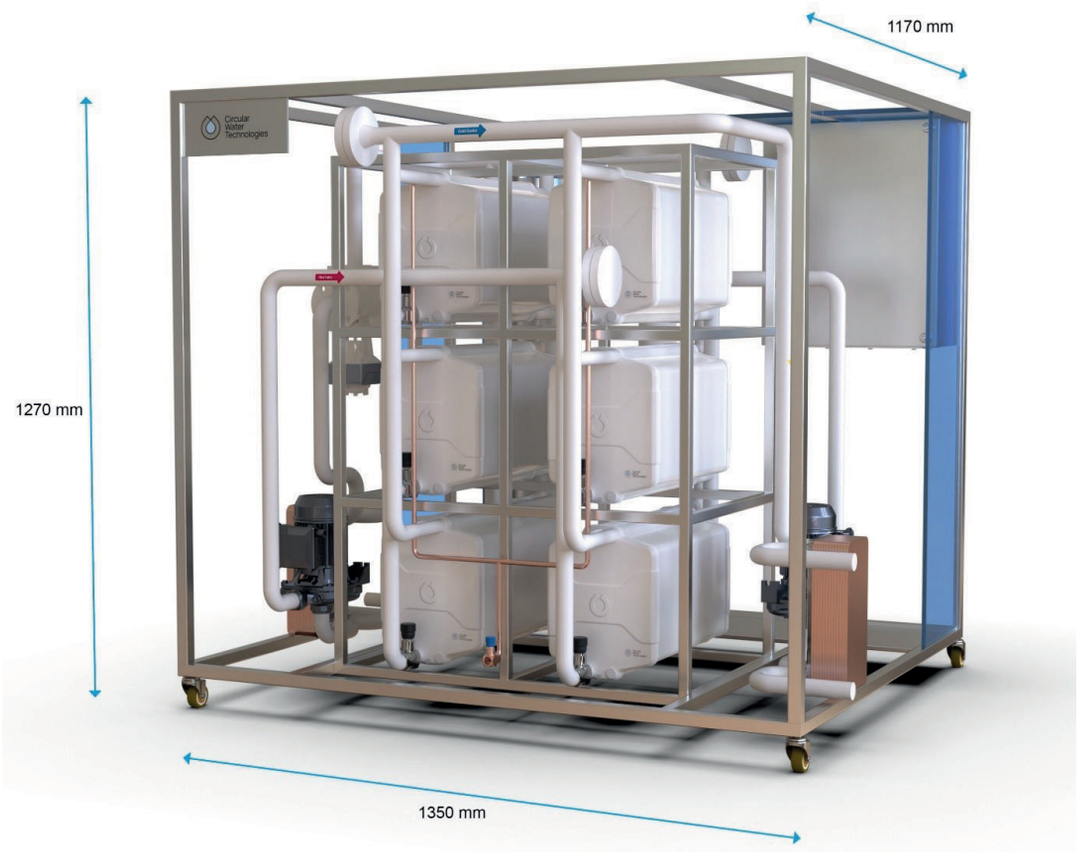


Figure 3: Scheme for the Membrane distillation | CWT owns sole proprietorship of the above 3D graphic sketch of Membrane Distillation Line and provides an estimated outline of the pilot.

TECHNOLOGY DEMONSTRATION

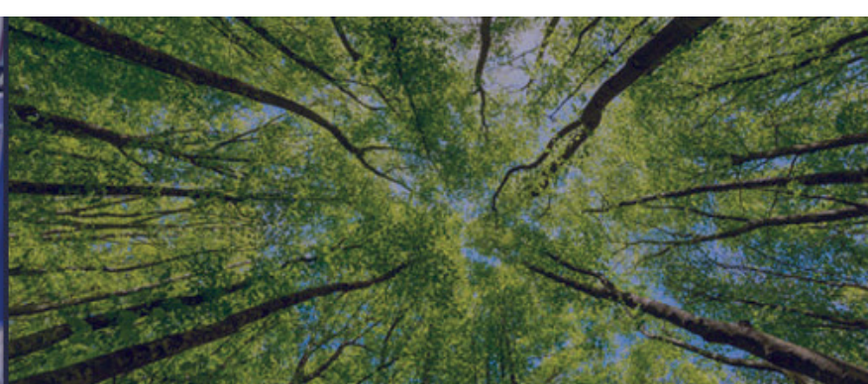
WP5 deals with the demonstration campaign and has as principal objectives, the preparation of the appropriate infrastructure at the different sites for the implementation of the demo plants, start up and run of the different demo plants for different applications in an industrial environment and finally technology evaluation in other applications. Within this WP, Gas Separation is supervised by ENGIE, Pervaporation is supervised by ARKEMA, while Membrane distillation is supervised by GVS. The main activities done in this period were to gather all the documentation about the existing location for the three companies in particular material definition, pipe size, utilities, and to support Pilot design with respect of SHE issues.

MODELLING

In modelling activity, two tasks have started, one related to the detailed modelling of the permeation process, led by the National Institute of Chemistry (NIC), and the other on LCA and harmonization, led by Eurecat. In the former, computational fluid dynamic (CFD) models are in preparation for the three lines, to model the three membrane processes. CFD will allow to understand the entity of some important phenomena, such as concentration polarization and temperature gradients. In the latter, from Eurecat, a harmonization procedure is in preparation, to maximize synergy among tecno-economic analysis, the LCA and the social acceptance of the solutions proposed in MEASURED (s-LCA).

DISSEMINATION & COMMUNICATION

WP7 – Dissemination & Communication started at the beginning of MEASURED and runs throughout the whole project, feeding from the results of previous work packages, and providing support to exploitation of project results through highly focused communication and dissemination activities. All channels, materials, and tools supporting the D&C strategy have been successfully delivered and are actively utilized to disseminate news and raise awareness about the project. Want to discover more? Take a look at the MEASURED website and video!



MEASURED SHOWCASED AT THE ICCMR16

Great success for MEASURED at the 16th edition of the International Conference on Catalysis in Membrane Reactors, an event organized by Tecnalia to promote the research and progress in catalytic membrane systems by bringing together academic scientists and industry working in the membrane, catalysis and process engineering fields.

On October 18th, 2023, the ICCMR16 conference program featured presentations from the MEASURED Project consortium within the session "#European #research #project 2":

- **Membrane Scale-up for chemical industries**, Luca Di Felice, Eindhoven University of Technology;
- **Membrane Scale-Up for Gas Separation**, Mathilde Jégoux, ENGIE Lab CRIGEN;
- **Polishing CH4 from a mixture product of the methanation of CO2**, Margot Anabell Llosa Tanco, TECNALIA Research & Innovation.

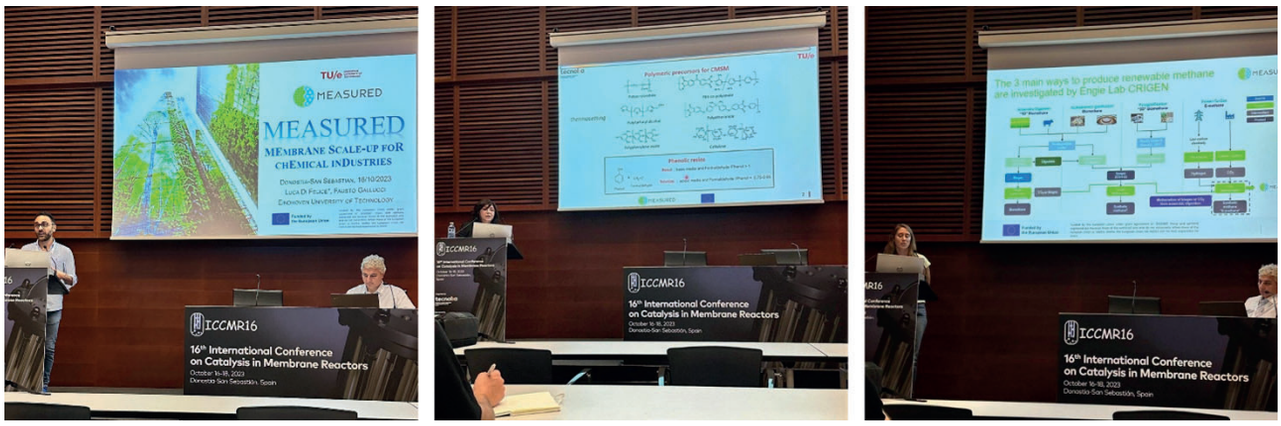


Figure 4: from left to right, Luca Di Felice (TU/e), Margot Anabell Llosa Tanco (TECNALIA), Mathilde Jégoux, (ENGIE)

We had the chance to showcase our project and to present how MEASURED will developing and demonstrating advanced membrane materials.

PARTNERS

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