

Membrane scale up for chemical industries

PROJECT PROGRESS AND KEY ACHIEVEMENTS



So far, we have observed that the project partners have been working in harmony, with all partners sharing responsibilities and collaborating under the leadership of the respective WP leaders to ensure high-quality outcomes. At this stage, all partners are diligently fulfilling their roles across the various work packages, ensuring alignment with the original project proposal. Activities, processes, and deliverables within the MEASURED project are fully in compliance with the Grant Agreement, including all associated annexes. Project processes and activities have been closely monitored to effectively reach the targeted outcomes, with quality being evaluated from both an outcome and process perspective.

The Market and Stakeholder Analysis has been completed, and 11 project KERs across the three business cases (gas separation, pervaporation, and membrane distillation) have been defined and analyzed. The preliminary exploitation routes for these KERs were defined through contributions from the project's partners via individual and group workshops. The first report on the MEASURED Exploitation and Business Strategy, which provides an overview of the current IPR status, ongoing protection measures, and potential challenges, has been completed.

Additionally, the project reached its first milestone: the creation of a business plan for a spin-off company by TUE-TEC, which was agreed upon with ENGIE and other consortium partners. Not only is the business plan finalized, but the spin-off company, named **X-MEM**, has also been established.

During the project's progress, the second milestone was achieved, identifying the best-performing membranes in terms of KPIs for the three business cases. The selected PVDF membrane will be used in the pilot for industrial wastewater treatment (GVS) rinsing water) through membrane distillation. These MD PVDF membranes will enable the recovery of purified water with more than 25% reduction in the water footprint. The selected HybSi membrane will be scaled up for use in the pervaporation unit demonstration for dehydration of Arkema's esterification reaction mixture. This pervaporation membrane will replace distillation equipment, leading to at least 20% energy savings and improved final product quality (reduced catalyst loss and minimized byproducts). For the gas separation business case, advanced composite boehmite carbon molecular sieve membranes (AI-CMSM) have been selected for methane purification in ENGIE's existing GAYA R&D methanation platform. Compared to commercial polymeric membranes, Al-CMSM membranes offer lower footprint and higher efficiency. All required documents for the basic design package of the novel pilot units, including Process Flow Diagrams (PFD), Heat and Material Balances, and Piping and Instrumentation Diagrams (P&ID), have been prepared.

To optimize operational conditions during the demonstration, a digital twin model is being developed for the three demonstration lines. Based on the inventory of selected membranes, CFD simulations are being used to investigate polarization phenomena and refine membrane models.



PROJECT COORDINATOR

Prof. Dr. Eng. Fausto Gallucci

Professor Inorganic Membranes and Membrane Reactors | Sustainable Process Engineering (SPE) Department Chemical Engineering & Chemistry Eindhoven University of Technology

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