

Membrane technologies driving industrial sustainability

Strategic insights from the MEASURED project and the role of PNO Innovation's Strategic Innovation Service Team in advancing market readiness.

Membrane technologies are moving from the margins to the mainstream. Long valued for their efficiency in separation processes, they're now becoming central to how industries approach resource recovery, emissions reduction and system optimisation.

The EU-funded MEASURED project is part of this momentum. Focused on three promising technologies—pervaporation (PV), membrane distillation (MD) and gas separation (GS)—it brings together materials science and industrial needs. The goal is to enable membrane-based systems that are more adaptable, sustainable and commercially viable.

But technical innovation alone doesn't guarantee adoption. Bridging the gap between R&D results and real-world uptake requires strategic foresight and market alignment. That's where PNO Innovation's Strategic Innovation Service Team steps in.

Translating innovation into market potential

MEASURED is advancing three membrane solutions aimed at process-intensified, low-footprint, high-selectivity operations:

- carbon molecular sieves (CMS) for gas separation
- hybrid silica ceramic membranes for solvent recovery via pervaporation
- PVDF membranes for MD, developed with green solvents and hybrid coatings.

All three are designed with sustainability and cost efficiency in mind, targeting sectors where performance and compliance requirements are increasing, such as chemical processing, solvent recovery and gas upgrading.

These technologies don't just respond to technical needs; they address a changing regulatory and economic environment that increasingly favours circularity, emissions control and smart process integration.

A strategic approach to exploitation

PNO Innovation's Strategic Innovation Service Team leads MEASURED's exploitation, dissemination and communication work package. But the focus is not just on visibility, it's on market validation, stakeholder alignment and identifying real entry points for membrane innovation.



Our approach combined data-driven mapping with strategic analysis. We identified and profiled over 1000 stakeholders globally, spanning R&D organisations, membrane developers, system integrators, end-users and material suppliers. This effort drew from a wide base:

- 73 EU-funded R&D&I projects
- over 2500 scientific papers
- more than 1000 relevant patents
- industry reports, private investment data and interviews with leading players in the membrane ecosystem.

This intelligence was powered by Wheesbee, our in-house innovation platform, which aggregates publications, projects, patents, funding opportunities and organisational data in a unified environment. From this analysis, we mapped more than 300 active technology developers, many of them well-positioned to scale new membrane solutions.

Market dynamics and adoption patterns

Membrane systems are increasingly recognised as key enablers of sustainable production. Their versatility is part of the appeal—whether in hydrogen purification, biogas upgrading, solvent recycling or ultrapure water generation. They provide modular, compact alternatives to traditional systems, with the added advantage of energy savings and cleaner byproducts.

That said, adoption is still uneven. Technical barriers, such as fouling, investment costs and integration complexity, remain, especially in legacy industries. Familiar technologies, including pressure swing adsorption, distillation and chemical absorption, still dominate many processes.

What's changing is the context. A stronger policy push for zero-waste processes, improved separation efficiency, and digitalised manufacturing is shifting the balance. Membranes, when linked with smart controls and real-time diagnostics, fit into this next-generation industrial logic.

In short, they no longer need to compete on energy savings alone—they now offer process intelligence and system adaptability.

From trends to opportunity

Several application areas are showing strong commercial traction. Carbon capture, ammonia recovery and solvent recycling are among the sectors actively searching for membrane-based solutions that can outperform traditional methods both environmentally and economically.

The role of PNO Innovation's Strategic Innovation Service Team has been to spot where interest is turning into demand, and where MEASURED's technologies align with emerging needs. That means looking beyond R&D success to where barriers can be overcome, whether through business model innovation, value chain integration or policy shifts.

We don't just track the market—we identify market readiness and help align it with technological maturity.

Looking ahead

MEASURED is entering a crucial phase. As demonstration activities advance, the question is not whether membrane technologies work, but how they can be scaled. That's where exploitation becomes a matter of strategy, not just dissemination.

For industrial actors looking to future-proof operations, membranes are no longer an experimental option. They are a platform for building smarter, more resilient and more resource-conscious systems.

And for projects like MEASURED, the future isn't about waiting for adoption. It's about shaping it.

PNO Innovation's Strategic Innovation Service Team's final market analysis report, due in October 2025, will provide a deeper look at the stakeholders, dynamics and value chains shaping this shift. But much of the value is already in motion—through targeted engagement, ecosystem awareness and ongoing validation of real-world use cases.

About the author



Ivan Panza

An Innovation and Business Analyst and Exploitation Manager at PNO Innovation, where he supports technology-driven projects in identifying market potential and aligning innovation outputs with commercial and regulatory trends. His background spans data-driven stakeholder analysis, business modelling and strategic foresight in the field of sustainable industrial technologies.

- ✉ ivan.panza@pnoinnovation.com
- 🌐 <https://www.pnoinnovation.com>
- 🌐 <https://www.pnoinnovation.com/it/>



PROJECT SUMMARY

MEASURED aims at developing and demonstrating advanced membrane materials for pervaporation (PV), membrane distillation (MD) and gas separation (GS) technologies applied to acrylic ester production, membrane manufacturing and gas separation from a carbon capture and utilisation (CCU) stream. The MEASURED project addresses the call topic HORIZON-CL4-2022-RESILIENCE-01-14: Membranes for gas separations – membrane distillation. The MEASURED project is progressing successfully, with strong collaboration among partners and full compliance with the grant agreement. Key achievements include the completion of market and stakeholder analysis, definition of 11 key exploitable results, creation of spin-off company X-MEM and selection of high-performing membranes across three business cases, supported by digital twin development and CFD simulations for demonstration optimisation.

PROJECT PARTNERS

The interdisciplinary MEASURED consortium comprises 17 participants—two SMEs, seven industries and eight universities/research centres—which will comprehensively study the development of advanced materials, reactor design, and process configuration to identify the most sustainable options from a demonstration, techno-economic, and environmental perspective.

PROJECT CONTACTS

Prof. Dr Eng. Fausto Gallucci
Professor Inorganic Membranes and Membrane Reactors
Sustainable Process Engineering (SPE)
Department Chemical Engineering & Chemistry
Eindhoven University of Technology
✉ F.Gallucci@tue.nl
🌐 <https://www.measured-project.eu/>



FUNDING DISCLAIMER

This project has been funded by the European Union's Horizon Europe research and innovation programme – grant agreement number 101091887. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or HaDEA. Neither the European Union nor the granting authority can be held responsible for them.



PROJECT REPOSITORY

