



INNOMEM

WEBINAR FOR OITB SERVICE CATALOGUE PRESENTATION



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Inspiring
Business

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The project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement N° 862330.

WHO WE ARE



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Open Innovation Consultant| CiaoTech (PNO Group)
Strategic Innovation Services

INNOMEM activities: SEP service catalogue; Open Calls actions



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Energy, materials and transport sector

INNOMEM activities: SEP service catalogue; Open Calls actions



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INNOMEM Project Coordinator



Welcome to the webinar organised by



Our company

INNOMEM Project presentation by the Coordinator

INNOMEM Market scenario

OITB services catalogue for nano-enabled Membranes

Q&A Session

Closing remarks and wrap-ups

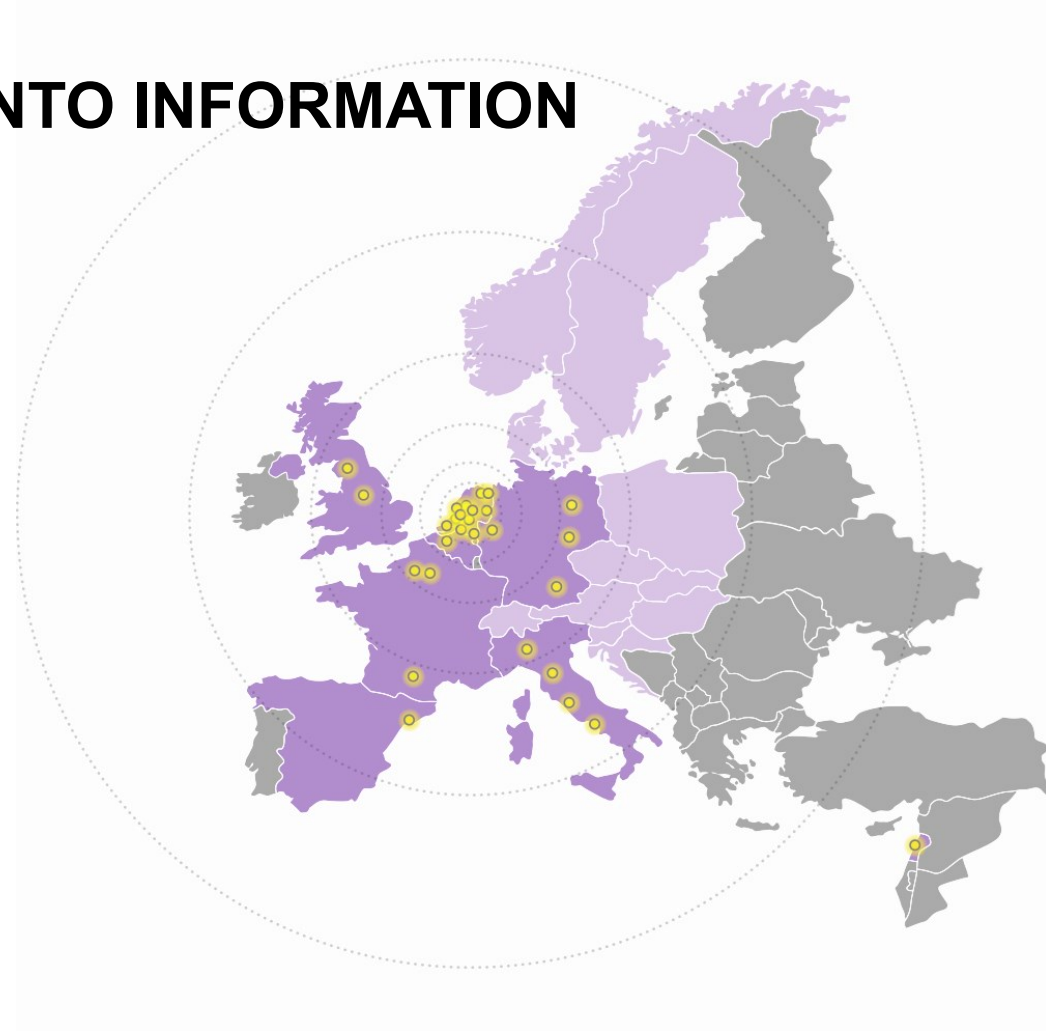


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From Grant Consultancy to Intelligence-driven Open Innovation, PNO makes Company's processes more focused, faster and funded:

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KEY FACTS



30+

Years of activity



7

Countries



400+

Open Innovation projects
per year



500,000+

Funded projects and
partners in our intelligence tool



14.000+

"qualified" Start-ups
and scale-ups



€ 1 B

Total annual
funding won

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INNOMEM Project presentation



Outline

What is an OITB?

Objectives of INNOMEM project

Overall approach & Methodology

Consortium



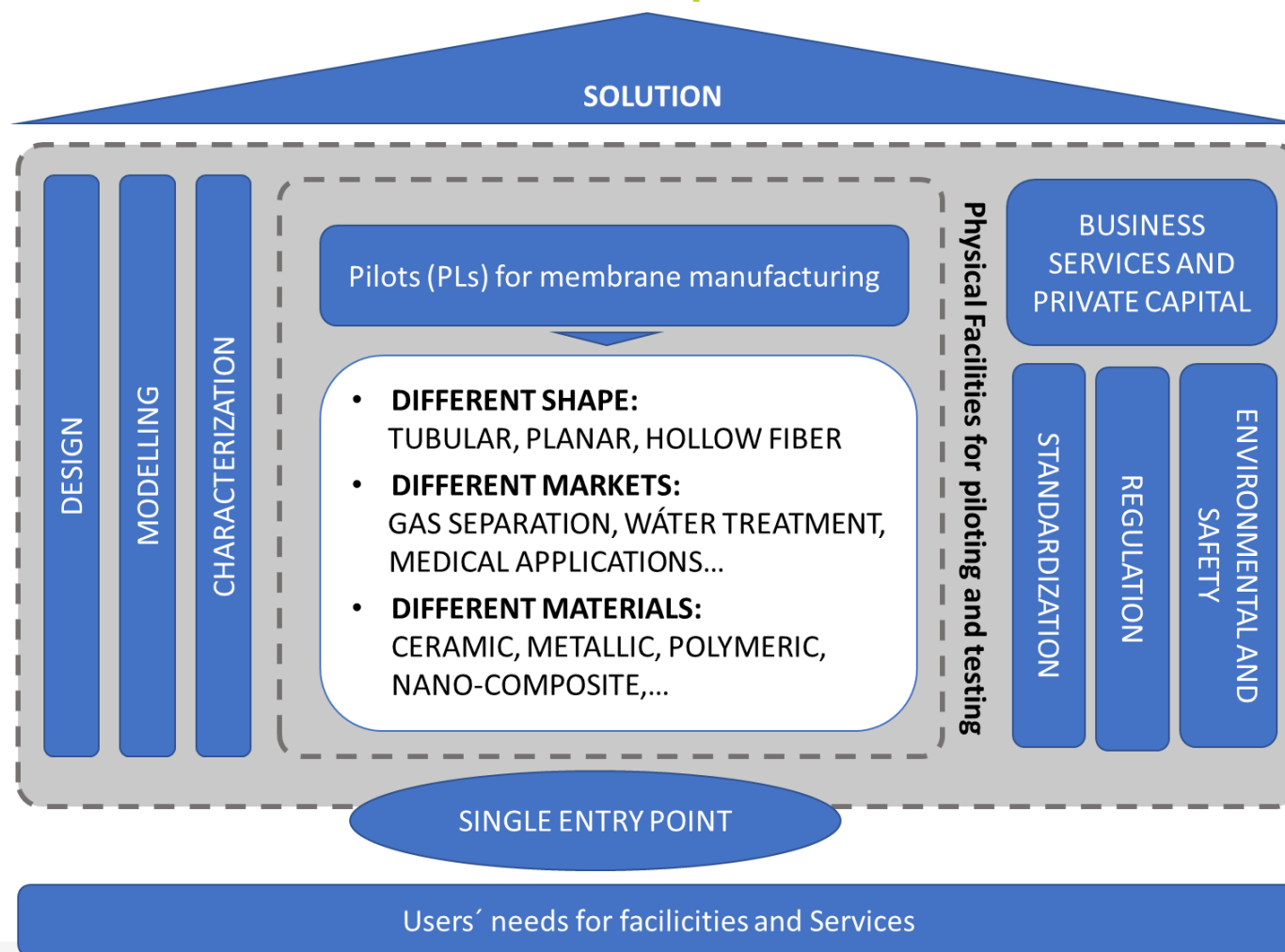
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What is an OITB?

- An **Open Innovation Test Bed (OITB)** is a **platform/entity providing common access to physical facilities, capabilities and services required for the development, testing and upscaling of nanotechnology and advanced materials in industrial environments**
- The objective of the OITB is to bring nanotechnologies and advanced materials within the reach of companies and users in order to advance from validation in a laboratory (TRL 4) to prototypes in industrial environments (TRL 7).
- It has been demonstrated that having access to testing and demonstration facilities is a catalyst for innovation. However, in industrial sectors (and specially SMEs), the access to technologies requires significant investment. That is why the concept of Open Innovation Test Bed (OITB) is gaining importance in Europe and can be very helpful for industrial sectors.
- In this sense, recently several EU projects on the creation of OITB are running in different topics, e.g. nanomaterials.
- Cooperation between Test Beds is supported and encouraged by EC.

Main objective

Creation of a sustainable Open Innovation Test Bed

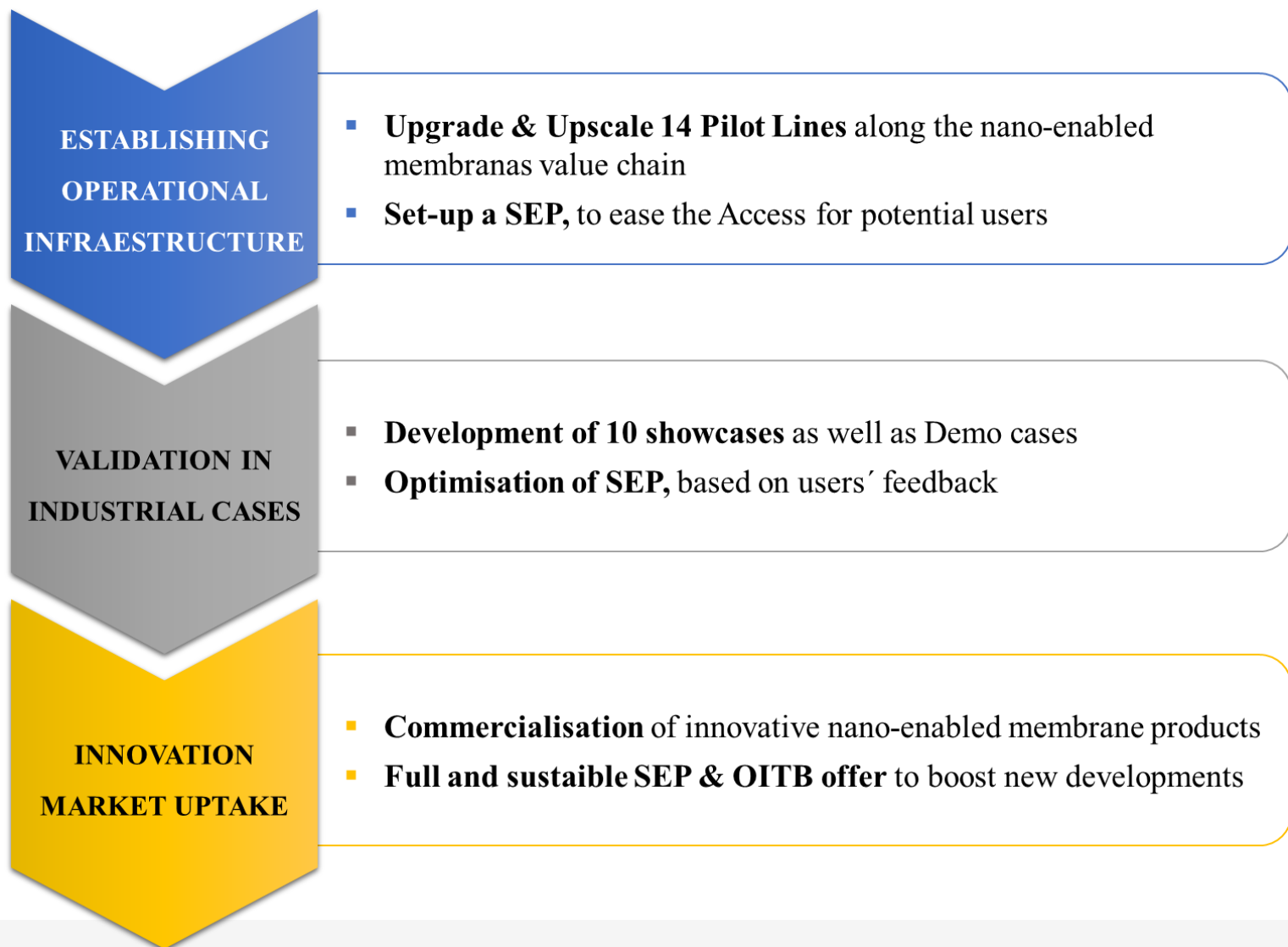


- Budget: 16 M€.
- Start: May '20.
- Duration: 4 years

Specific objectives

- ❑ Development and organization of the OITB:
 - ❖ **Upscale/upgrade of 14 Pilot manufacturing lines**
 - ❖ **Development of associated Technological and non-technological services**
- ❑ **Set-up a Single Entry Point** for easier access to SMEs and sustainable operation/commercialization of the OITB service offer
- ❑ **Validation of the upscaled/upgraded pilots and services through 10 Showcases**
- ❑ **Set-up of two waves of Open Calls** to validate the SEP and ensure the sustainability of INNOMEM
- ❑ **Development of the Democases selected in the Open Calls** with the project partners in continuous collaboration with the applicants (Industries, in particular SMEs).

Specific objectives



Upscale/upgrade of 14 Pilot manufacturing lines



PL1 *Dual Layer Mixed Matrix HF manufacturing system*

PL2 *Pd-based membrane plating system*



PL3 *Grafting of ceramic membranes*



PL4 *Nanostructured inorganic micro-tubular-membranes*



PL5 *Flat sheet polymer membrane production.*



PL6 *Zeolite membranes*

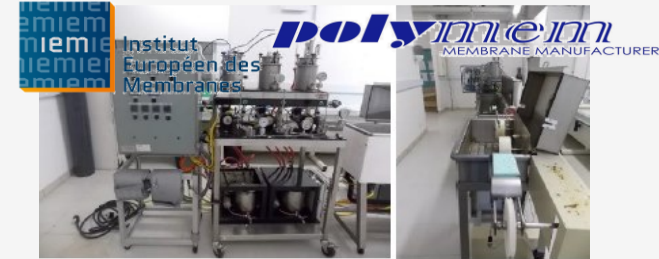


PL7 *Roll-to-Roll Coating of Advanced Nanophase-Segregated Ion-Exchange Polymer Membranes*



Upscale/upgrade of 14 Pilot manufacturing lines

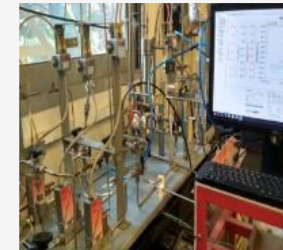
PL8 *Surface nano-structured and functionalized HF*s



PL9 *Modification of HF*s by microfluidics



PL10 *In-line modification of nano-coatings on hollow fiber membranes* UNIVERSITY OF TWENTE.



PL11 *GO/CNTs mixed-matrix membrane system*



PL12 *Molecular sieving nanoporous ceramic and CNT membranes system.*

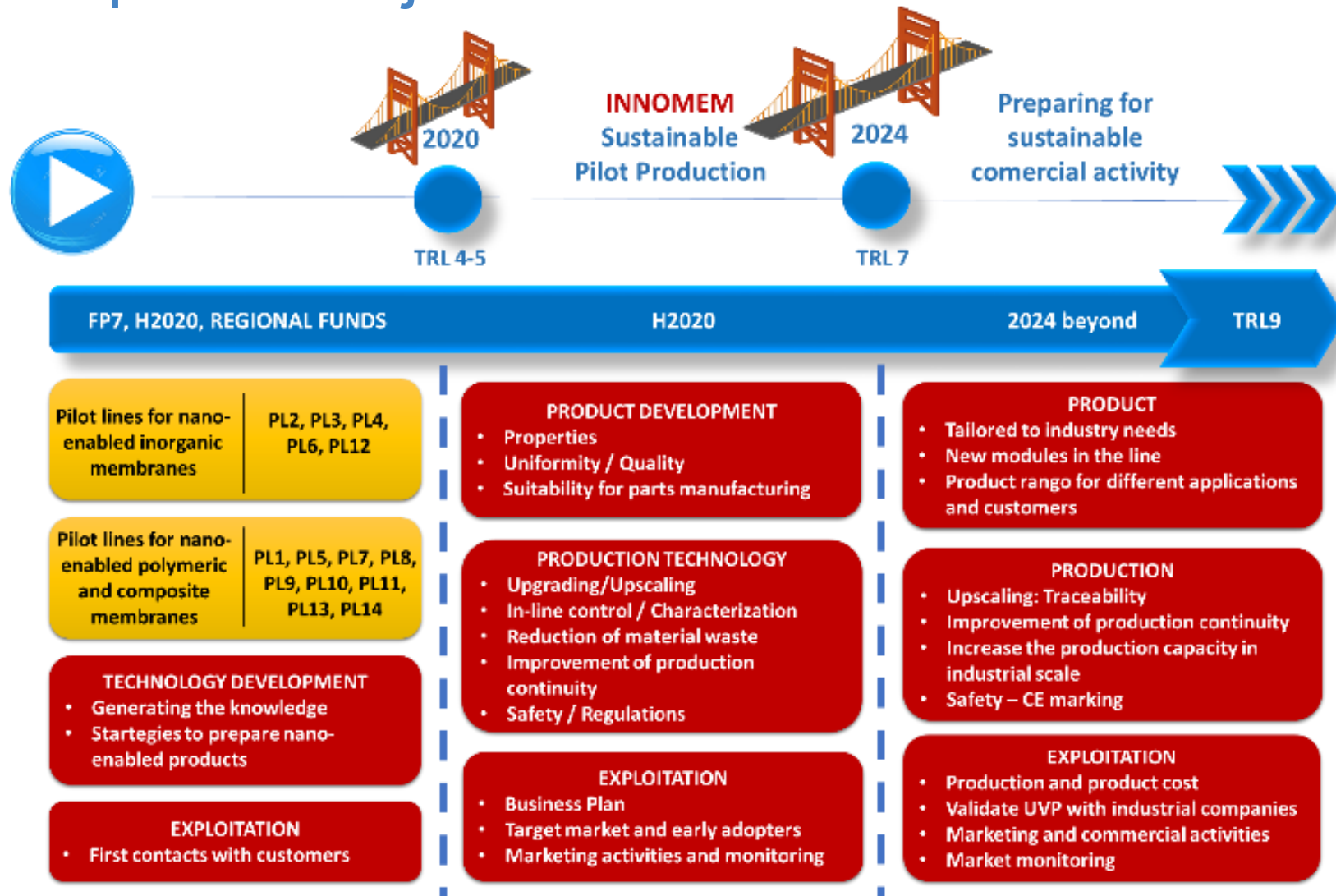


PL13 *Hollow fiber membrane spinning with improved geometric features*



PL14 *Centrifugal potting of HF membranes* Me Sep

Specific objectives

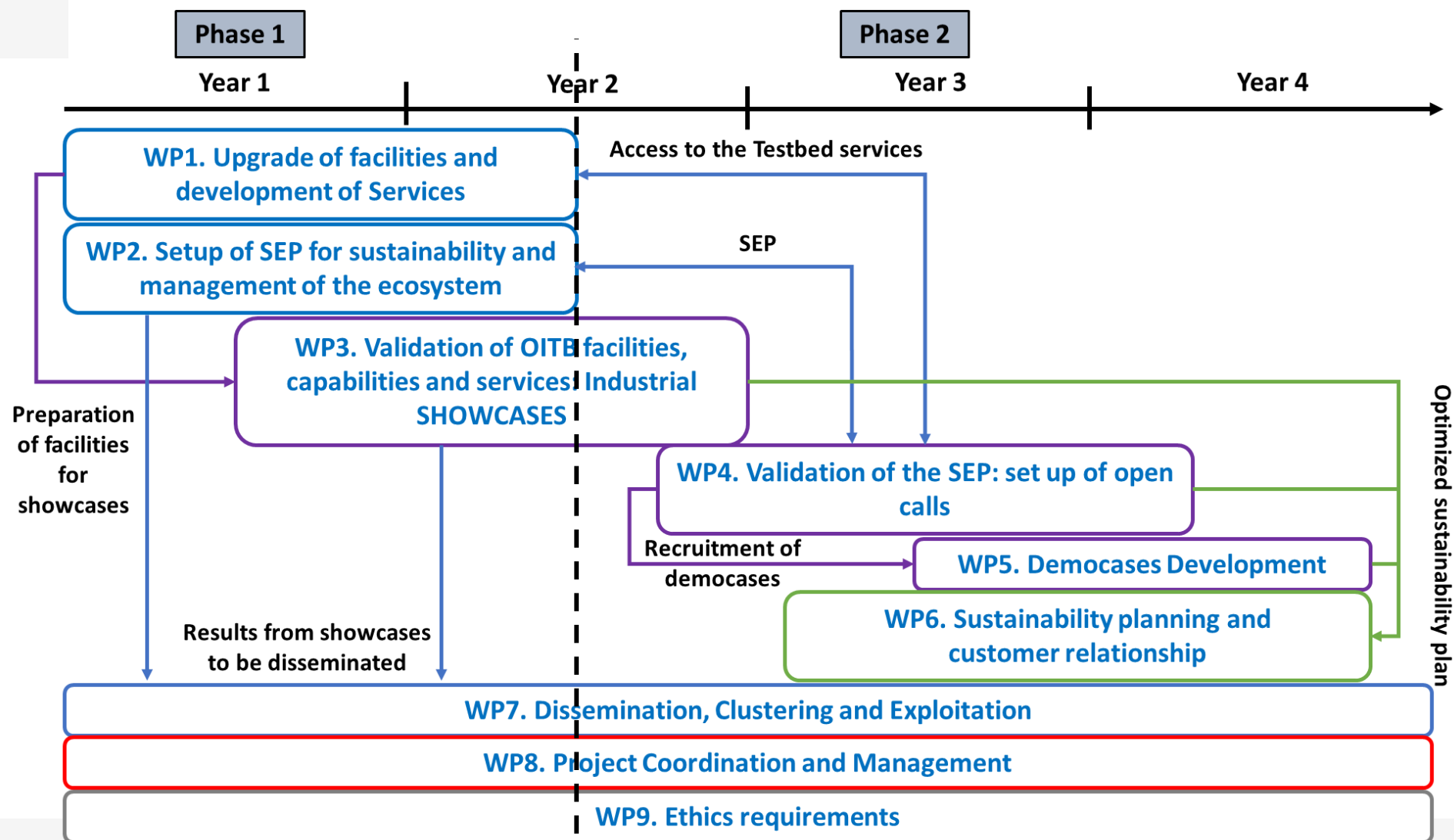


The main KPIs for INNOMEM

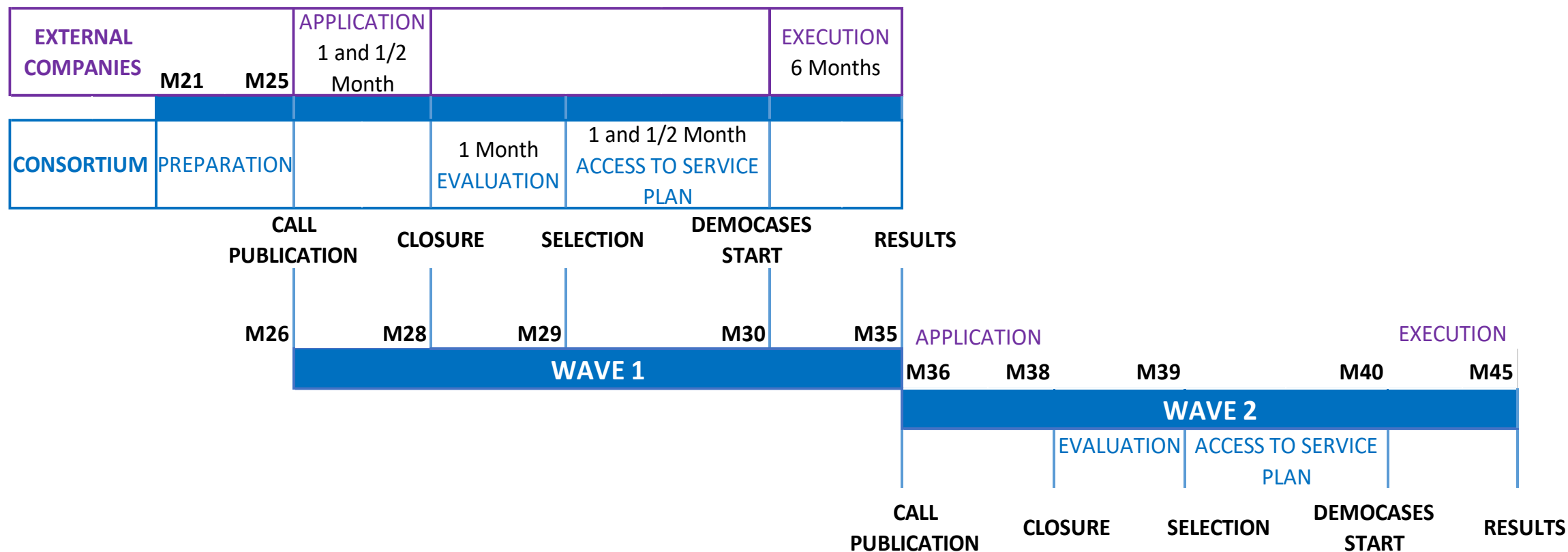
Technical	Membrane Productivity Improvement	Membrane Verification Improvement	CO ₂ emission reduction per showcase	Energy reduction per application
	> 20%	> 30% faster	> 40%	> 40%

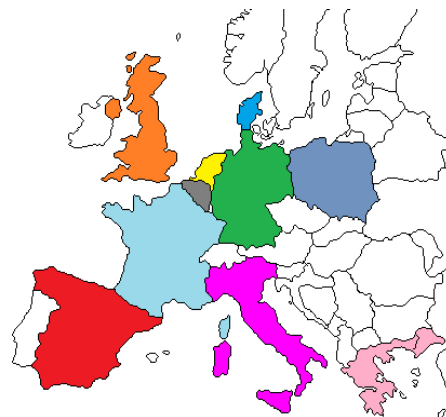
Non-Technical	Number of Showcases	Number of Democases	Number of reachable SMEs	Number of reachable Investors
	10	≥20	> 100	> 300

Overall approach & Methodology



Setting up of the Open calls

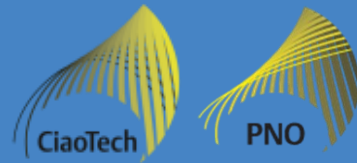




- 32 partners from 10 countries.
- 15 UNI/RTO + 11 SME + 6 IND
- INNOMEM gathers relevant expertise that will be used for:
 - Setup of services related to PLs by RTOs and academic partners + virtual labs for characterization (CNR) and modelling (TUE).
 - 10 industrial showcases driven by industrial partners leaders in their sectors: LIQTECH, FILATECH, POLYMEM, DBI, HTF, EVONIK, ENGIE, NX.
 - Managing and providing all standardisation support related to the project by UNE
 - Non-technical services through the network of investors of PNO and VNTRS (support the users in the post-development phase of the democases)
 - Business Innovation Coaching services by PNO
 - Exploitation and transfer of research results by VNTRS. VNRTS will act as the SEP defining the business model and collaboration agreements between the partners
- Advisory Board: will ensure links with SMEs, associations, regional clusters, investors and other stakeholders

Project coordinator contact:
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INNOMEM Market scenario



Membrane Market Analysis Methodology

Research focus: market size, success stories among testbeds

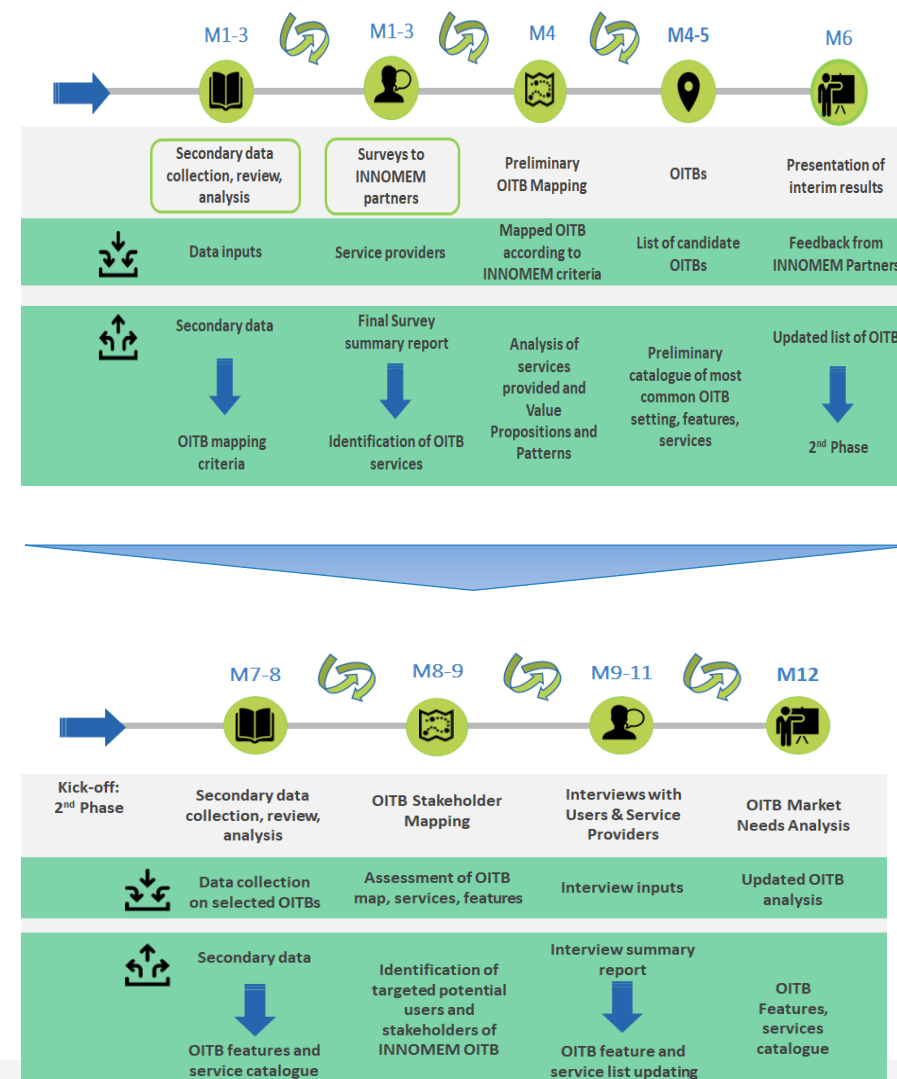
and OITBs, scouting of innovative SMEs and end-users

Combined mixed methods

- Secondary data collection through desk-based research
- Primary data collection through survey

2-phased mapping activity

- Phase 1 (M1-6): Preliminary market needs analysis – D2.1
(<https://www.innomem.eu/dissemination/deliverables/>)
- Phase 2 (M7-12): Final market needs analysis – D2.3



Updated service catalogue and the results of customer segment analysis

Criteria:

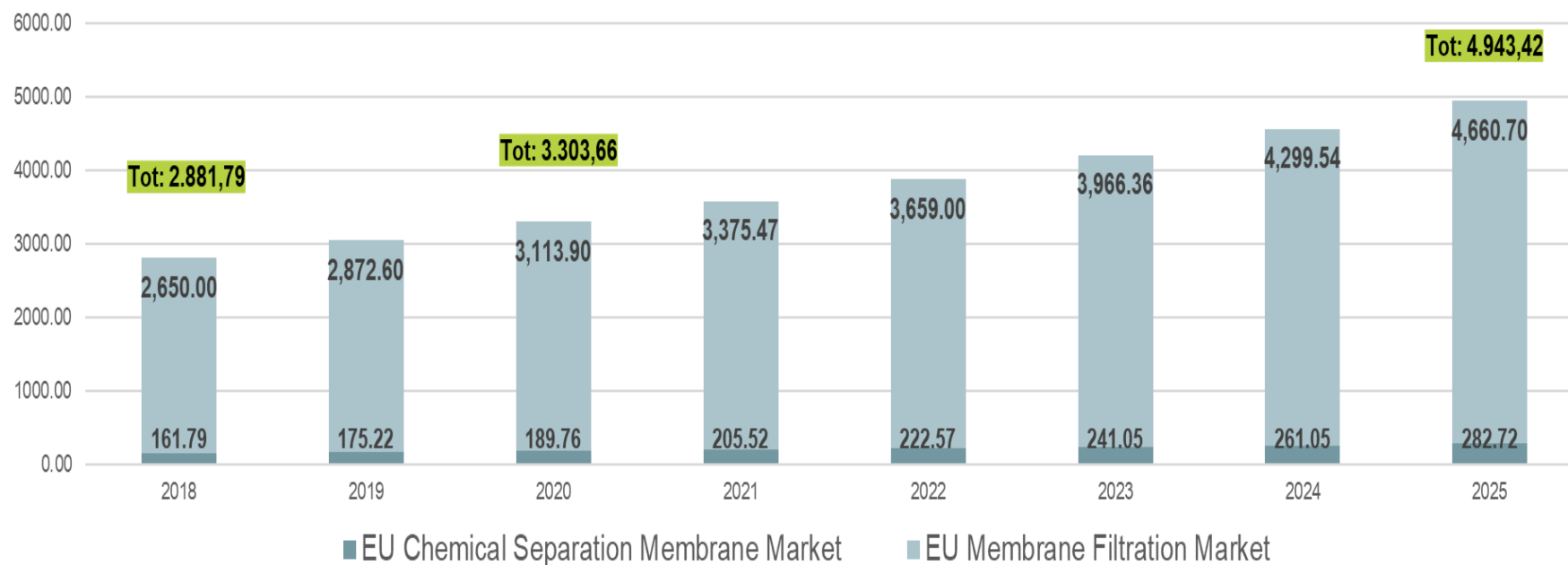
Relating the services to be offered in the INNOMEM OITB to with the potential demand of the main actors operating in the membrane sector

1. Quantification of membrane market value to determine INNOMEM OITB's business potential
2. Identification of INNOMEM OITB potential user segments
3. SEP catalogue definition building on INNOMEM OITB list of services

Market Analysis

Total EU membrane market*: € 4.9 M in 2025 (25% of global mkt)

CAGR: 6,61% from 2018



* Chemical Separation Membrane & Membrane Filtration Markets sum

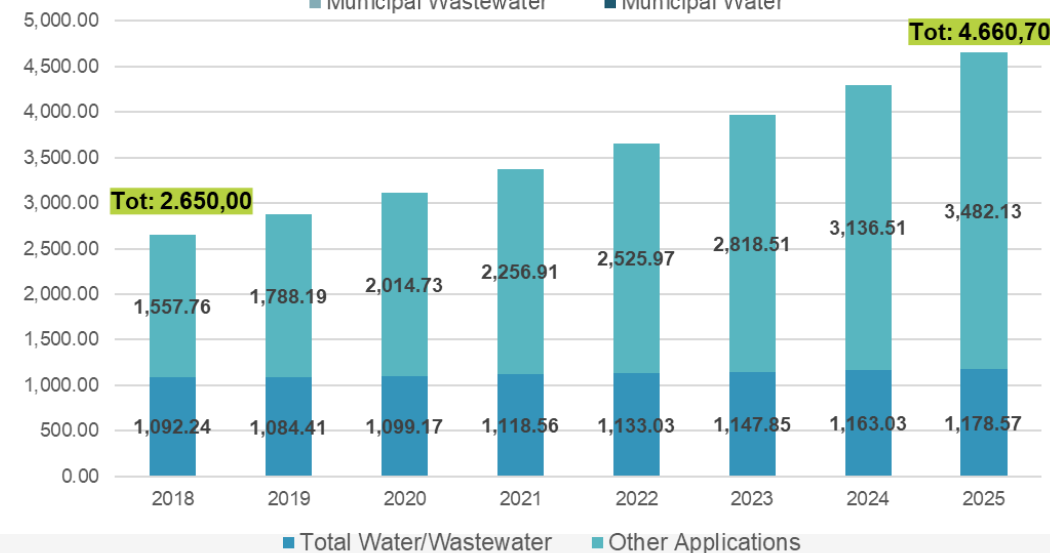
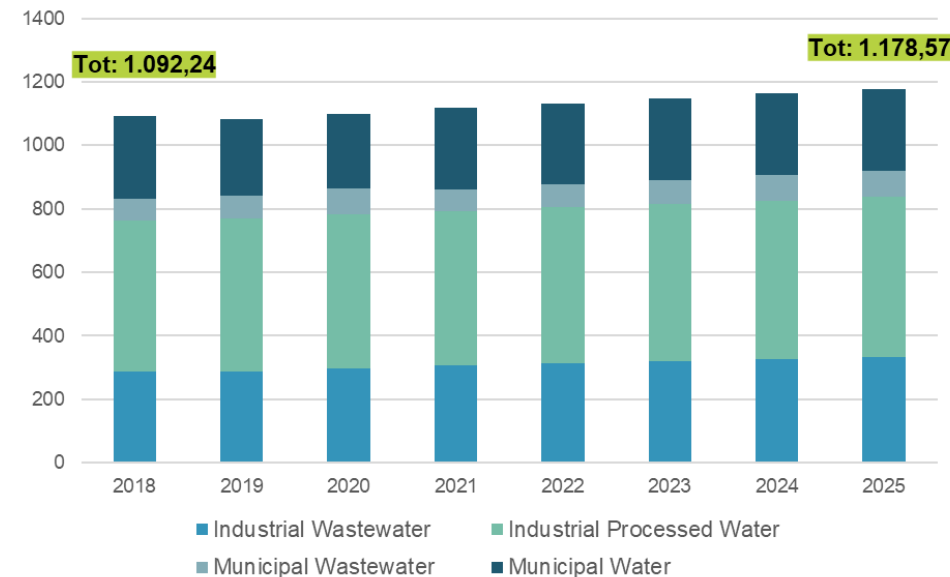
Membrane filtration market

Water and Wastewater processing is the larger market segment:

- **€ 1.092,24 M** (2018)
- **1,32% CAGR** (till 2025)

Other applications (Food & Beverages, Pharmaceuticals; Industrial/manufacturing) :

- Greater growth expected



Customer segment identification

Desktop research:

- Identification of case studies among EU ready-to-market Testbeds
- Analysis of customers types that benefited from testbed services
- Mapping and classification of EU companies operating in the membrane sector

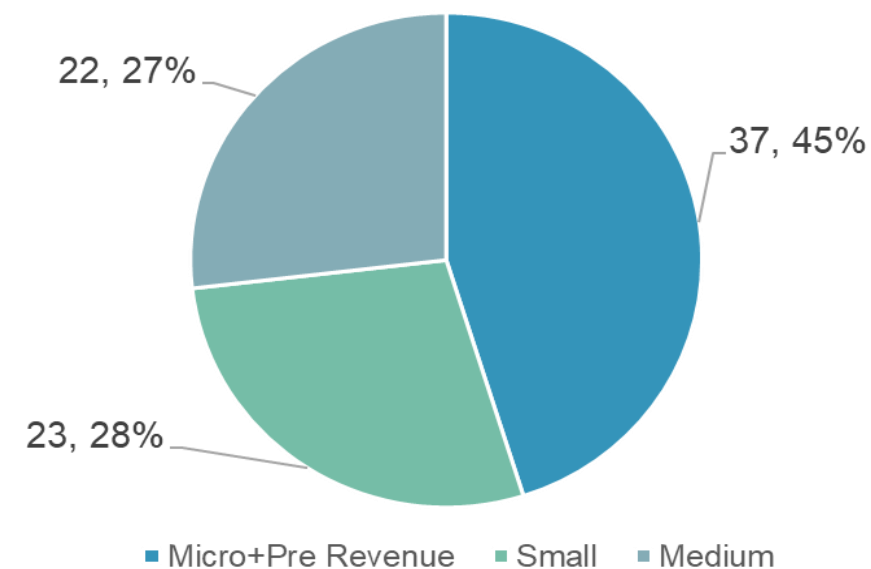
Results:

13 testbeds selected

106 client organisations analysed per type of collaboration

77% SMEs (82 companies) v. **17% large enterprises** (18 companies)

6% universities (4) and other types of organisations (2)



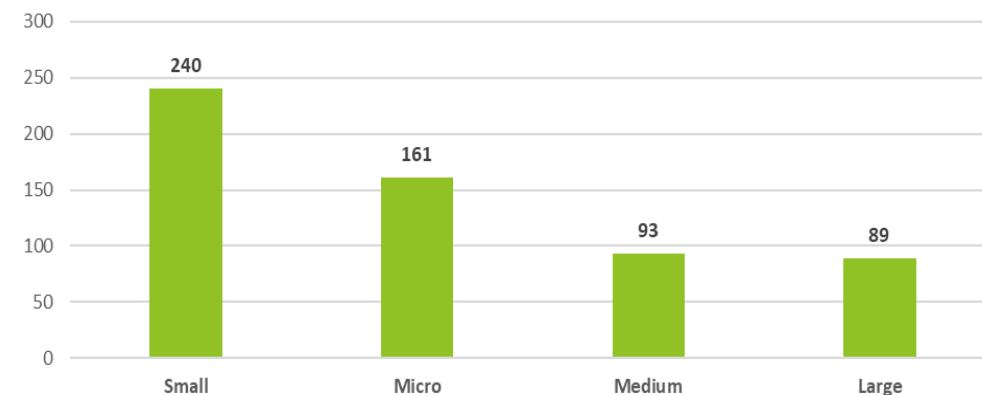
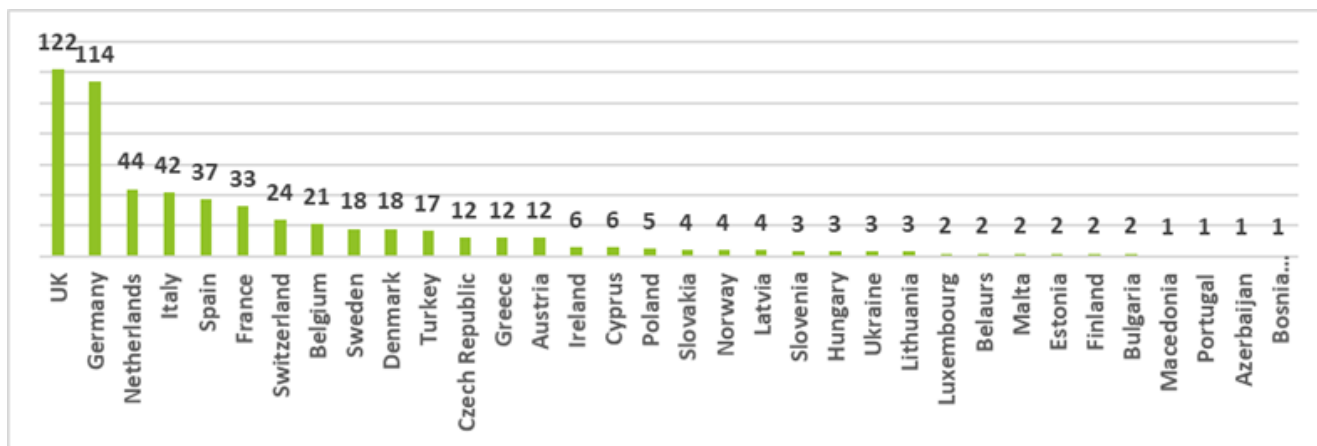
Customer segment analysis

Characteristics of the 82 SMEs

- Young
- Pre-revenues
- Micro-enterprises

Identification and Selection of similar stakeholders of the **material science for membranes market:**

583 EU companies



INNOMEM Catalogue

OITB technical and not technical services
for nano-enabled Membranes



OITB's Service catalogue list structuring

Mapping of existing services

- The services catalogue is built on the customers' NEEDS and the partners' CAPABILITIES, for a sustainable and easy-access SEP of the OITB service offer.
- 1. Technical v. non-technical services
- 2. Different categories to simplify the access to needed services
- 3. Collection of expertise and facilities among INNOMEM partners service providers

Technical services

Membranes properties characterisation techniques
Membranes scale up (equipment and techniques)
Development and scale up of membranes
Engineering & Design

Non-technical services

Data management
Software development
Venturing activities
Techno-economic analysis and market validation
Consultancy
Innovation services

INNOMEM Catalogue

OITB technical services



Technical services-Membranes properties characterisation techniques

UPSCALING FACILITIES/EXPERTISES & CAPABILITIES

Gas separation: testing and characterisation of membranes for gas separation such as H₂ production, CO₂ capture, natural gas purification, air separation. High pressure permeation testing setup. Validation technologies for biogas production

Liquid separation: testing and characterisation of membranes for liquid separation i.e. olefin/paraffin, water and solvent fluxes; retention measurement of different molecules.

PROVIDERS



Technical services-Membranes properties characterisation techniques

UPSCALING FACILITIES/EXPERTISES & CAPABILITIES

Long term performances evaluation: verification of separation performances and long-term stability

Membrane related equipment: lab scale and mobile pilots' equipment for liquid filtration (Ultra-, nano-filtration, reverse osmosis, Electrodialysis); construction and installation of membrane filtration units; Pilot installations and equipment for gas and liquid separation, permeation, filtration testing.

Physico-chemical characterization techniques: surface and bulk characterisation, electrokinetic measurements, Laboratory rigs for membrane performance assessment.

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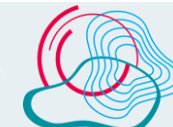
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Institut Européen des Membranes



Consiglio Nazionale delle Ricerche



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Imperial College London






Aachener Verfahrenstechnik

RWTH AACHEN UNIVERSITY

Technical services-Membranes scale up

UPSCALING FACILITIES/EXPERTISES & CAPABILITIES	PROVIDERS
<p>Gas Separation & Liquid purification: Membrane scale-up for gas separation (H₂ production, CO₂ capture, biogas upgrade, gas purification, air separation), aqueous application (purification), through lab scale and pilot scale equipment for membrane preparation.</p> <p>Membrane module design, construction, and manufacture for large areas.</p>	<div data-bbox="1549 468 1872 535">  </div> <div data-bbox="1997 479 2277 568">  </div> <div data-bbox="1561 568 1814 768">  </div> <div data-bbox="1824 622 2216 668">  </div> <div data-bbox="2028 725 2331 756"> <p>UNIVERSITY OF TWENTE.</p> </div>
<p>Membrane modules characterization trough pilot scale units for modules for filtration, separation, permeation.</p> <p>Module autopsy.</p>	<div data-bbox="1510 896 1666 1029">  </div> <div data-bbox="1727 911 1992 968">  </div> <div data-bbox="2142 889 2372 1068">  </div> <div data-bbox="1765 1018 2158 1063">  </div> <div data-bbox="1516 1075 1829 1153">  </div> <div data-bbox="1893 1096 2097 1153">  </div> <div data-bbox="2130 1096 2346 1153">  </div>

Technical services- Development and scale up of membranes

UPSCALING FACILITIES/EXPERTISES & CAPABILITIES	PROVIDERS
<p>Polymeric membranes and HF membrane : Polymeric, inorganic (metal, carbon), mixed matrix membranes and HF membrane <i>for gas separation, gas and vapour permeation, pervaporation and organic solvent nano filtration applications.</i></p>	
<p>Micro- and nanostructured or nanocomposite membranes: development by different type of separation processes; fabrication of thin films composites; ALD coatings. Surface functionalization of commercially available membranes.</p>	
<p>Ceramic membranes: functionalisation of ceramic membranes for micro-, ultra- and nanofiltration of solvents, Water and wastewater treatment, gas separation, CO2 capture, energy conversion, such as solid oxide fuel cell and electrolysis, Large multi-channel-tube-structures for filtration like honeycombs. Catalytic membranes for emission control.</p>	

Technical services- Modelling & Design

UPSCALING FACILITIES/EXPERTISES & CAPABILITIES

Process Design modelling, simulation for the development of membrane modules for various operations as well as hybrid and integrated processes. Prediction of topological, transport, separation and/or barrier properties, geometry characterization and 3D reconstruction.

PROVIDERS











INNOMEM Catalogue

OITB non-technical services



Non-technical services

Non-technical Services	Expertises & Capabilities	PROVIDERS
Data management	Software FURTHRmind for research data management; Consultancy on data management; Training on FAIR research data management; Rental of server capacity.	 
Software development	Software FURTHRmind: Customized software development, programming as a service; Programming expertise: Python, Qt.	
Venturing activities	Support in corporate venturing activities to accelerate innovation in companies (B2B “deep tech” breakthrough innovation), addressing the business opportunity maturation process from challenge identification, scouting, acceleration, IP transfer, market validation.	
Techno-economic analysis and market validation	Techno-economic evaluations of membrane-based processes. Market studies for proposed technological solutions on green gases, Techno-economic evaluations of technologies.	   

Non-technical services

Non-technical Services	Expertises & Capabilities	PROVIDERS
Consultancy	Module design, R&D activities in module development, Set up of the production process. desktop or consultancy work, feasibility studies, characterization of membrane samples, membrane development up to first prototype, application studies, small scale piloting, benchmarking, troubleshooting and building of customized equipment.	UNIVERSITY OF TWENTE. 
Innovation services	Market analysis, business plans, grants & funding scouting, intelligence (market, patent, stakeholders, technology analysis); grant scouting & funding strategy; business planning & modelling; exploitation and commercialization strategy, coaching and investor readiness support	

Validation of the Service Catalogue



OITB User Survey

Take few minutes to give us your input and feedback on the INNOMEM Service Catalogue!

Scan this QR Code and answer our Survey to contribute to the Membrane sector progresses!



Or go to this link:

<https://forms.gle/gbHZxWcgynN2rTW86>

Q&A session





Keep In Touch with INNOMEM!



[HTTPS://WWW.INNOMEM.EU/](https://www.innomem.eu/)



[HTTPS://WWW.LINKEDIN.COM/COMPANY/INNOMEM-PROJECT/](https://www.linkedin.com/company/innomem-project/)



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OUR CONTACTS



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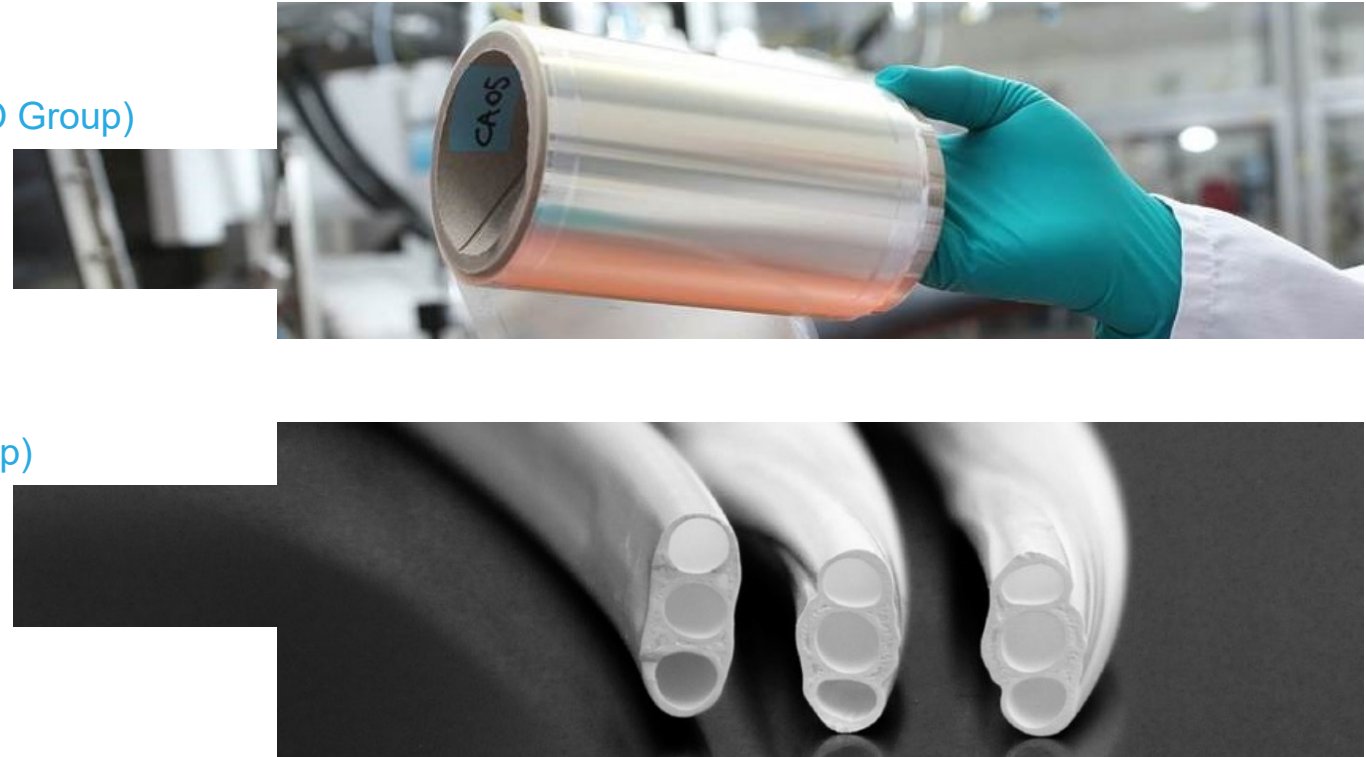
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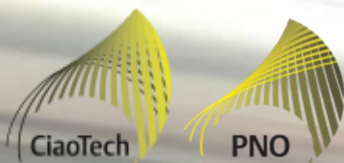


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Thank you!

MILAN/ROME, ITALY

SAN SEBASTIÁN, SPAIN

MAY 2021

Project coordinator contact:
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For more information:
<https://www.innomem.eu/>

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LIQTECH CERAMICS

polymem MEMBRANE MANUFACTURER

DBI GUT Gas- und Umwelttechnik GmbH

FURTH

suk

HTE

WATER AND ENVIRONMENTAL ENGINEERING ECOTECH

FilaTech Filament Technology & Spinning GmbH

Rauschert



EVONIK Leading Beyond Chemistry

ENGIE

H2 SITE Membrane reactors for H₂ generation

Me Sep

tecnalia ventures Technology Value for Growth

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