

# Executive Summary

## Advanced Membrane Technology Report

### THE BACKGROUND OF THE MEMBRANE TECHNOLOGY REPORT

*This report was published in February 2015 and was elaborated in collaboration with the European Membrane House.*

Only 1% of the world's water is available as freshwater. Drinking water production, municipal wastewater treatment, industrial effluent processing and reuse have become crucial challenges for the future of our societies. **Membrane technologies are key to provide competitive solutions in these areas.**

In November 2012, the Board of the Water Supply and Sanitation Technology Platform renewed its Working Group (WG) on membranes for the 2013-2014 period.

Its missions: continue and expand on the work carried out in 2010-2012 on these dominant and breakthrough technologies, with a specific focus on advanced membrane technology<sup>1</sup>. The European Membrane House and VEOLIA were appointed co-leaders of the WG.

The 2015 report provides the trends and conclusions that emerged from the work conducted during two years, with video-conferences in 2013 and face-to-face meetings with all WG members in 2014.

### THE PURPOSES AND MAIN FINDINGS OF THE ADVANCED MEMBRANE TECHNOLOGY REPORT

Drinking water, industrial and municipal wastewater are the three application areas the Advanced Membrane Technology WG selected to **think out of the box** and imagine **which technology developments should be given priority to in order to improve the use of water in Europe**. Water reuse and recycling, water and wastewater treatment and the water-energy nexus are the entry points of this approach, in relation with the Strategic Implementation Plan of the newly created European Innovation Partnership on Water.

Four topics are covered by the report and their priority R&D needs listed:

1. Next generation of processes for **hybrid membrane systems for water treatment** (increasing synergy between membrane systems and biology, advanced oxidation processes and other physical processes such as adsorption).
2. Next generation of processes for **low energy seawater desalination**: processes with technological breakthrough.



<sup>1</sup>cf *Membrane technologies for water applications*, a technology booklet published by Wsstp in March 2012.

# A Common Vision for Water Research and Innovation

3. **Environment-friendly design** in membrane processes.
4. Blue Sky ideas (bio materials, bio-mimicking, bio-based economy concept...)

**Cross-cutting approaches** between application sectors which tended to ignore each other (e.g. water and health, water and energy) are emphasized. The opportunities offered by **nanoscale engineering** to address new challenges are in the spotlight too, along with **biological tools**, deemed so important in a sustainable and bio-based economy.

## CONCLUSIONS

Three remarks are paramount. They express the same need to privilege truly holistic approaches in order to make the best of membrane smart technologies and to address properly the demanding water sector applications. They were pointed out in the original 2012 roadmap for this Working Group and are reminded here since their importance goes on making itself abundantly clear:

1. *Cross-cutting approaches between application sectors: **Sharing information and developing strong synergies*** constitute a very powerful driver for the whole of the industrial water sector.
2. *Better knowledge and integration of new concepts* issued from the fields of nanotechnology and of biotechnology.
3. *Improved education of experts/scientists: A **holistic approach*** appears as one of the main challenges for the entire water sector. The concept of Membrane Engineering launched with the NanoMemPro Network of Excellence, and recognized by the EU through the creation of the Erasmus Mundus master (EM3E) and PhD (EUDIME) on Membrane Engineering were the first steps to provide an appropriate answer to this training challenge.

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### Report Credits:

This report was published in February 2015 and involved 32 contributors from different countries and was created in collaboration with the EMH.

This report was made possible thanks to the work carried out by the Working Group co-heads, Gilbert RIOS (EMH) and Catherine DAINES (Veolia).

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