



**3rd SPIRE
Brokerage event
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2015**

**WATER MANAGEMENT
TECHNOLOGY WITH INCREASED
ENERGY EFFICIENCY**

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NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS"

- NCSR “D” is Greece’s largest multidisciplinary research center focusing on basic and applied research in the areas of materials, environment, energy, nuclear and bioscience.
- NCSR “D” has **5 Research Institutes**, more than **50 Research Laboratories** (*clean room, nuclear research reactor, XRD, SEM, Deep Sea research facility, immunoassays laboratory etc*) and **850+ Researchers**, research support professionals and scientific associates.
- NCSR Demokritos hosts more than 25 Technology Intensive Companies and spin offs in their premises

SPIRE 1: Water management technology with increased energy efficiency

A cost effective **hybrid nanobubble/membrane system** is going to be developed and demonstrated.

CONFLICT

Development of **CO**mbined **N**anobubble **F**lotation, **uL**trafiltration and membrane distillation to **effeCT**ively recover the contaminants and the water from waste water



The objective of **CONFLICT** is to develop, install & demonstrate the next-generation of **renewable powered integrated Nanobubble flotation, Ultrafiltration and /or Nanofiltration & Membrane Distillation waste water treatment systems**, as a novel technology to recover more than 95% of the water and of the contaminant, while reducing the energy demands of the treatment by 30%.

Existing UF, NF, and MD membranes (TRL+4-5) will be assessed for best performance and used for the pilot unit development (TRL6). The membrane system and will be combined with a Nanobubble flotation unit, based on low energy cost Nanobubble production unit.

THE HYBRID SYSTEM of CONFLICT at a glance



- a) **Fostering innovative water treatment technology** by introducing an innovative membrane based integrated system utilizing **high flux graphene oxide and carbon nanotube MD membranes** and hollow fiber NF membranes.

- b) **Reducing the energy demands** via replacing fossil fuels with an effective CSP (Concentrated Solar Powered) system, **for storing and providing heat to the MD unit**

- c) Demonstrating a low energy and nearly **Zero Waste Water Discharge waste** water treatment unit , minimizing the Water footprint.

The *goal* of **CONFLICT** is to develop and demonstrate the **cost-efficient recovery of both the waste water contaminants & of water with acceptable contaminant concentration.**

In addition to the availability of advanced performance membrane the second main advantage is the «**generic**» character of the **CONFLICT technology**, while one of its superior characteristics is its adoptability to the specific requirements of each application.

Two EUROPEAN leading membrane groups have joined forces in CONFLICT together with four SMEs active in membrane production and novel technologies.



EXPECTED IMPACT

- Reduction of at least **20% in water use** compared to the current practice in the sector.
- Reduction of at least **30% in wastewater production** compared to the current practice in the sector.
- Reduction of at least **15% in energy use** compared to the current practice in the sector.
- **Minimising the Water Footprint**, employing less water intensive or waterless technologies and increasing recycling.
- **Foster new technology developments in water treatment.**
- Decouple the industrial production from the utilisation of fresh water reserves.



EXISTING PROJECT CONSORTIUM

SPIRE 1 Water management technology with increased energy efficiency

*NCSR DEMOKRITOS
University of Leuven
University of Oxford
ITN – CNR (prof. Drioli)
SMEs*

LOOKING FOR PARTNERS

LARGE companies with different major waste water problems

**SPIRE 03-2016:
Advanced MembrAne systems to
effectively Convert Bio-rEsources inTo High
added value products (MACBETH)**



MACBETH is aligned with the Bioenergy & Sustainability concept

SPIRE 03-2016: Advanced MembrAne systems to effectively Convert Bio-rEsources inTo High added value products (MACBETH)

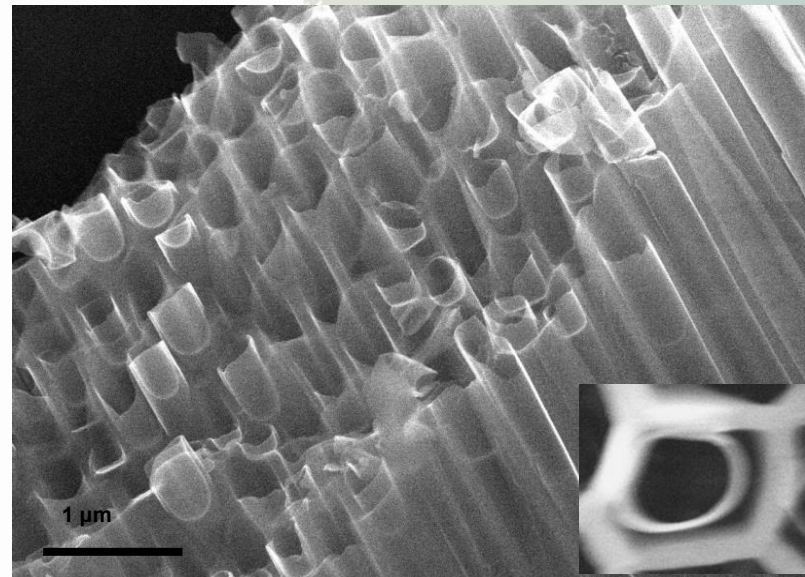
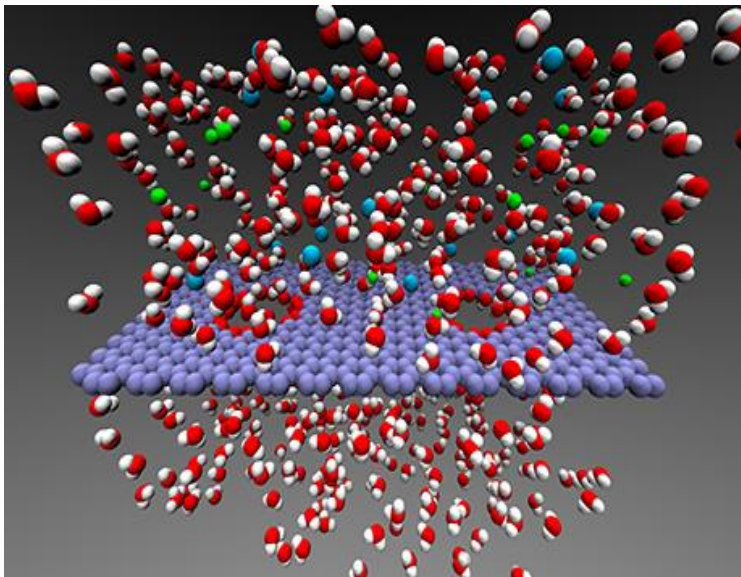
The goal of **MACBETH** is to develop an optimized waste management system for efficient use of agricultural waste, co-products and by-products, thereby contributing to the creation of sustainable value chains.

The objectives are:

- **enhanced biogas production**
- **the production of hydrogen by dry reforming as well as, of formic acid (FA)**
- **the development of an advanced catalytic membrane reactor for the hydrogenation and upgrading of the biofuel (innovative membrane HDO unit)**
- **the production of high added value products from lignin**

The **MACBETH** integrated system will be based on **novel Ionic liquid, ultrafiltration membranes & high flux graphene oxide Membrane Distillation (MD) & Single wall carbon nanotube membranes, providing**

All the aforementioned systems will be integrated in one fully functional pilot unit, which will be further optimized in providing zero carbon footprint policy by recycling CO_2 .



How MACBETH is strengthening the competitiveness & growth of companies

- By decreased utilization of fossil resources in the process industry of at least 30 %, compared to similar commercially available processes.
- Improvement in energy utilization in the process industry of at least 30 %, compared to similar commercially available processes.
- Decrease in CO₂ emissions of at least 30% compared to similar commercially available processes.

More topics Interested in

2016 topics

- **LCE 24:** Expertise in Capture of CO₂ from flue gas
- **LCE 25:** Expertise in Capture of CO₂ from flue gas plus in conversion technologies into value-added industrial products



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