

## Materials and technologies for performance improvement of cooling systems in power plants

The power generation sector depends strongly on water availability for cooling. Climate change and resulting changes in water resources will therefore affect power generation while energy demands continue to increase with economic development and a growing world population. Currently the power generation sector requires approximately 43-45% of the total water abstraction in European Union and the gap between water demand and water availability, will expected to increase in the upcoming years. The European Commission's Resource Efficient Europe Roadmap 2050 indicates that by 2020 the water abstraction should stay below 20% of available renewable water resources. To meet these EU requirements, additional innovations actions are needed.

### MATChING project

The MATChING project (Materials & technologies for performance improvement of cooling systems in power plants) started 1.5 year ago. The international consortium consists of utility companies, technology providers, research institutes and a service provider, partners from six EU countries (Italy, Spain, Belgium, France, the Netherlands and Denmark). The Flanders Knowledge Center Water (Vlakwa), an independent division of VITO, is a member of the MATChING user group and will link the project to the broader stakeholder community.

The project focuses on sustainable solutions to reduce the water demand and improve energy efficiency for cooling systems for geothermal and fossil fuelled power plants through the use of advanced and nano-technology based materials and innovative configurations.



Figure: MATChING objectives

### The role of VITO and EnergyVille

VITO evaluates water saving possibilities using innovative membrane technology. The first pilot test is running at Engie lab site in Linkebeek. The VITO membrane distillation pilot is coupled to the cooling tower pilot of Engie lab. During three months the feasibility of the technology will be evaluated together with water savings and chemical reduction. In 2018 an additional pilot using membrane capacitive deionisation technology (VITO technology) will be tested as a pretreatment step.



*Pilot : VITO membrane distillation pilot (left) and Engie lab cooling tower pilot (right)*

EnergyVille's role is to examine different options to improve the electricity production process from low-temperature geothermal sources (100°C-175°C) with focus on the optimal cooling of the conversion system (ORC). Different configurations of hybrid cooling systems will be worked out and optimized aiming at not only increasing the electricity production but also reducing the net water consumption. The use of groundwater in a closed loop is one of the options that is explored in detail as this hybrid cooling concept allows to cool the ORC with low temperatures in summer months.

### **Balmatt geothermal site as demonstration site**

The Balmatt geothermal site in Mol functions also as demonstration site for testing of different coatings for classical steel pipes. A bypass circuit in the geothermal brine circuit will be included in the design. In this by-pass circuit different coated pipes in contact with the brine (at extraction temperature) can be tested on the corrosion resistance to brines.

*The exploitation of the MATCHING technologies will contribute, through water withdrawal reduction, plant efficiency increase, and extended geothermal plant lifetime to an overall reduction of CO<sub>2</sub> emissions and a reduction of our energy footprint.*

Project website : <http://www.matching-project.eu>



Figure: The MATCHING consortium