Upcoming Events

- 6th World Congress on Smart Materials and Polymer Technology, Dubai, UAE, December 16–17, 2019 https://smart.materialsconferences.com
- ICCG13 - International Conference on Coatings on Glass and Plastics, Braunschweig, Germany, March 29-26, 2020 https://iccg.eu

Project Updates

Here is a summary, at VIP level, of the most relevant progress:

- WP3 - Low-T geothermal case: lab tests with coatings for geothermal brine were completed (12 coatings for AISI 316L and 9 coatings for P265G). Six of them have been selected (5 on stainless steel and 4 on carbon steel) and are being tested at Balmat site where they will work with the real geothermal brine.

- WP4 - High T geothermal case: The hybrid wet/dry module was designed and supplied to Nuova San Martino plant. This module is towards the end of the testing period and very promising results are being collected.

- WP5 - Steam Condenser materials: Tests on antifouling materials and stainless steel with biocide properties completed at Pericles facility. Performance test concluded at Thryco Facility for steam side hydrophobic coatings. Installation of a pilot condenser at a production site has been completed for testing the most promising coatings.

- WP6 - Technologies for water treatment: all the technologies under investigation have been already tested at lab scale with promising results. All pilots are operating. So far, successful results were achieved with capacitive deionization and Vortex technology at Engie’s test site and with membrane distillation at At Pontes Power Station. Tests at Tomavallalta still ongoing.

Welcome to the 5th edition of MATCHING Newsletter

Since our last Newsletter in November 2018, there were several developments in the project: at this moment all the pilots have been commissioned and some were already closed. This edition will summarize some of them. Partners’ updates have been added by EGP for the Nuova San Martino demonstration of hybrid cooling; by ENEL for the long run test on membrane treatment of FGD wastewater. Technology focuses will describe membrane condenser configuration from ITM. Update on past and future workshops is included.

PARTNER : EGP

The application of hybrid cooling tower in high temperature geothermal power plant (WP4) is going to complete the DEMO tests at Nva San Martino power plant (Monteortondo Marittimo, Italy) owned and operated by EGP. After an initial validation phase where the behavior of innovative materials was investigated at pilot scale, one of six cells of the cooling tower was retrofitted by SPIG and operated for more than 6 months by EGP; in the retrofitting works, the existing filling pack was replaced with an innovative one and 4 air water finned tubes heat exchangers were added at the roof.

The 3-D shaped wet filling pack increases the contact surface between the air and water increasing the specific heat exchange capability. The surface heat exchangers vary the thermodynamic state of outlet air avoiding the achievement of dew point thus eliminating the typical visible plume from the stack.

The main results after 6 months of operations is the reduction of evaporation rate up to 10% without clogging and fouling phenomena.

Subscribe to our Newsletter or Join our Stakeholders’ Community

Interested in MATCHING progress? Subscribe to our newsletter or ask to join our stakeholders’ community. Joining the stakeholder community is a non-binding complimentary and voluntary basis. For further information contact: matching-communication-team@enel.com

Welcome! P.1
Partner update: EGP at Nuova San Martino P.1
Vortex Technology by Pathema P.2
Partner update: ENEL FGD wastewater treatment by membrane technology P.2
Partner update: EGP (continued) P.2
Final Workshop P.3
Membrane Condenser P.3
After the promising results achieved by ITM with the lab test on real water samples coming from the Torrevaldaliga Nord wet-FGD wastewater treatment plant, ENEL, supported by ITM, started the design and realization of a demonstration pilot plant to perform test directly on site. A 1 m³/h pilot plant has been realized including a pretreatment section constituted by a softening step, an acidification step and a stripping section to remove hardness (Ca and Mg) and CO₂ to mitigate scaling risks. Pre-treated water is then fed to an Ultra Filtration section and to a Reverse Osmosis section. The pilot has been designed to achieve up to 75% recovery considering a feed water with a TDS of around 15 mS/cm. Brine produced by the RO section is then treated in a Membrane Distillation unit able to reach an additional 40% recovery in order to achieve a total recovery of around 85%.

Aim of the demonstration is to evaluate the performance and the reliability of membrane processes to be a valid alternative to thermal brine concentrators. Tests are still ongoing but some interesting results have been achieved. Despite a worsening of the pilot inlet conditions: In fact feed water quality showed a high variability and compositions reached high TDS values (up to 54 mS/cm), the RO pilot achieved recovery in-between 30% and 60% according to feed quality. Rejection was quite high (92-98%) even if permeate quality would probably require a second RO pass in order to additionally reduce the salinity.

In high temperature geothermal power plants no fresh water is used as cooling media, but the geothermal fluid itself is exploited in the cooling towers once it has been condensed. The re-injection stream that typically recharges the reservoir is the spent fluid of the cooling process and its amount is about 30% of inlet steam. Nowadays the standard cooling technology in high temperature geothermal power plants is the wet cooling tower because of low energy penalty and small footprint. So far hybrid cooling tower technology has not found application in high temperature geothermal plants due to corrosion and fouling phenomena that can have a high impact on cooling tower performance. One of the main challenge of MATCHING project has been the effective application of hybrid cooling towers in high temperature geothermal plants in order to enhance sustainability of the process due to the reduced loss of evaporation thus increasing the re-injection stream. Another important effect of the application of hybrid cooling towers is the removal of the typical plume at the stack reducing the visual impact of the whole plant. All the existing wet filling media were replaced with a 3 dimensional shaped material designed to compact the height of the filling thus reducing the air head loss: 4 heat exchangers were installed under the top floor removing 2 lateral parts of the module. The heat exchangers were equipped with a combination of base materials and special inner coatings in order to assess corrosion and fouling behavior in real environment. The operation of demo module has switched between wet to hybrid for 6 months has an average reduction of the evaporated water of about 10% with a small addition energy penalty due to fan consumption.

The Final Workshop of MATCHING project was held in Brussels in June 25-26, 2019. The purpose of the workshop was to share the most relevant results of the Project and to engage an open discussion with the Stakeholders on the current and future scenarios related to the water availability and to technological measures for improving the performance of cooling systems in power plant, in Europe and abroad.

MD tests showed good rejection with industrial water while with the w-FGD waste water the distillate quality was not so good. Probably highly volatile species are going through the membrane. A new membrane with oleophobic properties will be tested in the following weeks.