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Field demonstration of large scale stationary power and CHP fuel cell system

GA No. 621256



**Demonstration of a combined heat and power 2MWe PEM fuel cell generator and integration into an existing chlorine production plant**

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## Publishable summary

The report constitutes the project Deliverable D3.3 “Report on the measuring system and comparison of measured data with simulations made with the computer model”. The report discusses the results of experimentation of the plant, based on the outcome of the measuring system, and the comparison with the simulation model developed for the DEMCOPEM-2MW PEM plant, related to WP3 , Task 3.5 Measurements on the system and feed-back of results on operation, following previous tasks 3 and 4 “Process simulation of the PEM generator with a computer code” and “Computations with the computer model”.

Following the definition of a simulation model for the DEMCOPEM-2MW plant, reported in Deliverables 3.1 and 3.2, this report D3.3 focuses on analyzing measurements taken on the plant, comparing the results with those of the simulations and suggesting further update and evolution of the simulation model.

A first set of measures was collected during the plant construction at MTSA and presented in section **Error! Reference source not found.**; this experimental campaign was performed before the placement of the stacks. The analysis focused on evidencing possible uneven flow distributions for the air and cooling water streams among the different sections of the system (groups, modules, stacks).

A second analysis is performed on the data from the acquisition system of the plant itself, after the installation at Ynnovate; its results are presented in section **Error! Reference source not found.** , referring to acquisitions in the period September-December 2016. The analysis focuses on the assessment of plant performances under real operating conditions, and will continue throughout the rest of the project following the availability of new set of data and new periods of data acquisition.

The measurements in the observed operating period allowed also to evolve the calibration and validation of the simulation model. Results obtained with the simulation model vs. the experiments are discussed in chapter 4. Firstly (section 4.1), a comparison is developed between the current-voltage relation (polarization curve) of the system in real operating conditions with the curve predicted by the model. The simulation model is then applied (section 4.2) to assess the effects of hydrogen flow rate variations.

The final section of the report (section 4.3 and 4.4) is dedicated to the overall plant simulation and comparison with the model. Globally, the model performs well and most variables are centered by the simulations.

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### Disclaimer

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