



Solid Oxide Cell and Stack Testing, Safety and Quality Assurance

Collaborative Project - FCH JU GRANT AGREEMENT N° 621245

THEME [SP1-JTI-FCH.2013.5.4]

Start date: 01.05.2014 – Duration: 36 months

Project Coordinator: M. Lang – DLR

DELIVERABLE REPORT

D.7.4 – PROJECT OUTCOME WORKSHOP		
Revised Due Date	15.05.2017	
Main Author	S. McPhail (ENEA)	
Co-Author(s)	M. Lang	
Work package	7	
Work package leader	ENEA	
Date released by WP leader	19.05.2017	
Date released by Coordinator	22.05.2017	
DISSEMINATION LEVEL		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
C O	Confidential, only for members of the consortium (including the Commission Services)	
NATURE OF THE DELIVERABLE		
R	Report	X
P	Prototype	
D	Demonstrator	
O	Other	

SUMMARY	
Keywords	<i>Presentation of results, industry reach-out, dissemination to stakeholders</i>
Abstract	To disseminate the results generated by the project and to raise awareness of the needs for standardization for SOC testing and industrialization, the final outcome workshop was organized in the form of a booth at the Hannover Fair (“Hannover Messe”). The test modules were presented, the process followed to arrive at validated procedures and the context in which the protocols operate. Many stakeholders were interviewed, yielding a wide variety of inputs and interpretations. Two oral presentations were given at the Technical Forum in addition to 5-day presence at the booth and promotion of the “SOCTESQA” outcome during all by-side events.

D.7.4 – PROJECT OUTCOME WORKSHOP

1 Objectives of the workshop

The aim of the final “SOCTESQA” event was to reach as many industrial stakeholders as possible. To do this, it was decided to choose the right location, where the targeted audience was known to be present, rather than to organise a separate event where it would be difficult to engage and involve the wide range of interested parties. It was thus convened to rent a booth at the Hannover Fair, the largest exhibition on fuel cells and hydrogen in Europe, 24-28 April 2017.

2 The “SOCTESQA” booth

Interaction with stakeholders has been part of “SOCTESQA” since the time of writing the project proposal, and a newsletter announcing the final event was sent out on April 12th 2017, containing a link to redeem a free entrance to the fair, as guest of the “SOCTESQA” booth. The IEC (International Electrotechnical Commission) sent a package of promotional material related to energy storage activities in the standardization process of this important organization. The working group on standardization of test procedures for solid oxide cells operated in regenerative mode – initiated by “SOCTESQA” – was highlighted in this material (see the following links:

http://www.iec.ch/about/brochures/pdf/technology/iec_work_energy_storage.pdf

<http://www.iec.ch/whitepaper/pdf/iecWP-energystorage-LR-en.pdf>).

The booth was the result of intensive deliberation between project partners as to the best presentation of results at the Fair, in order to gain most attention and communicate the project outcome most effectively. To this effect, the “SOCTESQA” booth was united to the DLR booth, in order to create a larger (common) space while keeping the two areas clearly distinguishable, see Figure 1. Impressions of the final result are shown in Figures 2 and 3. All project partners were represented at the booth during the week: ENEA (as main organizer and financier of the booth) with support from DLR and DTU for all 5 days; CEA, EIFER and JRC for one and a half days each.

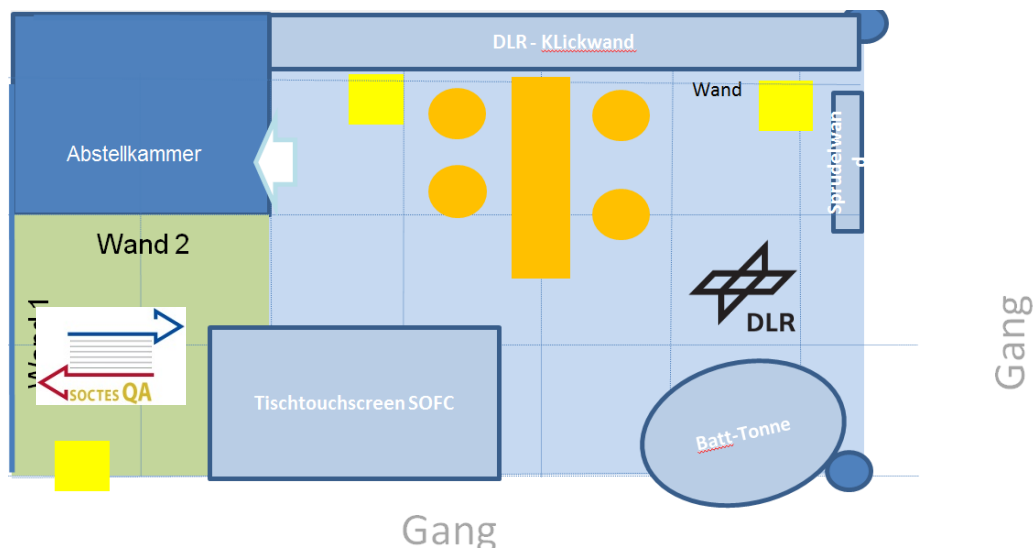


Figure 1: Scheme of SOCTESQA booth integrated with the DLR booth at the Hannover Fair 2017



Figure 2: SOCTESQA booth at the Hannover Fair 2017
(left: Qingxi Fu, EIFER and right: Michael Lang, coordinator, DLR)

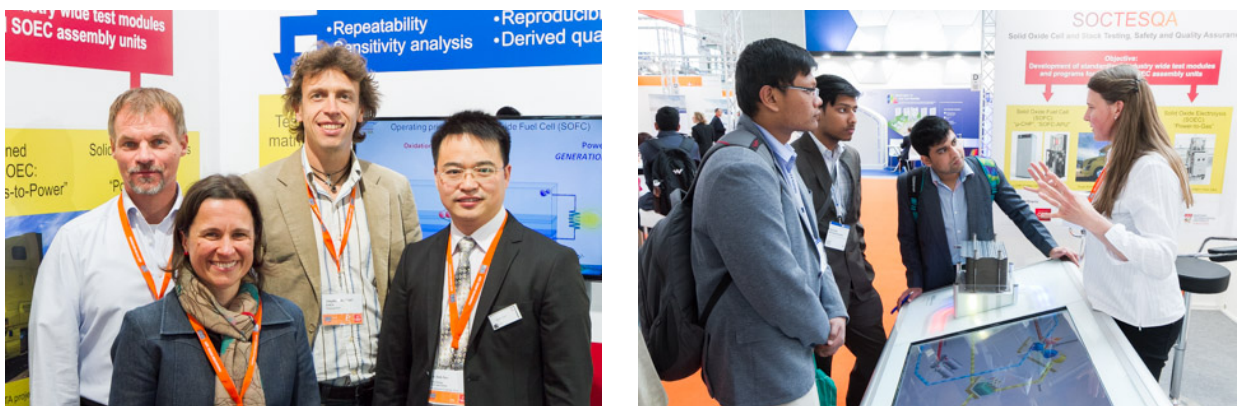


Figure 3: Impressions of the “SOCTESQA” booth: left – Michael Lang (DLR), Karine Couturier (CEA), Stephen McPhail (ENEA), Xiufu Sun (DTU) in front of the “SOCTESQA” booth; right – Corinna Auer (DLR) explaining the SOC basics to interested students

3 Interviews with Fair participants

During the manifold interactions taking place at the event, the following are cited as particularly interesting, in terms of take-up of the procedures as well as giving useful inputs as to follow-up or enlargement of the procedures developed in “SOCTESQA”:

- Andreas Frömmel (FCES, Sunfire) mentioned the lack of similar work for MCFC
- Van Nhu Nguyen (Forschungszentrum Jülich) considered the test module for constant operation valuable to assess the degradation rate of different stacks: FZJ’s 90kh test is a notable example
- Caroline Willich (IREC) debated the applicability of “SOCTESQA” procedures to an all-ceramic stack
- Inozaki Asashi (NEDO) considered the procedures valuable to benchmark improvements in electrolyte development

- Sandro Ruhland (EBZ), as a developer of SOC test benches, recognized the importance of procedures that minimize the influence of the test equipment, as well as of explicitly reporting crucial quantities during measurement
- Mr. Schütte (HC-Starck) enquired about test procedures for regenerative SOFC-SOEC operation for their future adoption
- Klaus Taube (Helmholtz Gesellschaft) considered the integration of hydrogen storage with SOEC operation, especially interesting due to the high temperatures, required for H₂ release
- Mehmet Akif Caddesi (DAL Engineering Group) manifested interest in building SOFC stacks, and recognized the need for testing standards
- David Gong (Shenzen Grand Capital Investment) enquired after the status of SOFC technology for follow-up in China
- Saskia Bostelmann (BOSCH), developed SOFC-APU and recommended the development of standards also for component performance characterisation
- Juergen Puetter (Blue Fuel Energy) was particularly interested in using SOFC for APU and range-extending applications, but enquired after procedures for fuelling with methanol
- Tuomas Hakalo (Convion) – being committed to integrating the best stacks for their systems, Convion is particularly keen to have a common benchmark to evaluate various stack suppliers by
- Yan Xiong (Huazong University) hoped to receive Chinese translations of the test modules
- Rodolfo Tacani (University of Trieste) was particularly interested in marine applications and enquired if these could be covered by the “SOCTESQA” modules
- Alessandro Morbiato (SAES Group) was curious to know whether there were any standards for gas purity considered (especially as regards H₂ produced in SOEC mode)
- Martin Roelke (BOSCH) manifested general interest in the approach to SOC testing
- Carlo Tregambe (ICI Caldaie) enquired after the applicability of the “SOCTESQA” procedures for larger m-CHP testing (>30 kW)
- Mihails Kusnezoff (Fraunhofer IKTS) had extensive comments about the calculation of ASR, and reported these would be brought forward during the next meeting of the IEC Working Group 13

4 Presentation of “SOCTESQA” outcome

Finally, “SOCTESQA” obtained 2 slots for presenting the project outcome at the Fair’s Technical Forum. These were seized as an opportunity to underline the importance of the project’s pre-normative activities in the context of international industrialization and product quality assurance (“Test procedures for SOFC/SOEC - implementation in international standards” presented by Stephen McPhail (Researcher - ENEA) on the 26th of April), as well as to explain the key results of the procedure validation carried out and completed within the project (“Test procedures standardization for industrialisation of SOFC/SOEC” presented by Eva Ravn Nielsen (Center Manager - DTU) on the 27th of April). The video recordings of these presentations can be viewed on YouTube, at the following links respectively:

<https://youtu.be/R0dOIZo10iY>

<https://youtu.be/eDiFcgGpdll>

Overall, organizing the final workshop directly where the targeted audience was known to be present, rather than as a separate event where it would be difficult to engage and involve the wide range of interested parties, was considered a success, especially since the audience reached was very much larger than could be expected of a specific project workshop. It is now important to take note of the inputs gained during the Fair and to modulate the definition of the international standards accordingly,

maintaining constant visibility of the FCH JU and the support of the European Commission towards the implementation of quality-assured procedures for SOC characterization and industrialisation. For a start, the finalized test modules will be made available on the ongoing “SOCTESQA” website, www.soctesqa.eu, for free download by all interested parties.