



## **INNO-SOFC Deliverable D5.3**

### **Dissemination workshop for industrial stakeholders**

**Date:** 09/05/2017

**Lead Beneficiary:** ENEA

**Nature:** Report

**Dissemination level:** Public

#### **Summary:**

The dissemination workshop for INNOSOFC was organized as a joint workshop with the other EU projects NELLHI, DEMOSOFC and HELTSTACK. In this way, cross-fertilization was promoted and a larger number of industrial stakeholders could be reached.



**The Joint Workshop on the Development of the European SOFC Value Chain**

**30 January 2017, Stuttgart, Germany**

Hosted in conjunction with the *Fundamental developments in fuel cells (FDFC)* conference, 31 Jan-2 Feb 2017, Stuttgart

The 4 Projects HELTSTACK, NELLHI, INNOSOFC and DEMOSOFC, with support from the Fuel Cells and Hydrogen Joint Undertaking (FCH JU), organised a unique collaborative event, showcasing the advancement of SOFC technology within an all-European supply chain for next-generation, clean heat and power.

**The Projects:**

- HELTSTACK: Scientific networking and SOFC stack development
- NELLHI: SOFC stack development for mass manufacturing
- INNOSOFC: SOFC system integration and market assessments
- DEMOSOFC: SOFC system demonstration at a municipal waste-water-treatment plant

**Workshop objectives:**

- Pairing business & research: what does the market need? what can the technology offer?
- A briefing on the status of stack manufacturing cost and production volume trajectories
- Evaluating business opportunities in EU, the most promising potential markets and applications
- Reaching out to technology uptakers, industries and potential customers

**Programme:**

11.00-11.30	Introduction from the FCH JU, outlook & expectations for SOFC in stationary applications	Dionisis Tsimis (FCH JU)
11.30-12.00	10-minute overview of each project: objectives, status, outcomes	Reio Pöder (NICPB), Stephen McPhail (ENEA), Jari Kiviaho (VTT), Marta Gandiglio (PoliTO)
12.00-12.20	Elcogen's latest stack product: performance, reliability, cost	Matti Noponen (Elcogen)
12.20-12.40	Making volume happen: component manufacturing for roll-out	Robert Berger (Sandvik)
12.40-13.00	Packaging the Power: Convion's latest CHP modules	Erkko Fontell (Convion)
13.00-14.00	Lunch	
14.00-14.20	Finding a business case: Applications and their Market	Jeroen Larrivéé (Energy Matters)
14.20-14.40	Making money: Business Analyses	Marta Gandiglio (PoliTO)

**Key findings:**

- The SOFC technology in Europe is improving rapidly in terms of performance
- Close integration of projects follows the take-up from core technology to market application
- Component manufacturing is ready for mass market roll-out, big orders are now needed

- Many (niche) markets identified, business investigations needed to identify low-hanging fruit
- Commercial viability proven in many cases, technology (long-term) reliability is key requirement

**Attendants:**

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The FCH JU dedicates about 25% of portfolio budget to SOFC-related projects, 80% of which related to CHP. Most projects focus on residential-scale applications but there is an increased interest in developing further the commercial segment (50-200kW) in a similar way as residential. However, all other application areas are viable, including H<sub>2</sub> generation and Transport (battery charging and APU). The launched AWP2017 provides 6 Topics in RIA and 2 in IA that (could) concern SOFC.

The SOFC technology presented in this workshop is Elcogen's, which – thanks to the development within HELTSTACK and NELLHI – has proved exceptional performances at <650°C operating temperatures, including >70% gross efficiency and >85% single-pass fuel utilization. Low degradation rates are being achieved with coated interconnects, and in idealized, single-cell conditions even extremely low, indicating 100kh is technically achievable with planar technology. With 50MW/y production capacity a unit stack *price* of 1000€/kW can be achieved.

Convion shows how the technology standard developed in Wärtsila has been improved by over 50% in system simplicity aspects such as number of functional components, weight/power and volume/power ratios, leading to corresponding BoP cost reductions which can compensate for the high stack cost in order to achieve competitive prices. Convion targets system flexibility in terms of type of stack integration and fuel feed, but also in terms of power delivery, even synergizing with battery packs to provide grid services.

Electricity remains the largest value driver for SOFC, due to their high efficiency. This means that a large spark-spread is beneficial for their profitability, but also specific cases where a large value is tied to delivered electricity: mission-critical services requiring prime power such as smaller data centres are examples, but also superchargers for electric mobility (up to 60€/ct./kWh), which is being pushed strongly in the European framework. WWTPs (>20k people-equivalent incoming load, corresponding to >30kW SOFC)



like the DEMOSOFC site also have huge potential, with 2.5-7 Gm<sup>3</sup>/y of biogas that could generate 1-2.5 GW of power using SOFC, that can largely be used on-site, with great savings on the plant's electricity bill. Thanks to the SUPERSOFC workshop, a closer integration of the DEMOSOFC and INNOSOFC projects will be pursued, leveraging the potential of addressing this market segment with SOFC systems in the future. To this effect, a common videoclip will be produced showcasing the chain from stack production (at Elcogen), to system integration (at Convion) and final application (DEMOSOFC).