



SOSLeM

Solid Oxide Stack Lean Manufacturing

Elli Varkaraki
HTceramix SA / SOLIDpower

<http://www.soslem.eu/>

Coordinators: Marco Alberani & Simone Zanzarin
Email: simone.Zanzarin@solidpower.com

Programme Review Days 2017
Brussels, 23-24 November

PROJECT OVERVIEW



- Call year: 2015
- Call topic: FCH-02.6-2015 Development of cost effective manufacturing technologies for key components of fuel cell systems
- Project dates: 01.04.2016 - 31.03.2019
- % stage of implementation 01/11/2017: 50 %
- Total project budget: 2.85 million €
- FCH JU max. contribution: 1.99 million €
- Other financial contribution: 860 k€ (CH)
- Partners: SOLIDpower, AVL, Athena, EPFL, Greenlight Innovation, HTceramix

PROJECT SUMMARY



SOSLEM aims at facilitating the market penetration of fuel cells by reducing the production costs

- Improvement of production processes
- Novel manufacturing technologies for Solid Oxide Cell stacks
- Reduction of manufacturing costs by about 70%
- Reduction of capital cost at about 2500 €/kW

In terms of industrial SOFC applications in Europe, SOLIDpower essentially represents the State-of-the-Art

The stationary applications of Solid Oxide Cells address a large number of market areas, from Cogeneration of Heat and Power and Energy Storage, to Power-to-Gas or Power-to-Fuel applications

PROJECT PROGRESS/ACTIONS



Objective of MAWP 2014-2020	Status and comments
Enable environmental benefits	- Replacement of Co-based powder - Evaluation of on-site Nickel removal from waste water

FCH-02.6-2015 Challenge	Key innovation by the project
Significant cost reduction in manufacturing	- No-brushing of cassettes reduced by 30% the manufacturing cost from around 4500 €/kW to 3150 €/kW - Automated laser welding under implementation - Reduced qualification times by simplifying the stack test station

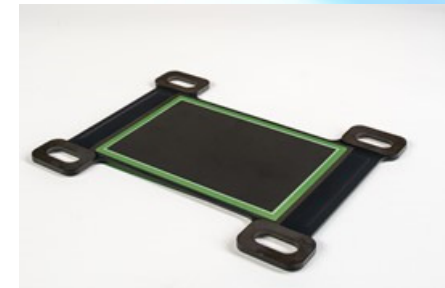
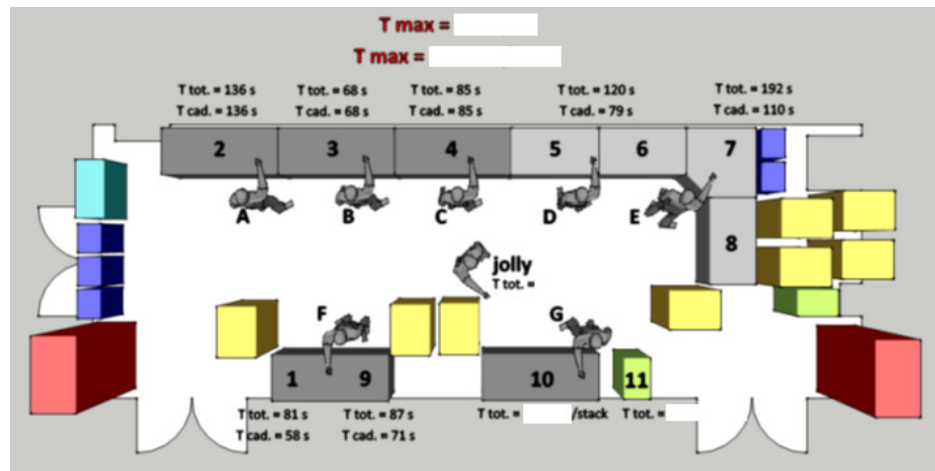
PROJECT PROGRESS/ACTIONS



- Advanced glass curing
- Improved sealing adhesion



SOLIDpower's room for stack assembly



- Frequency signature of relevant failure modes
- Requirements for “end of the line” diagnostic tools (THDA, EIS)
- Segmented cell

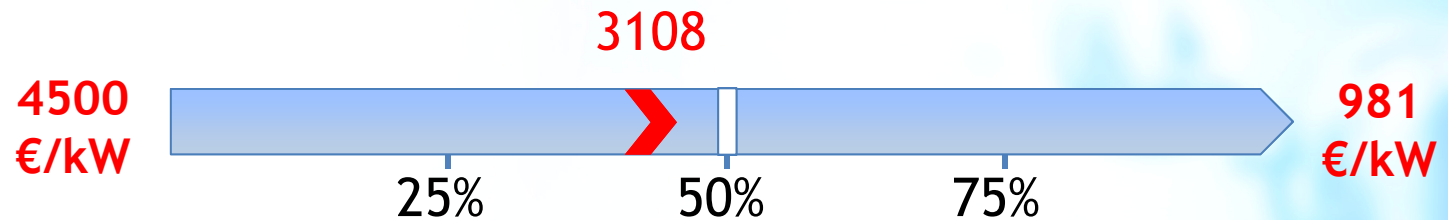
PROJECT PROGRESS/ACTIONS



- Revised stack conditioning process
- New, low cost, conditioning and qualification test system



PROJECT PROGRESS/ACTIONS



Aspect addressed	Parameter (KPI)	Unit	SoA 2016	Reached	Target
				2017	2020
Cost	Manufacturing cost of stack	€/kW	4500	3108	981
Novel manufacturing process	TRL (average)	-	5	6	7

Future steps:

Implement cassette production with new welding process

Introduce the new stack conditioning and qualification test station in the production line

SYNERGIES WITH OTHER PROJECTS AND PROGRAMMES



- Interactions with projects funded under EU programmes
 - ENDURANCE: Enhanced durability materials for advanced stacks
 - MMLRC=SOFC: novel design for lightweight SOFC stacks
 - PROSOFC: Improving the robustness, manufacturability, efficiency and cost of Topsoe Fuel Cell's stack
 - D2Service: cost and labour reduction for repair work
 - DIAMOND: Innovative strategies for diagnosis and control
 - Ene.field: 1000 micro-CHPs into homes
 - PACE: major initiative towards mass market commercialisation

DISSEMINATION ACTIVITIES



- Project brochure and website
- EPFL Master course on fuel cells
- **Advanced Fuel Cells Annex of the International Energy Agency**
- **Standardisation of Quality Controls of Stacks, Participation in standard setting bodies**

Conferences and Fairs:

- FC EXPO 2018, Tokyo, Japan, 28.2 - 2.3.2018
- MODVAL 2018, Aarau, Switzerland, 12-13.4.2018
- Hannover Fair, Hannover, Germany, 23-27.4.2018
- European Fuel Cell Forum 2018, Lucerne, Switzerland, 3-6.7.2018

Thank You!

Coordinator: marco.alberani@solidpower.com
simone.zanzarin@solidpower.com

Speaker: elli.varkaraki@solidpower.com