NELLHI
New all-european high-performace stack: design for mass production

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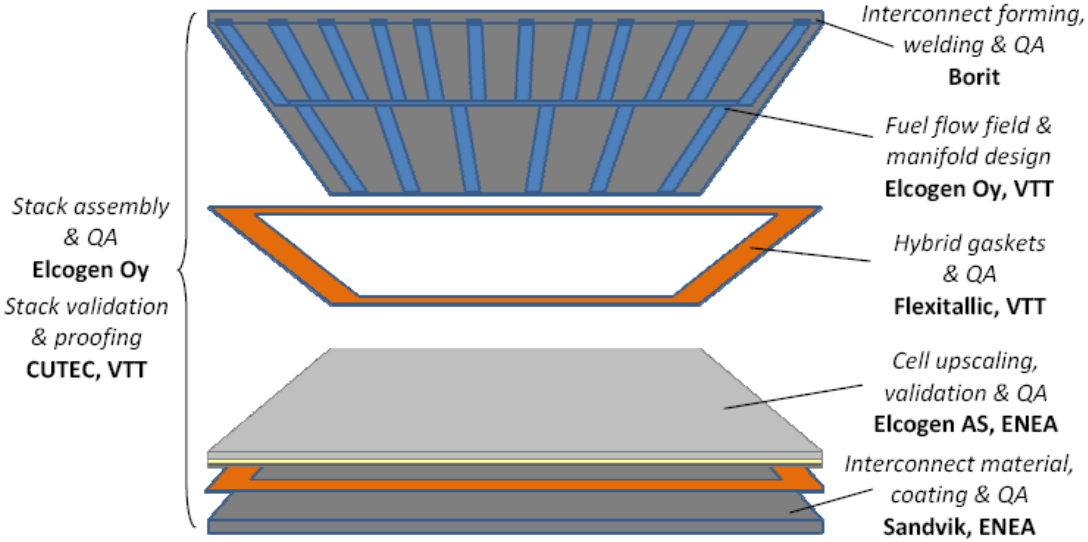
PROJECT OVERVIEW

Project Information	
Year	2013
Call topic	SP1-JTI-FCH.2013.3.2 Improved cell and stack design and manufacturability for application-specific requirements for Stationary Fuel Cell power and CHP systems
Project dates	01/05/2014 – 30/04/2017
Implementation %	100%
Total budget (€)	2,858,447.20
FCH JU contribution (€)	1,633,895.00
Other contribution (€, source)	
Partners	ENEA (IT), Elcogen AS (ET), Elcogen Oy (FI), VTT (FI), Flexitallic (UK), Borit (BE), Sandvik (SE), CUTEC (DE)

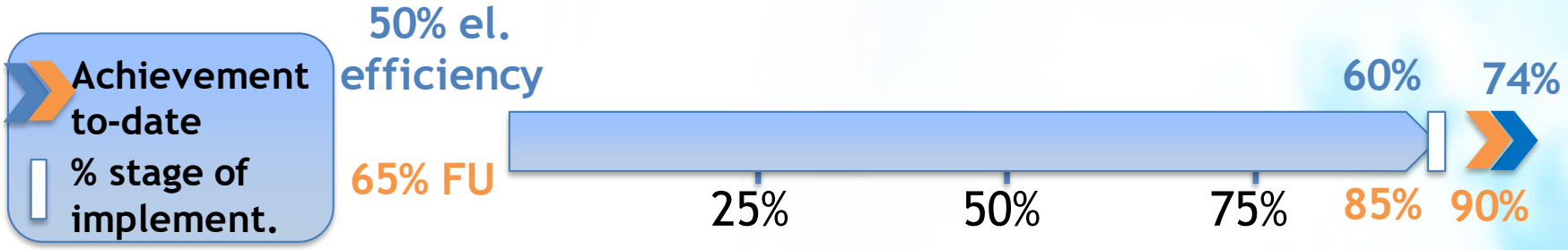
PROJECT SUMMARY

NELLHI is an all-European technology assembly for a high-performance, low-cost, mass-manufacturable **SOFC stack**

- High performance: Elcogen AS Cells @ 650° C
- Low-cost materials: cells, seals and interconnect steel
- Mass manufacturing: Flexitallic casting, Borit hydroforming, Sandvik roll-to-roll precoating, Elcogen Oy automated assembly
- 1000 €/kW stack, 0.2%/kh degradation, 900 mV @ 0.4 A/cm2
- Natural-gas fed applications for CHP at all scales (1 – xxx kW)



PROJECT PROGRESS/ACTIONS - Performance



Aspect addressed	Parameter (KPI)	Unit	SoA 2017	FCH JU Targets		
				Call topic	2017	2020
Performance	Electrical efficiency	%	60	n.a.	>60%	70%
	Fuel utilization	%	91 *)	n.a.	n.a.	n.a.

Future steps:

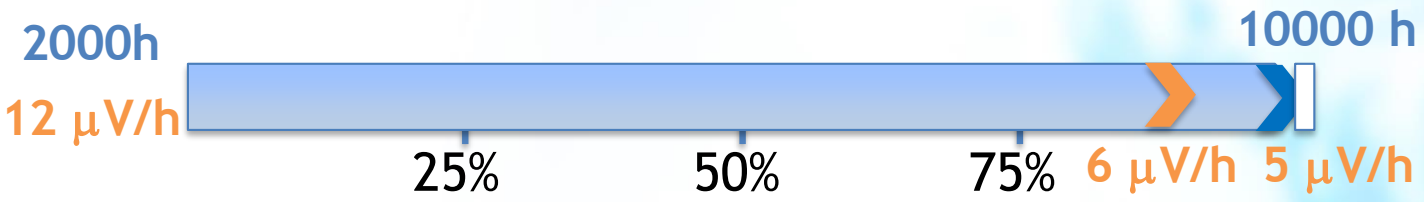
Reduce costs, maintain performance, increase reliability

*) Elcogen values = SoA

PROJECT PROGRESS/ACTIONS - Durability

Achievement to-date

% stage of implement.



Aspect addressed	Parameter (KPI)	Unit	SoA 2017	FCH JU Targets		
				Call topic	2017	2020
Durability	Stack Lifetime	h	20 000 *)	n.a.	12 y (syst)	13 y (syst)
	Degradation rate	µV/h	10 *)	n.a.	n.a.	n.a.

Future steps:

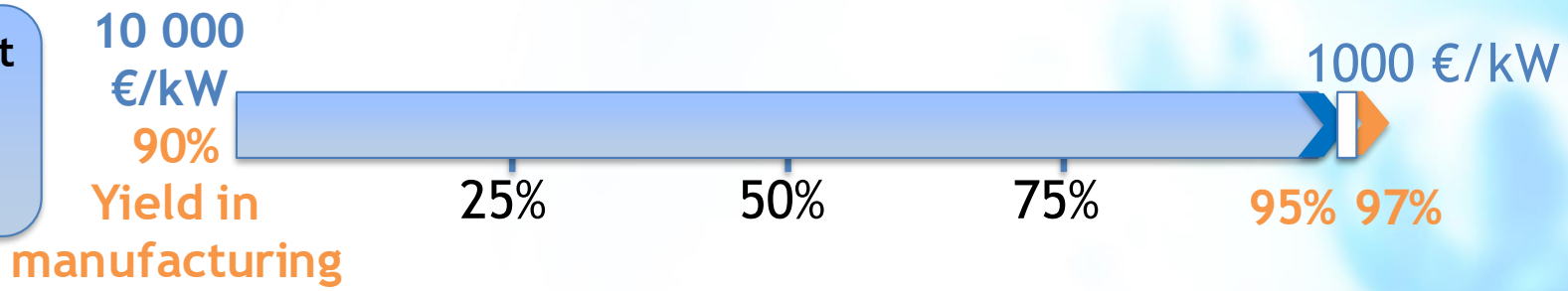
Optimization of protective coating

*) Market values

PROJECT PROGRESS/ACTIONS - Cost & capacity

Achievement to-date

% stage of implement.



Aspect addressed	Parameter (KPI)	Unit	SoA 2016	FCH JU Targets		
				Call topic	2017	2020
COST	Specific stack cost	€/kW	5 000	n.a.	14000 (syst)	12000 (syst)
	Manufacturing yield	%	95	n.a.	n.a.	n.a.

Future steps:

Further component design optimizations, robotic stack assembly, increased stack conditioning speed

*) Stack production in Europe

SYNERGIES WITH OTHER PROJECTS AND PROGRAMMES

Interactions with projects funded under EU programmes	
SOCTESQA	Adoption of testing procedures for stacks: better benchmarking
INNOSOFC	Exchange of NELLHI stack design specs and characterization data: better stacks into the INNOSOFC system
DEMOSOFC	Realizing a real-potential supply chain: consciousness
qSOFC	Quality assurance and step increase in stack component manufacturing
BALANCE	Utilization of single-cell set-up designed in NELLHI: more insight into cell processes
Interactions with national and international-level projects and initiatives	
IEA AFC Annex 32	Promotion of NELLHI stack and consortium as example of mass manufacturing: more awareness
STEP	Optimization of stack design and manufacturing processes: in-depth development
ElPaSO	Integration of Flexitallic gaskets in stacks: consolidation on components

DISSEMINATION ACTIVITIES

Public deliverables

- D2.1 Report on cell performance validation
- D4.4 Summary of steel pre-coating materials, characterization and coating/manufacturing
- D6.4 Workshop for dissemination to industrial stakeholders
- D6.6 Final Layman's project report

Conferences/Workshops

- 1 organised by the project
- 3 in which the project has participated (but not organised)

Publications: 7

- M. Rautanen et al., J. Power Sources (284, 15) 2015
- F. Santoni et al., J. Power Sources (370) 2017

Patents: 20

- EP3103153 (A1) *Assembly Method And Arrangement For A Cell System*, Elcogen Oy
- 1614946.0 (UK) - *Thermiculite CL87* by Flexitallic Ltd.

EXPLOITATION/EXPECTED IMPACT

Exploitation

5 industries: Enhanced co-operation, alignment and solidity within SOFC-stack value chain

3 R&D centres: Qualification and correlation of cell & stack performance tests, including in-cell process identification, cycling, long term operation

Impact

Higher quality, more cost-effective products for customers

Higher quality data, real interaction and close collaboration with industry advancing development

Thank You!

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