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Deliverable D39 D8.5 - Materials (presentations, posters, etc.) for final project workshop/event

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Dissemination Level		
PU	Public	☒
PP	Restricted to other programme participants (including the Commission Services)	☐
CO	Confidential, only for members of the consortium (including the Commission Services)	☐

Version History

Version	Date	Author	Organisation	Description
V0.1	May 2019	J. Hughes	PNO	Initial draft/planned content & requests to all partners
V0.2	August 2019	R. Steinberger-Wilckens	UBHAM	Consolidated content (all partners)
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Index

Index of figures

Index of tables

Glossary

Table 1: Glossary

PNO	PNO Consultants (UK)
SFC	Senior Flexonics Crumlin (UK)
UBHAM	University of Birmingham (UK)
WP	Work Package
DoA	Description of the Action
AMD	Amendment
R&D	Research and Development
Cr	Chromium
SOC/SOFC	Solid Oxide Cell / Solid Oxide Fuel Cell
CAPH	Cathode Air Pre-Heater
CHP/mCHP	Combined Heat and Power / micro-Combined Heat and Power
PACE	Pathway to a Competitive European Fuel Cell micro-Cogeneration Market
OEM	Original Equipment Manufacturer
ICI	ICI Caldaie (Italy)
SUNFIRE	Sunfire GmbH (Germany)
EDX	Energy Dispersive X-Ray
XRD	X-ray powder diffraction
SEM	Scanning Electron Microscopy

1 Introduction

The purpose of this deliverable is to record the materials created for, and used during, the final HEATSTACK project event.

The purpose of the event itself was to disseminate key achievements/results from HEATSTACK to relevant stakeholders.

1.1 Background to the choice of final event

The DoA (Annex 1, Part A) required HEATSTACK to have a final event:

End of project event:
A dedicated project workshop will be organised at the end of the project (Month 35). The purpose of this workshop will be to raise awareness of the project, involving international experts in the field and the WP leaders from the consortium. The final workshop will provide the opportunity to present the results of the project to European private and public stakeholders including the general public.

This directly supports the overall objective of **WP8 Dissemination, Exploitation and Communication**, which was "*to analyse, present and communicate the project results*". It also supports specific WP8 objectives:

- Disseminate the key findings of this research programme through appropriate channels

- Maximise the project's visibility by creating a distinctive project identity

- Communicate project information (objectives, activities and achievements) to a wide audience of industry players, policy makers, the wider scientific community and the general public

- Facilitate future commercial exploitation of the research outputs [e.g. products, processes, services]

Although the project was extended twice in 2019 (see further: **AMD-700564-12**, end date 30/11/2019;and, **AMD-700564-13,** end date 29/02/2020), a final event had to be committed to many weeks in advance based on the project end date as it was at the time of planning (i.e. Q1 2019) and when the expected project end date was June 2019 [Month 37]. The end date as a result of the extension requests was ultimately February 2020 [Month 45].

The consortium therefore chose the 12th Progress in Fuel Cell Systems workshop series, which was held in May 2019 [Month 36], as the official end-of-project event. This annual event, which focuses on solid oxide, high temperature and stationary applications, brings together industry, research and academia active in the field of Fuel Cell System technology, with attendance of approximately 30 of the top people participating each year.

The project's participation at that event was supported by including HEATSTACK at SUNFIRE's exhibition booth at the Hannover Messe in April 2019 [Month 35]. This event is Europe's largest hydrogen, fuel cells and battery exhibition – a world leading event in this area that attracts up to 200,000 visitors over the 5 days and had approximately 6,500 exhibitors. It was agreed by all partners

that this would provide the best mix of engaging with direct stakeholders (commercial/industry and academia/research) as well as the wider stakeholder community (policy makers and influencers, media, general public).

2 Presentations – Progress in Fuel Cell Systems

The primary materials for presenting HEATSTACK's key achievements/results at the chosen final event were presentations from the project coordinator and partners leading each area of R&D.

The presentations delivered were:

1. Design and manufacture of Cathode Air Pre-Heaters
2. Gas/Gas Heat Exchanger for process intensification
3. Status of the development and manufacturing of Sunfire-Home
4. The Effect of Pre-heat Treatment of AluChrom 318 on the Corrosion Behaviour and Cr Evaporation in SOFC Cathode Air Pre-heater

2.1 Presentation #1: Design and manufacture of Cathode Air Pre-Heaters

This presentation was created by SFC and was delivered by Charlie Penny. In addition to providing an overview of the project, listing the objectives and outlining the main risks and challenges, it detailed the development conducted around the new AluChrom 318 material and summarised the impact on cycle times for manufacturing their CAPHs. This presentation had 21 slides, approximately half of which were focused on AluChrom 318.

A selection of slides is illustrated in Figures 1-5:

Figure 1: SFC presentation – slide 3

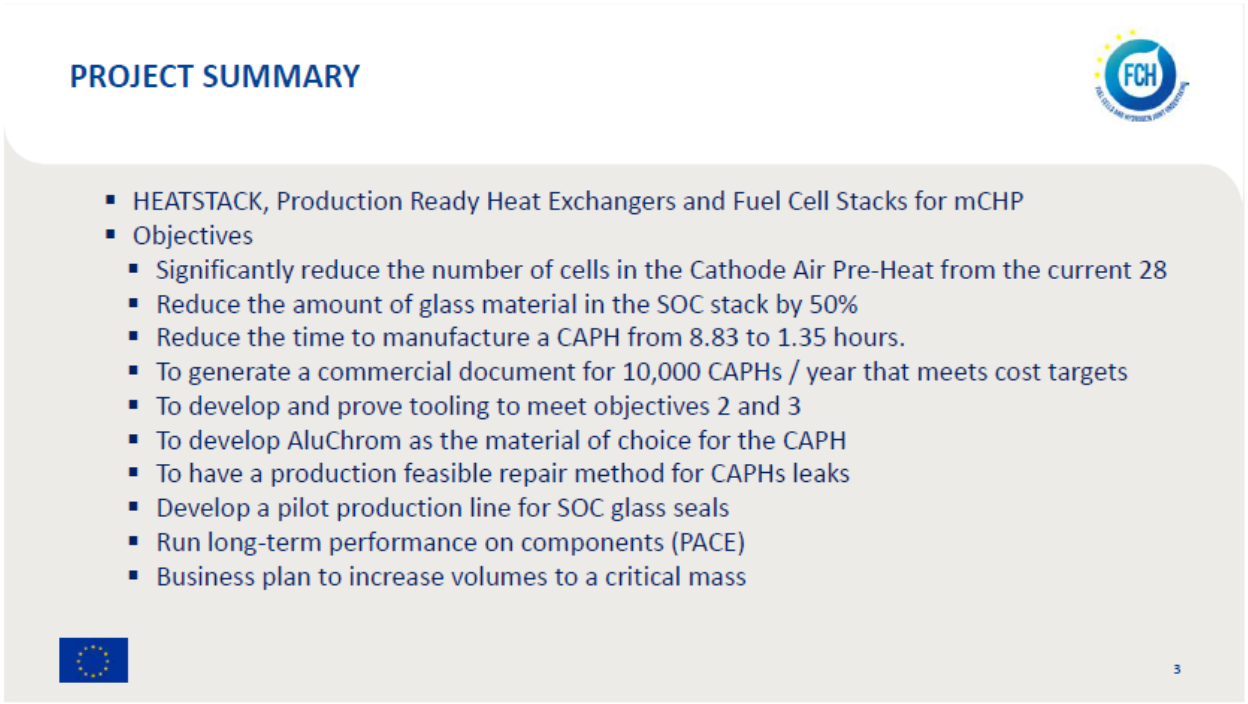


Figure 2: SFC presentation – slide 6

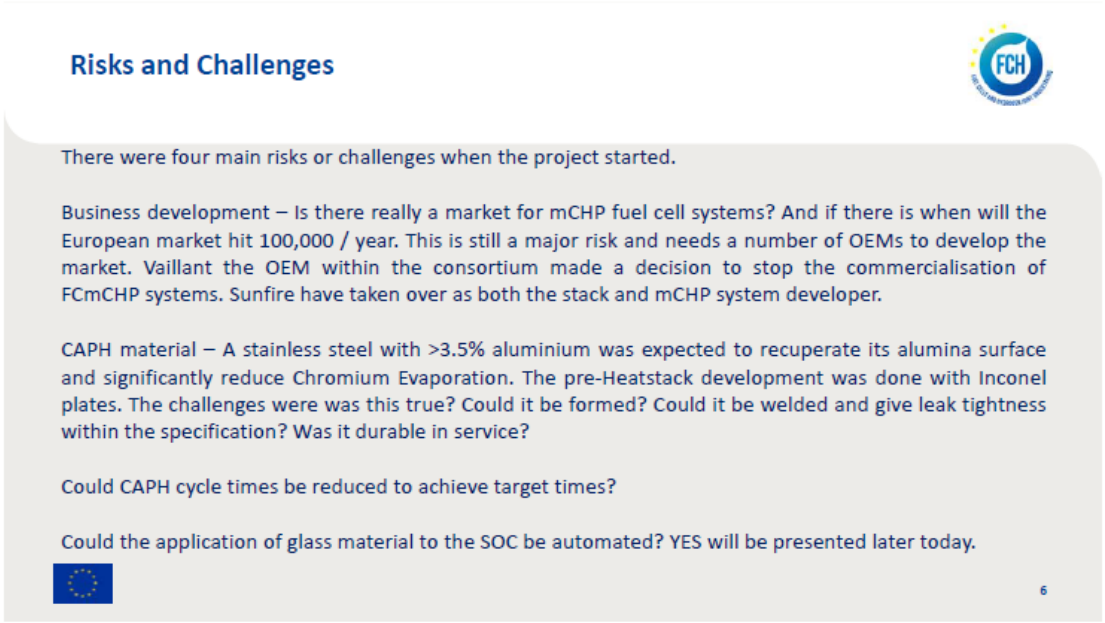


Figure 3: SFC presentation – slide 10

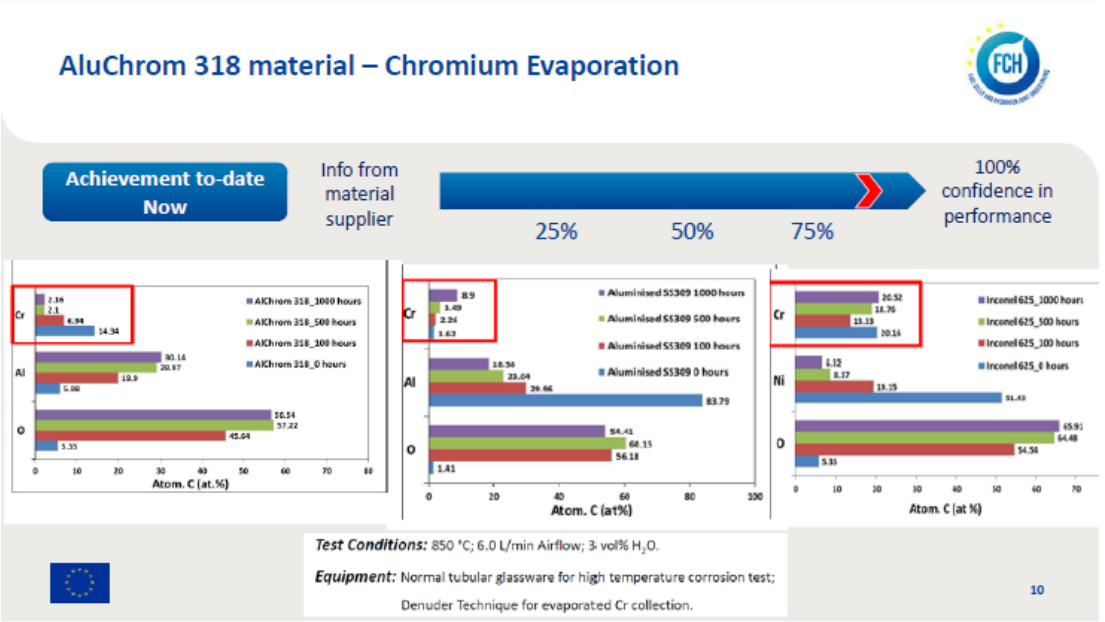


Figure 4: SFC presentation – slide 12

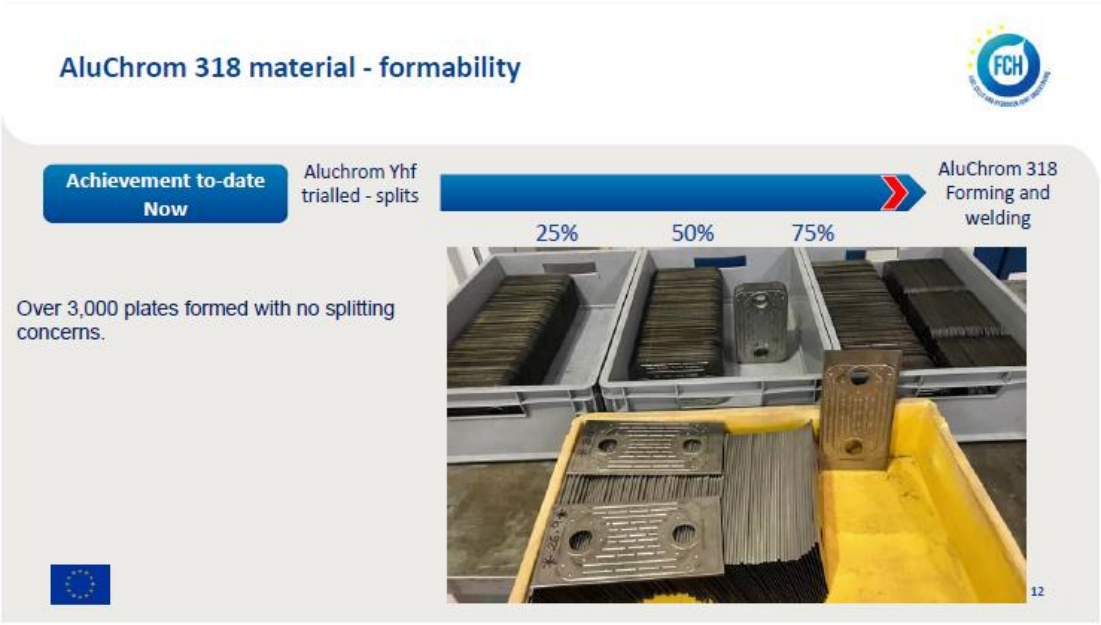
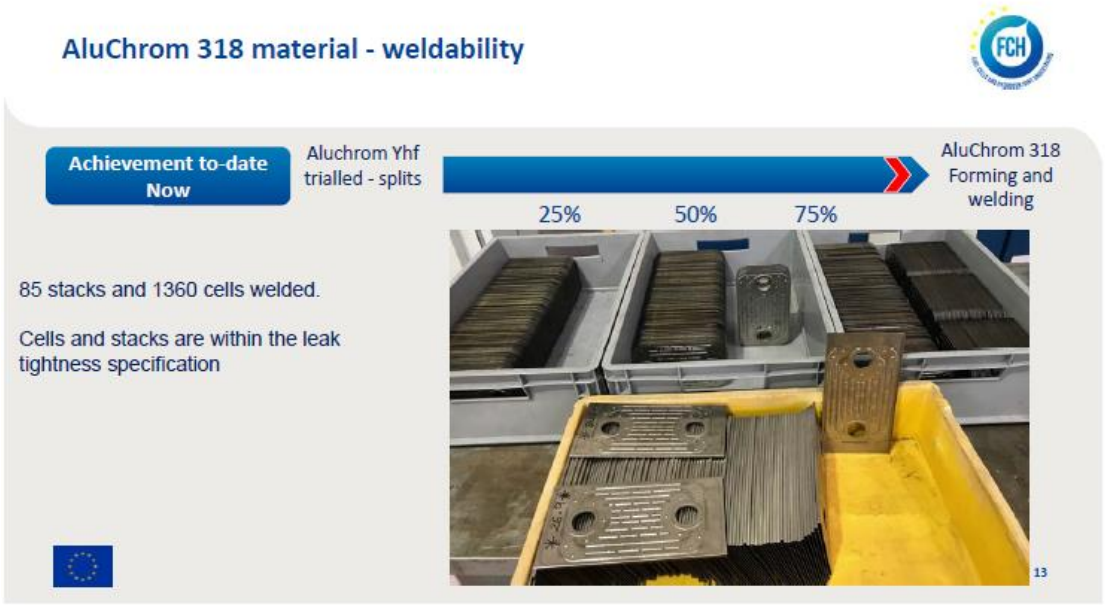


Figure 5: SFC presentation – slide 13



2.2 Presentation #2: Gas/Gas Heat Exchanger for process intensification

This presentation was created by ICI and was delivered by Carlo Tregambe. It had 27 slides, which charted ICI's evolution from boilers to top boilers (including green and advanced predictive systems) then focused on further evolution to go beyond boilers to CHP. The presentation also gave examples of ICI's projects and products, emphasised the benefits of collaboration and undertaking R&D, and covered the transition to a hydrogen economy.

A selection of slides is presented in Figures 6-9:

Figure 6: ICI presentation – slide 9

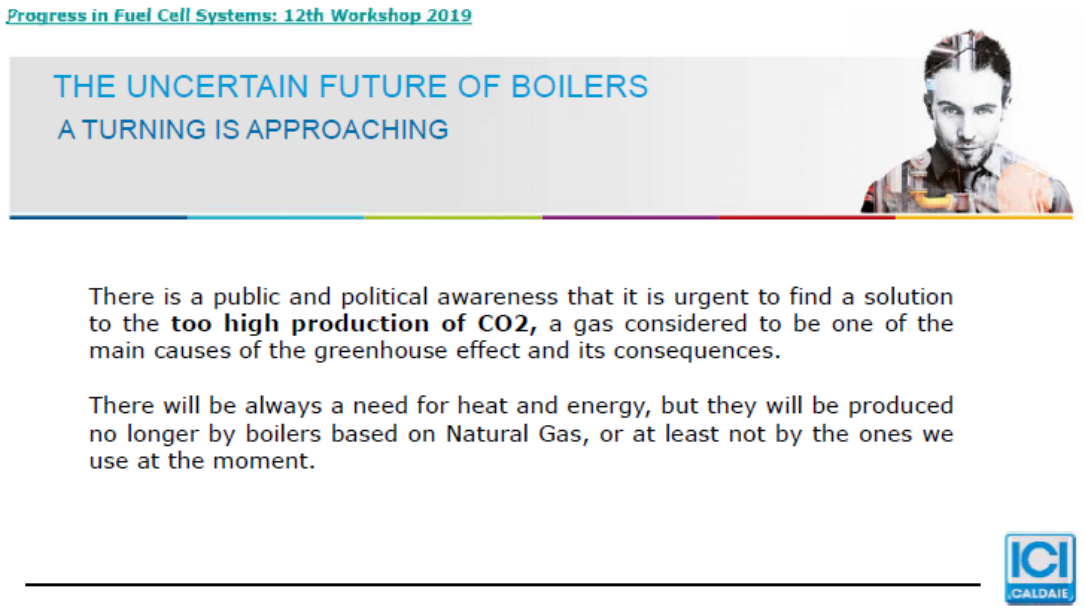


Figure 7: ICI presentation – slide 11

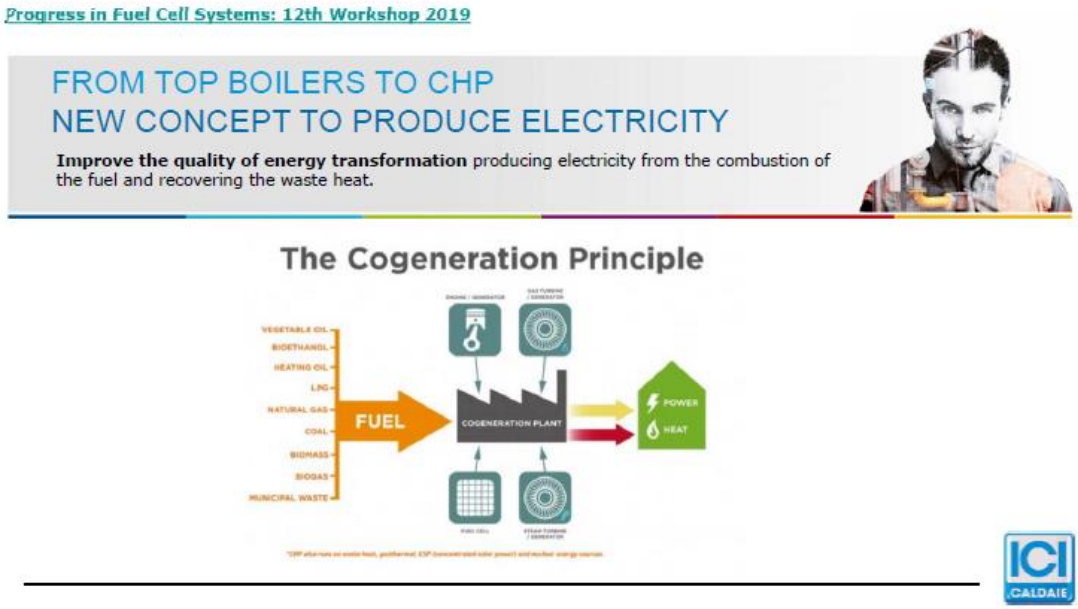


Figure 8: ICI presentation – slide 12

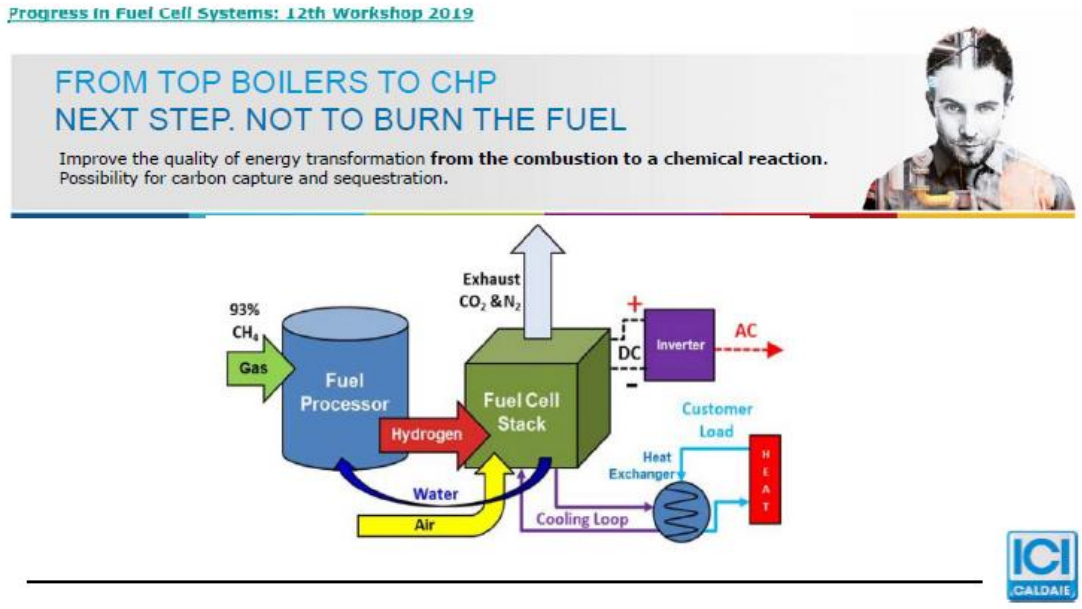
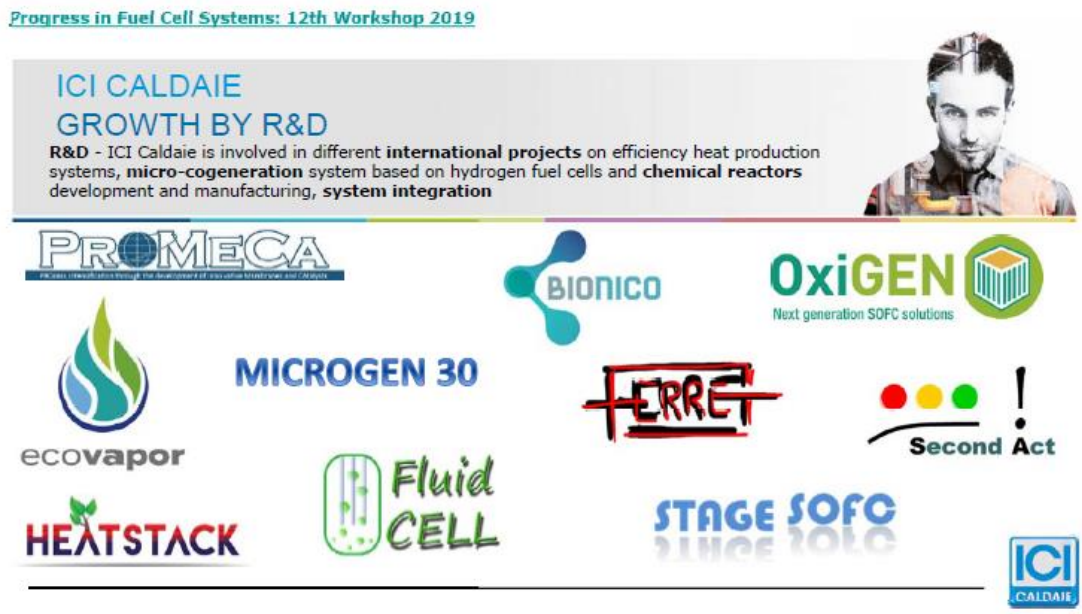


Figure 9: ICI presentation – slide 21



2.3 Presentation #3: Status of the development and manufacturing of Sunfire-Home

This presentation was created by SUNFIRE and presented by Dr. Tobias Seidel. It had 18 slides, which were split into 2 sections:

i. company information, product and service portfolio, vision, and information on the Sunfire-Home system specifically; and
ii. development undertaken during WP3 and WP5* within HEATSTACK.

*It should be noted that WP5 was ongoing at the time of the event (and this was one of the reasons for AMD-12/AMD-13), so some achievements/results could not be presented.

A selection of slides is presented in Figures 10-13:

Figure 10: SUNFIRE presentation – slide 4

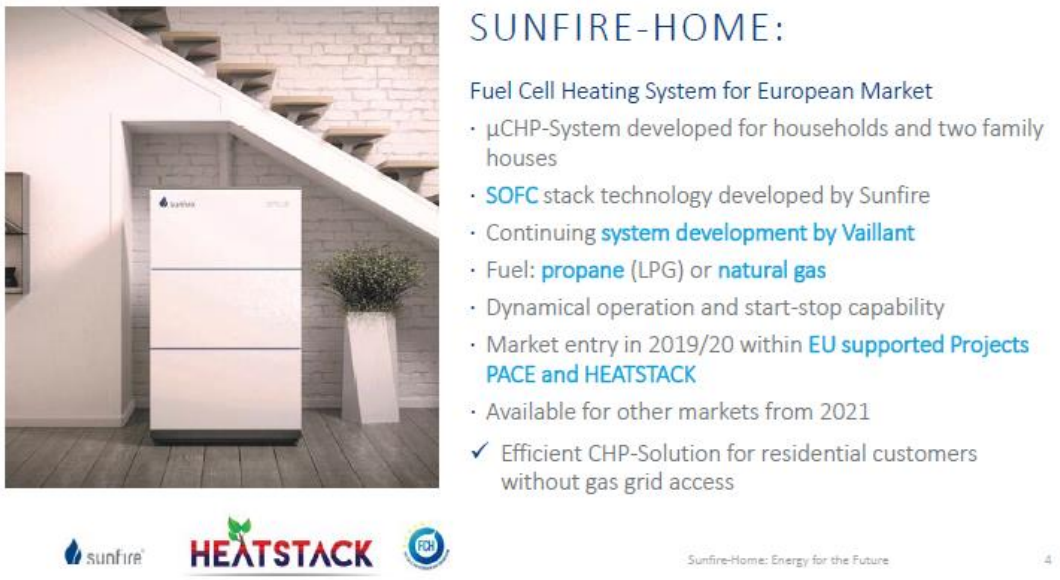


Figure 11: SUNFIRE presentation – slide 5

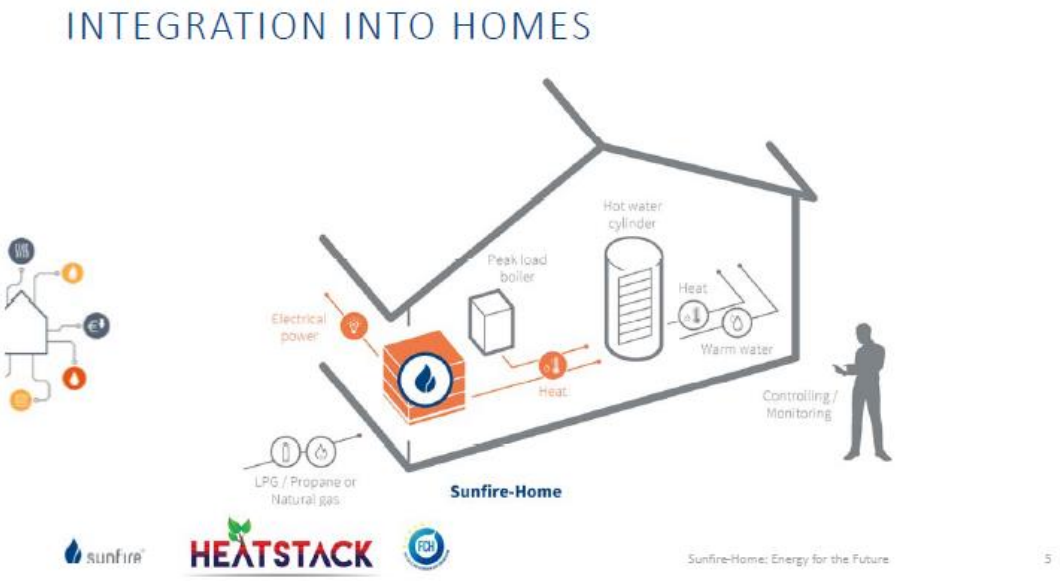


Figure 12: SUNFIRE presentation – slide 12

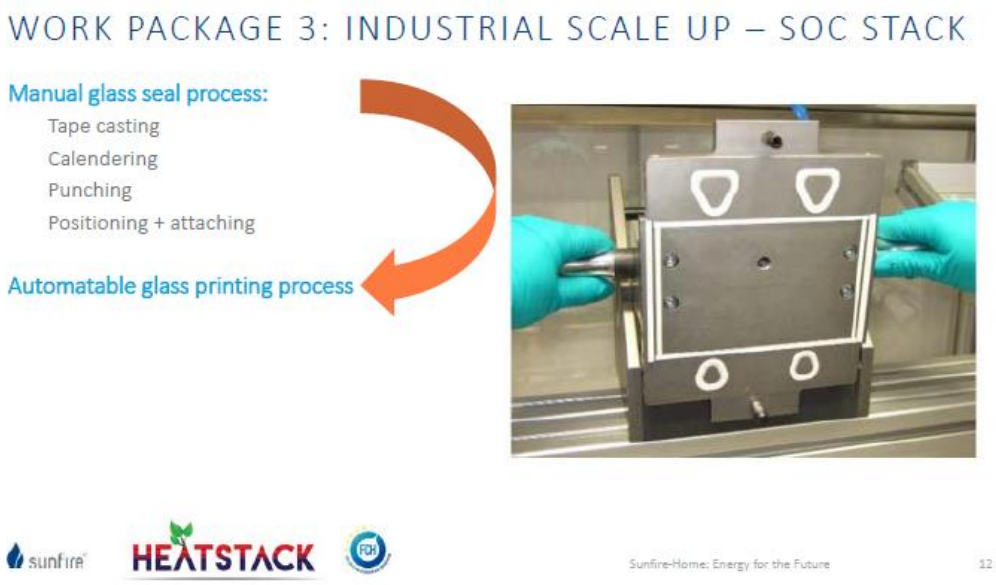


Figure 13: SUNFIRE presentation – slide 13

2.4 Presentation #4: The Effect of Pre-heat Treatment of AluChrom 318 on the Corrosion Behaviour and Cr Evaporation in SOFC Cathode Air Pre-heater

This presentation was created by UBHAM and was delivered by Kun Zhang. It had 16 slides, which detailed a wide range of testing carried out during their investigations and research within HEATSTACK, including:

- Effect of Time and Temperature on the Pre-treatment
- EDX: Surface Element Concentration
- XRD Analysis
- SEM/EDX Analysis
- Exposure Test
- Corrosion Testing-Mass Gain
- Cr Evaporation Test
- Surface Morphology After Exposure Tests

A selection of slides is presented in Figures 14-17:

Figure 14: UBHAM presentation – slide 3

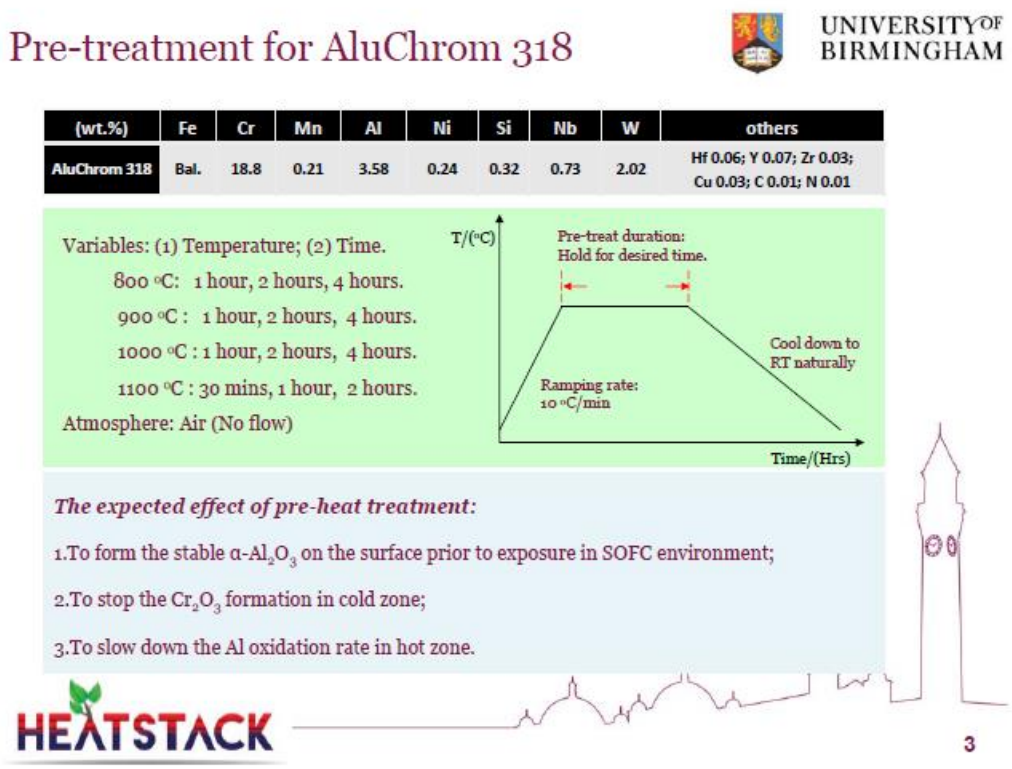
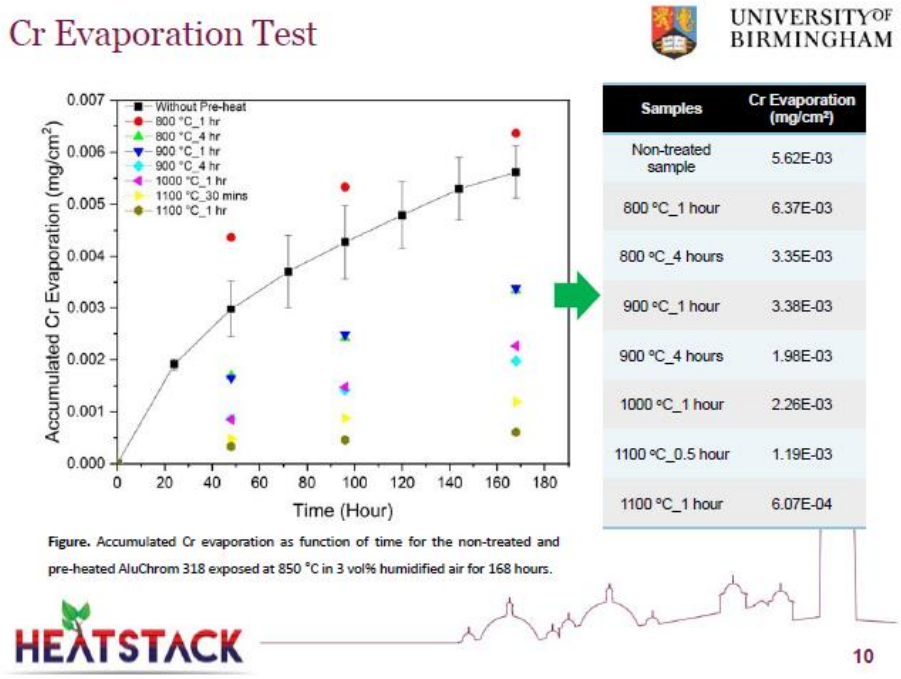


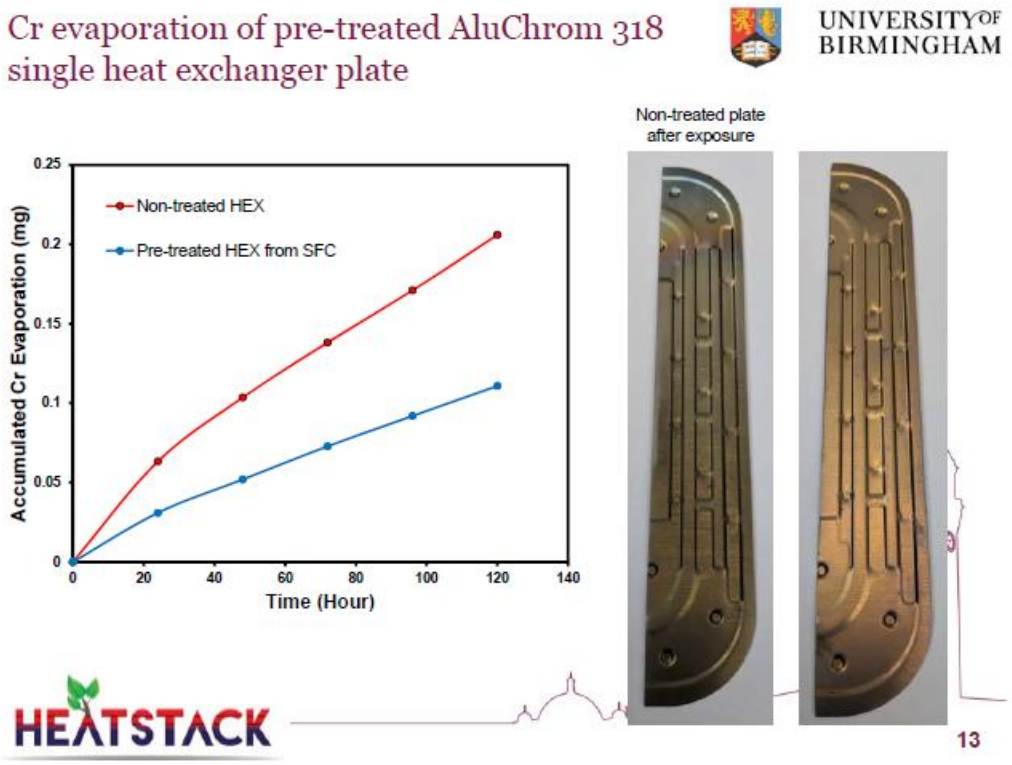
Figure 15: UBHAM presentation – slide 10



Samples	Cr Evaporation (mg/cm²)
Non-treated sample	5.62E-03
800 °C_1 hour	6.37E-03
800 °C_4 hours	3.35E-03
900 °C_1 hour	3.38E-03
900 °C_4 hours	1.98E-03
1000 °C_1 hour	2.26E-03
1100 °C_0.5 hour	1.19E-03
1100 °C_1 hour	6.07E-04

Figure 16: UBHAM presentation – slide 12

Figure 17: UBHAM presentation – slide 13



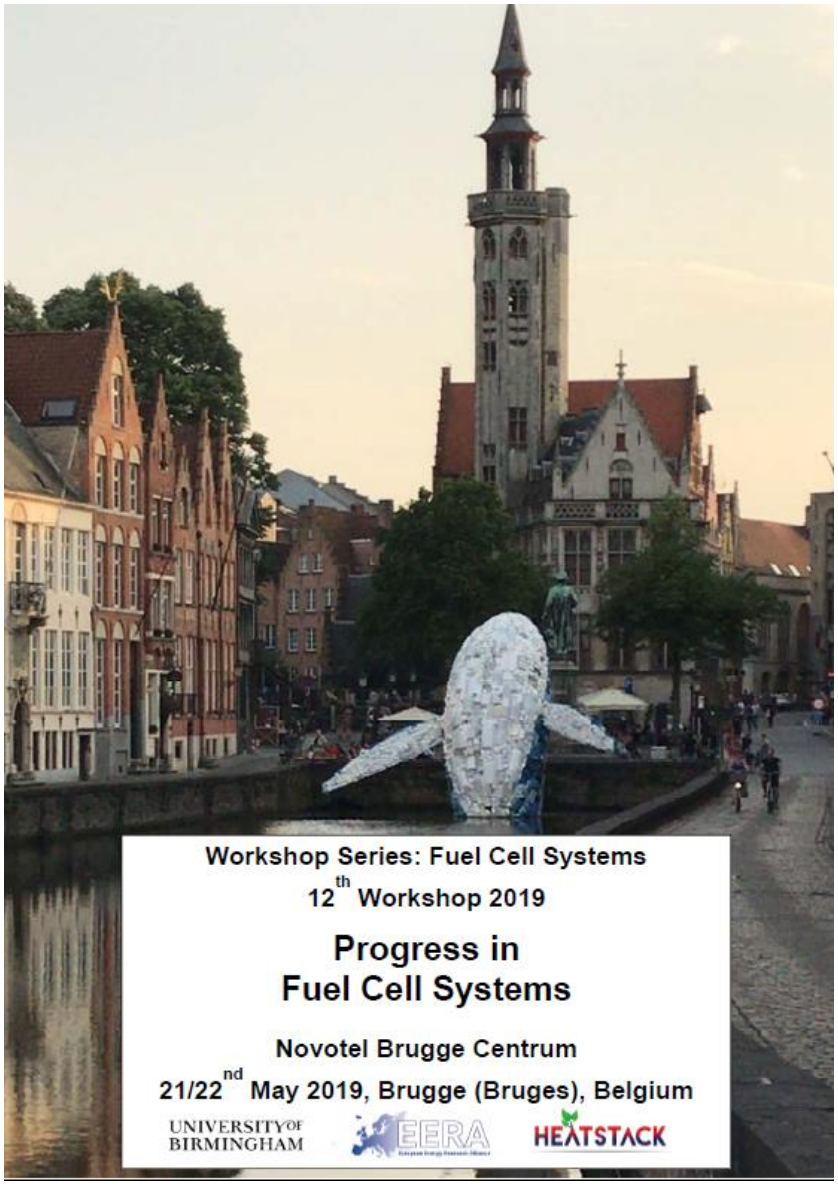
3 Other Materials – Progress in Fuel Cell Systems

Other materials were used to promote the event and HEATSTACK's participation, via several channels, and these are all outlined in this section.

3.1 Progress in Fuel Cell Systems – official event publication

The official event publication had a poster-style cover (illustrated in Figure 18) that included HEATSTACK's logo with those of the event organiser (UBHAM) and supporter (European Energy Research Area):

Figure 18: Progress in Fuel Cell Systems – cover page



Also included in the official event publication was an overview (shown in Figure 19) that referenced HEATSTACK and the project's source of funding.

Figure 19: Progress in Fuel Cell Systems – event overview

Progress in Fuel Cell Systems
Bruges, Belgium **21/22 May 2019**

Brief Overview of the workshop:

The current workshop will be the twelfth in the series that started off with the Large SOFC project.

As usual we are looking at fuel cell systems – somewhat with an emphasis on solid oxide, other high temperature technology, and stationary applications – but not exclusively so. As time goes by, interests broaden and in the past we have also had MCFC and PEFC technology on board, including SOFC applications for aircraft.

Nevertheless, the common theme is fuel cell systems and their components. One of the main reasons being that involvement of companies manufacturing and delivering system Balance of Plant is low in the fuel cell scene and we want to offer a platform for exchanging information and experiences between the system integrators, operators, and BoP suppliers.

Four presentations in this workshop will this time showcase results from the HEATSTACK project which focused on the development and industrialisation of cathode air pre-heaters for fuel cell systems.

Again, the workshop will be part of our activities in EERA, the European Energy Research Area, that is trying to establish a low TRL research programme to underpin the activities of the FCH JU on a European scale.

Presentations will take about 20 minutes with an added 10 minutes for questions and discussions.

The workshop will be followed by the BALANCE workshop on 22/23 May, looking into reversible SOC (SOFC/SOE) operation. Participants are welcome to also register for that event.

The evening programme will consist of a walk through town or a museum visit (t.b.c. and depending on the weather), followed by a traditional Flemish dinner in a nearby restaurant. Anyone arriving before 19:00 h on the Monday is welcome to join for a stroll through town and a visit to a 100-Belgian-beers pub.

The HEATSTACK project has received funding through the FCH 2 JU under contract number 700 564.

The other promotion of HEATSTACK within the official event publication was the agenda (displayed in Figure 20), which listed the presentation titles and speaker names.

Figure 20: Progress in Fuel Cell Systems – event agenda (part of, relating to HEATSTACK)

FC System Components / HEATSTACK results	
11:30 – 12:00	Status of the development and manufacturing of Sunfire-Home – *Tobias Seidel, Sunfire*
12:00 – 12:30	Gas/Gas heat exchanger for process intensification – *Carlo Tregambe, ICI Caldaie*
12:30 – 14:00	*Lunch*
14:00 – 14:30	Design and manufacture of Cathode Air Pre-Heaters – *Charlie Penny, Senior Flexonics*
14:30 – 15:00	Chromium release and corrosion on SOFC heat exchangers – *Kun Zhang, University of Birmingham*
15:00 – 15:30	*Coffee break*
15:30 – 16:00	HEATSTACK panel discussion - *Charlie Penny, Senior Flexonics*

3.2 Promotion via HEATSTACK's channels

PNO promoted the final event via the project website because this channel is open to all, i.e. does not require an account (like LinkedIn or Twitter). The event agenda was uploaded to the Public Materials section prior to the event and the presentations post-event.

HEATSTACK website news article:

http://www.heatstack.eu/news-and-events/heatstack-presentation-final-project-results/

LinkedIn was also used due to the professional nature of the platform and its users. Twitter was also used to share the news article created for the project website and the post created for LinkedIn.

HEATSTACK LinkedIn post:

https://www.linkedin.com/pulse/12th-progress-fuel-cell-systems-workshop-heatstack-project

HEATSTACK Twitter promotion:

https://twitter.com/HEATSTACK_EU/status/1128726224094859266?s=20

https://twitter.com/HEATSTACK_EU/status/1128956500972625921?s=20

3.3 Promotion via project partners

All partners that participated in the event promoted this via their own channels and networks, including sending out invitations to relevant stakeholders. Due to GDPR compliance, we cannot provide a list of people who were invited in this document given its status as public ("PU").

As the organiser of the 12th Progress in Fuel Cells Workshop Series, UBHAM were able to use their website to promote the event and this included references to HEATSTACK similar to the official event publication (see above, subsection 3.1)

3.4 Photographs

The final material from HEATSTACK's final event were the photographs taken, a sample of which are included in this subsection.

The photograph in Figure 21 shows Prof. Dr. Robert Steinberger-Wilckens introducing the agenda for the whole event at the start of the first day. The photograph in Figure 22, which was taken later that day, shows ICI's presentation during HEATSTACK's final project event.

Figure 21: photograph from 12th Progress in Fuel Cell Systems (1)

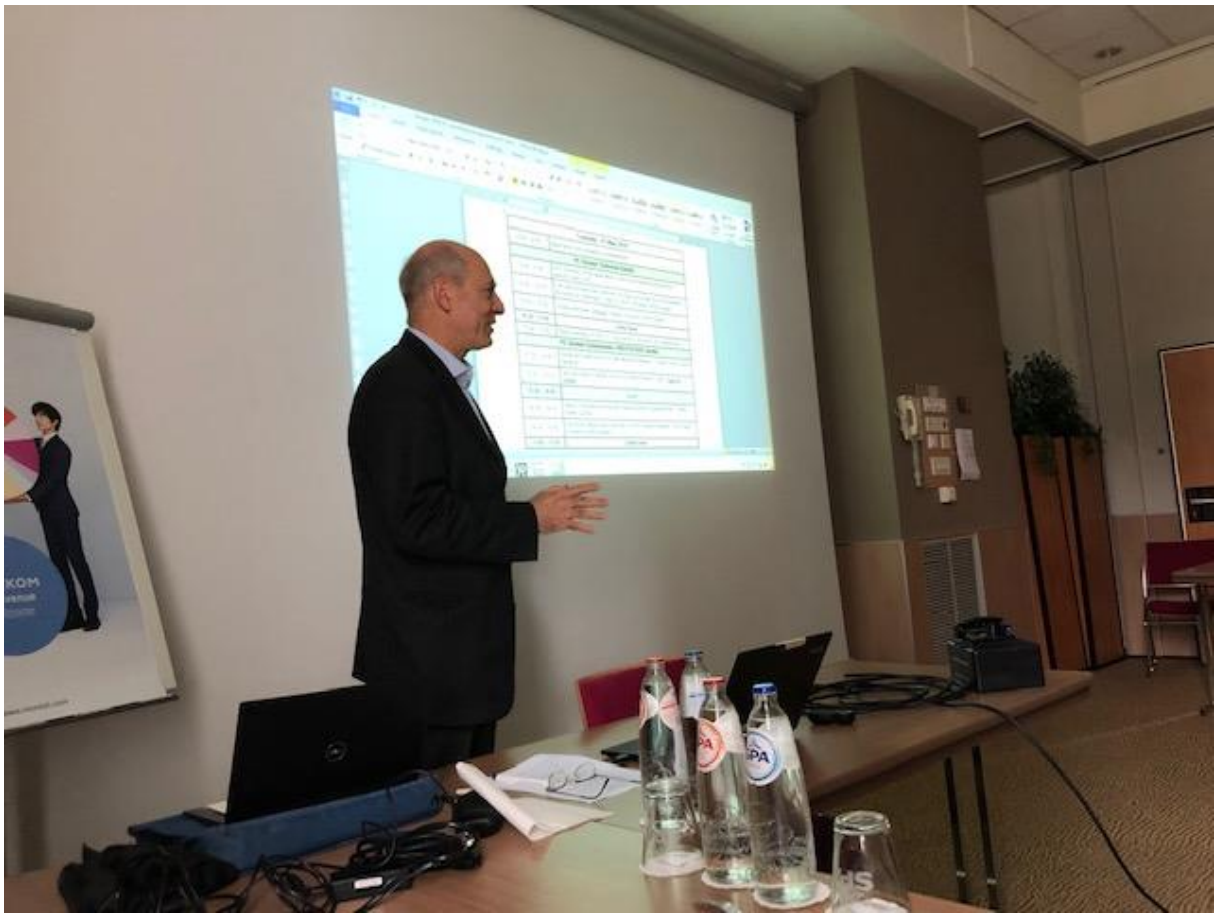


Figure 22: photograph from 12th Progress in Fuel Cell Systems (2)

4 Hannover Messe 2019

As noted in subsection 1.1, the consortium chose Hannover Messe 2019 in support of our final project event. This was chosen because it provided a more commercially-focused event with a much higher attendance (thousands across each of the 3 days), and which was taking place at a similar point in time (to both the 12th Progress in Fuel Cell Systems event and the then project end date of HEATSTACK). Thus, the project was included within SUNFIRE's booth in the exhibition hall with representatives from both SUNFIRE and SFC present.

Rather than presentations, the main materials used here were the technology itself (a fuel cell stack) and the project brochure – these are shown in the photograph in Figure 23:

Figure 23: photograph from Hannover Messe 2019

HEATSTACK's online channels were also used to promote the project's participation in this event.

Website: http://www.heatstack.eu/news-and-events/hannover-messe-2019/

Twitter: https://twitter.com/HEATSTACK_EU/status/1111669376300781569?s=20

5 Conclusion

The final project event for HEATSTACK is considered a success given both the quality of the presentations and the relevance of the audience at the 12th Progress in Fuel Cell Systems Workshop Series, which included both academia and industry. Organisations present included Delft University of Technology (The Netherlands), Politecnico di Torino (Italy), University of Loughborough (UK) and VTT Technical Research Centre (Finland) from the research community, as well as commercial organisations such as AVL (Austria), Borit (Belgium) and Ceres Power (UK).

Therefore, the final project event has met the requirements of the DoA. This event, as well as Hannover Messe 2019, also contribute to the overall aim of WP8 (Dissemination, Exploitation and Communication) and the specific objectives within it.