



Pathway to a Competitive European  
Fuel Cell micro-CHP Market

## REPORT

“Potential for supporting the European supply chain through joint action by manufacturers”

Alternative title:

“Definition of opportunities for joint actions on standardisation and approach for Work Package 5”

**Deliverable 5.1**

**Status: F 07/10/2019**

(D-Draft, FD-Final Draft, F-Final)

**PU**

(PU – Public, CO – Confidential)

## Executive summary

Work Package 5's main goal is to seek **standardisation opportunities** amongst the OEM consortium members, in order to create cost-down opportunities through synergies and buying power.

During the first meetings and discussions it quickly became clear that in order to find such opportunities, pricing of parts, IP-related information, production methods, experience and other detailed confidential topics needed to be collected, shared and discussed. Since the participants in WP5 are all OEMs producing and developing similar products, the sharing of such information is of sensitive nature and therefore encountered a lot of resistance. Questions around **competition law and anti-trust law** were raised. This hampered further progress within WP5. It was concluded that external expertise about these laws and their boundaries needed to be sought prior to any action creating legal risk to the OEMs.

After Vaillant left the consortium, SOLIDpower took over the WP5 leadership. Soon after, an Anti-trust training at the law-firm Crowell & Moring was organized for the OEMs. Hereafter it was concluded that reaching the goals that had been set out in the original DoA, would be very hard or even impossible due to EU competition and anti-trust law.

The following period has therefore been used to find alternative ways forward and to **formulate new goals**. In this process, the interest of the project **shifted from common purchase of key components to the simplification of installation**, grid connection standardisation across Europe, and simplification of **maintenance** intervention. On that level, exchange of desulphuriser- and possibly water treatment system- components are prioritized.

Following the recommendation of Crowell & Moring, a new non-OEM actor was invited to play a neutral role amongst the OEMs. **Challoch Energy** takes on its responsibility the **re-formulated work-package** as external subcontracted third party, selected out of 4 candidates and following the detailed evaluation of their proposals.

Since coordination of this workpackage by one of the OEMs, would not make much sense anymore due to the issues with anti-trust law, coordination by another neutral non-OEM partner has been discussed and **COGEN Europe are willing to take up coordination of WP5** once the pending amendment of the DoA has been approved and signed.

## Chapter 1. Objectives and explanation of the work carried out in WP-5

### 1.1 Objectives of WP-5 (DoA part A)

- Understand the potential for standardisation within the European mCHP supply chain.
- Recognising that past attempts at standardisation within the European domestic heating sector have not been successful, focus on identifying the barriers to standardisation in the sector and in particular to mCHP.
- Transfer learning from the automotive industry to identify potential opportunities for FC mCHP standardisation and/or commonality to improve the competitiveness of the EU supply chain.
- Develop proposals for standardisation activity amongst European mCHP manufacturers.
- Test new cost effective components developed in collaboration with the supply chain in PACE demonstration systems.

### 1.2 Explanation of the work carried out

In June 2018 SOLIDpower has formulated a new set of objectives that might work under the supervision of a lawyer, as displayed in the table below:

<b>WP5 - EU Supply Chain Standardisation</b>
<b>Lead beneficiary: SOLIDpower</b>
<b>NEW PROPOSAL! "Description of work and role of partners"</b>
<p>WP5 - EU Supply Chain Standardisation [Current Months: xxxxx] COGEN EUROPE, BOSCH, SOLIDPOWER SPA, VIESSMANN WERKE (Hexis), BDR (Senertec), SUNFIRE</p> <p>After ensuring the support of a lawyer, to comply with anti-trust requirements, identify and select one or two neutral third party who can undertake the following activities</p> <p>First phase (estimated duration 6-9 months):</p> <ul style="list-style-type: none"> <li>• Investigate the history of standardisation in different industries (i.g. automotive, heating, electronics) to present some suggestion/best practice</li> <li>• Collect data from the Fuel Cell mCHP manufacturers about their technical barriers for standardisation on both unit and component level</li> <li>• Analyse the current Fuel Cell mCHP supply and value chain and barriers to standardisation</li> <li>• Prepare and present a study who consider the above mentioned data and build suggestions about the best ways to proceed through development, components, process, customer service standardisation</li> </ul>

Second phase (estimated 12-15 months duration):

- Technical proposal for new IPs
- Build a theoretical Supply Chain Plan
- Best practice for the Fuel Cell mCHP production process
- Suggestion for the improvement of the installation and service activities

As a third phase the partners may be invited to cooperate with the single Fuel Cell mCHP to apply the best practice suggestion to their individual Supply Chains.

This activity may start inside the WP5, if the time allow it, but won't be mandatory, and each WP participants will choose freely to dedicate its time and budget to this part of the project.

At the end of the Second Phase, we will discuss the opportunity to organize an event, involving all the possible interested parties (e.g. engineering companies, suppliers, installers) to present the outcomes and discuss together the challenges of the standardisation. This activity will be organized in collaboration with the WP4 team, to avoid duplications and lever all possible synergies.

In all phases the partner should maintain absolute secrecy on all data collected from the manufacturers.

During the in-person meeting in June 2018 the above proposal was discussed. Still a lot of issues were raised. The cost of hiring a lawyer present at all WP5 meetings would be too expensive. Therefore, it was agreed to have a new neutral non OEM third party to carry out the standardization work within WP5 to perform the tasks and gather the necessary input from OEMs (bilaterally where required) in order to assure that competition law and anti-trust law are respected at all times.

In the next phase, a call for tenders was prepared and several candidates were identified and contacted:

- **DTU** (Technical University of Denmark)
- **Polimi** (university of Milan)
- **Challoch Energy** (specialist in energy research and consulting)
- **Fiona Riddoch** (independent consultant)

All above candidates where invited to draft a proposal and associated quote (see Annex 4) . Webinars and Q&A sessions were organized between each individual candidate and the PACE consortium, to evaluate each proposal.

This was concluded early December 2018. The minutes of these webinars are attached under Annex 2 and all the proposals are available at annex 4.

In December 2018, after thorough evaluations, Challoch Energy was chosen as the preferred candidate by the complete consortium to be subcontracted to carry out the standardisation tasks of WP5.

During Q1 of 2019 it appeared difficult to get the consortium together to define the alternative scope and targets for the standardisation tasks to be carried out by Challoch. In the end it was decided that it would move more towards standardisation, breaching administrative and market hurdles and streamlining grid connection codes, rather than seeking for possible classical supply chain synergies.

Challoch has made a proposal thereto that has been shared before-, and discussed within, the last in person meeting of the PACE consortium in Brussels (June 2019) The next step now is Challoch to visit the individual OEM's and gather detailed (confidential) information about the desired scope on hurdles, grid connection, data interface for VPP and still possible supply chain synergies like desulphurization cartridges.

COGEN Europe, together with Challoch Energy, reviewed the DoA part of WP5 based on the revised scope and objectives and on the proposal from SOLIDpower (see above – June 2018). The revised DoA is available at annex 5 of this document. The next amendment round will focus on finalising this revised version of the DoA and getting the approval of the FCH JU.

During this period, it emerged that coordination of WP5 by SOLIDpower, or one of the other OEMs within the consortium, would endanger the successful achievement of the WP objectives, due to the issues with anti-trust law, SOLIDpower gave up the lead of WP5. Coordination by COGEN Europe was discussed and agreed and will be addressed with an upcoming amendment.

## 1. Conclusions

Due to the severe restrictions imposed by EU Anti-trust and competition law, the original goals and Work package leadership for Work package 5 had to be reoriented to comply. These changes have now been recorded in a revised DoA (Annex 5) where Challoch Energy, a new partner to the consortium, will perform the (bi-lateral) research amongst the OEM-partners and work to reach the new goals that have been set. COGEN Europe will take up the coordination of this work-package, becoming the Work-package leader.

## 2. Annexes

**Annex 1:** Minutes of the in-person meetings (Wernau, 28/06/2018)

**Annex 2:** Minutes of the webinars with external parties

**Annex 3:** Presentation Training document Crowell & Moring

**Annex 4:** Excel sheet comparison of proposals

**Annex 5:** Revised DoA WP5

## Annex 1: Minutes of the in-person meeting (Wernau, 26/06/2018)

### WP5 – EU Supply Chain & Standards (presented by SP)

-> SP/COGEN to finalise revisions to WP5

-> SP to finalised Code of conduct and send to partners for review

-> Partners to review WP5 and Code of Conduct and sign Code of Conduct

-> SP to liaise with DTU to confirm potential roles and responsibilities within WP5 (on the basis of the revised version of WP5 which should be forwarded to them once approved by PACE partners)



## Annex 2: Minutes of the webinars with external parties

### 1. Presentation of the proposal by Fiona Riddoch

**Date and Time:** Wednesday, 21<sup>st</sup> November 2018 from 15.30 to 16.30

**Participants:**

- COGEN Europe: Benedetta Di Costanzo, Janos Vajda
- Element Energy: Lisa Ruf
- Fiona Riddoch (bidder)
- SenerTec: Gunter Grosch
- SOLIDpower: Renata Zanettini, Jan-Willem Tolkamp
- Sunfire: Tobias Seidel
- Viessmann: Jan Oberliessen, Volker Nerlich

**Minutes:**

- **Background:** Fiona Riddoch is not an expert in the field of standardisation, but she has good knowledge of FC micro-CHP sector and of EU-funded projects
- **Length of the task (Renata's estimate):** 18 months – Fiona not supposed to cover more technical tasks like coming up with an IP
- **Approach to the task:** pragmatic approach to produce something which would positively contribute to PACE and the after-PACE future
- **Steps for task completion:**
  - **Step I:** to organise a meeting with all the project partners active on WP5 and come up with an agenda to guide the work and define what we want to achieve. The scoping work should be carried out by both the selected consultant (50%) and the manufacturers together (50%), since they have a better understanding of what they need. It would clarify at the standardisation we are looking at (i.e. of installation procedure, life-cycle, product cost?).
  - **Step II:** Look at what other successful sectors have done and learn from them (i.e. automotive sector).
  - **Step III:** Identify barriers to standardisation for FC micro-CHP supply chain.
  - **Step IV:** Review of the gathered information and analysis with experts to come up with concrete proposals for standardisation given the potential identified**[All steps are closely interconnected]**

**Q&A session:**

- Lisa Ruf: **How to overcome the antitrust barrier?** At the end of the project, we should be able to come up with findings which can be publicly shared (at least in an aggregated form). Discussions on some barriers (i.e. barriers to installations) are not restricted by the antitrust legislation. We should be cautious on discussions on other kinds of barriers, restricted by antitrust legislation (i.e. how to reduce commercial product costs).

- Janos Vajda: **Involvement of experts from other sectors** to come at extra-cost (need for experts to be defined during Step I)
- Tobias Seidel: The **level of detail** during the discussions is to be agreed upon during step I and every project partner must be comfortable with it.
- Tobias Seidel: **Approach for task completion:** start with group discussions in order to agree on objective and level of detail to be shared and continue with individual discussions with manufacturers. The other way round might be less straight-forward.

## 2. Presentation of the proposal by Challoch

**Date and Time:** Thursday, 22<sup>nd</sup> November 2018 from 10.15 to 11.15

### Participants:

- Bosch: Wolfram Faas
- Challoch: Anna Limbrey, Simon Minett (bidder)
- COGEN Europe: Janos Vajda
- SOLIDpower: Renata Zanettini
- Sunfire: Tobias Seidel
- Viessmann: Jan Oberliessen

### Minutes:

**Background:** Simon in the CHP business since 1990. Moved in 1998 to Brussels to become the Managing Director of COGEN Europe. Established CHP working group. Founded Challoch in 2009.

Renata Zanettini: any experience in areas that is the scope of PACE WP5?

Simon Minett: They do have extensive experience for standardization and accreditation especially in the area of CHP.

Before any work is done, the first steps will include extensive discussions to make sure competition rules are complied with and confidentiality is ensured.

### **Phase 1**

Challenge: how to synthesize data without breaching confidentiality. It must be agreed what is expected to come out of this exercise. Phase 1 will involve a lot of work understanding how data is collected and how it can be shared.

#### Phase 1

1.0 – kick-off phase

1.1 – 1.4 see attached slides for details

### **Phase 2**

It is difficult to define without having gone through the steps in Phase 1.

Phase 2 has not been designed. It must come out from Phase 1. In response to a question from Renata, Simon Minett: they think they can cover most of the technical expertise needed but if it is very specific, they may need to use additional experts. It is hard to tell at this stage.

Simon Minett: they can produce data usable in the public domain from the data provided by the manufacturers without breaching confidentiality.

**Q&A session:**

- Wolfram Faas: good overview, no further questions
- Tobias Seidel: is Simon aware of VPP? Simon: his work is about standardization and does not really relate to the VPP.
- Lisa Ruf (via Renata Zanettini): travel costs? Simon: they do not expect to incur a lot of travel costs as they are located in Belgium. Easy to travel to Brussels or even to the manufacturers' premises.
- Timeline: 9 months – the most difficult bit is to get the data from manufacturers (3 months), task 1 – 1 month – 6 weeks, task 2 – 3 months, tasks 3 and 4 to follow after that
- They can prepare an indicative Gantt chart if needed.
- After the kick-off, they would develop a detailed timeline with milestones etc.
- *(Tobias Seidel: he started making comments in the shared file in the folder on OneDrive)*
- Renata Zanettini: decision is expected to be made before the end of the month, or at the in-person meeting, the latest.
- Start of the work is subject to the approval of the JU. Simon Minett: they can do some preliminary work at risk so as not to lose time.

**3. Presentation of the proposal by POLIMI**

**Date and Time:** Thursday, 22<sup>nd</sup> November 2018 from 15.30 to 16.30

**Participants:**

- BDR Thermea: Mike Small
- Bosch: Wolfram Faas
- COGEN Europe: Benedetta Di Costanzo, Alexandra Tudoroiu, Janos Vajda
- POLIMI: Federico Caniato (bidder)
- SOLIDpower: Renata Zanettini
- Sunfire: Tobias Seidel
- Viessmann: Jan Oberliessen

**Minutes:**

- **Background:** POLIMI (Politecnico di Milano) is the largest technical university in Italy. Close contacts with business and experience in answering their needs. Challenges in supply chain management is one of their research areas.

They have never done a standardisation analysis for an innovative product such as FC micro-CHP, but they have a lot of experience in supply chain analysis projects, as well as in EU projects. Good understanding of confidentiality issues.

- **Steps in the process:**
  - o Preliminary mapping of the market through interviews and collection of data from manufacturers
  - o Understanding of current status of FC micro-CHP supply chain via the map
  - o Product market analysis
  - o Identification of major barriers

**Q&A session:**

- Renata Zanettini: are there costs not included in the quote? Federico Caniato: **Travel costs** will depend on the required level of direct contact with manufacturers – direct contact generally a good idea.
- If selected, POLIMI will become a **partner in the project** and an amendment (following FCH JU approval) will be needed. As a university, POLIMI would have 100% of its costs reimbursed.
- Lisa Ruf (via Renata Zanettini): **Timeline** more than 12 months
- Lisa Ruf (via Renata Zanettini): Need to **outsource work to third parties**? Only if the consortium decides to carry out a standardisation of technical production or IP creation.
- Tobias Seidel: **Publication of results of the research**? Universities are expected to publish the results of their research, but this is not a requirement. Unlike PHD students, research fellows are not forced to publish the results of their works. Ideally the high-level outcomes could be published, while the confidential information will not be shared. [All publications are always to be approved by all the partners].

## Annex 3: Presentation Training document Crowell & Moring

Presentation available at this Dropbox link:

[https://www.dropbox.com/s/2d7ozk6hjn422na/PACE%20WP5\\_%20Anti%20Trust%20Training%20Presentation.pptx?dl=0](https://www.dropbox.com/s/2d7ozk6hjn422na/PACE%20WP5_%20Anti%20Trust%20Training%20Presentation.pptx?dl=0)

## Annex 4: Excel sheet comparison of proposals

All proposals including the quote request, can be found under the following drop-box link including detailed comparisons of those proposals:

[https://1drv.ms/f/s!AgUPDlsmgY4QgQxxTb0y5\\_k9hT-L](https://1drv.ms/f/s!AgUPDlsmgY4QgQxxTb0y5_k9hT-L)

SCOPE:	
PACE WP5	One of the work streams of the PACE project aims to look at future competitiveness of the European supply chain and further cost reduction. In this respect, PACE has initiated a standardization working group (under the project's Work Package 5 – PACE WP5) to explore options to increase standardization at component level and at unit level (to ease installation practices). This will build on techniques adopted from other sectors, to establish strategies amongst the PACE manufacturers for efficient interaction with the European supply chain.
Concerns	Unilateral or reciprocal disclosure of commercially sensitive information between competitors can be considered a concerted practice. Accordingly with the anti-trust law receiving commercially sensitive information from competitors can be sufficient to get into trouble. While anti-competitive discussions in the context of standard setting, limitation of technological development and innovation, patent ambush and abusive licensing practices are prohibited.  We require open and transparent Standard setting procedure and fair, reasonable and non-discriminatory access to the standard
What is requested	<p><u>Understand the potential for standardization within the European micro-CHP supply chain (6 months):</u></p> <ul style="list-style-type: none"> <li>• Investigate studies that are already available about standardization in different industries (automotive, heating, electronics) to present some suggestion/best practice</li> <li>• Collect data from the Fuel Cell mCHP manufacturers about their technical barriers for standardization</li> <li>• Analyze the current Fuel Cell mCHP supply and value chain</li> <li>• Prepare a study who consider the above mentioned data and build suggestions about the best ways to proceed through development, components, process, customer service standardization</li> </ul> <p><u>Develop proposals for standardization activity amongst European mCHP manufacturers (12 Month):</u></p>

- Technical proposal for new IPs
- Theoretical Supply Chain Plan
- Best practice for the Fuel Cell mCHP production process
- Suggestion for the improvement of the installation and service activities

Test new cost-effective components developed in collaboration with the supply chain in PACE demonstration systems (12 months)

As optional activities:

- The WP5 may give the opportunity to organize an event, involving all the possible interested party (engineering companies, suppliers, installers as an example) to present some of the outcomes and discuss together the challenges of the standardization.
- At the end of this first phase the partner may be invited to cooperate with the single Fuel Cell mCHP to apply the best practice suggestion to their individual Supply Chains. In this phase the partner should maintain absolute secrecy on all data collected from the other manufacturers.

When

The service will start in Q1 2019 and will last 18-30 Months

Key Performances	DTU	POLIMI	Challoch Energy	Fiona Riddoch
Background/ experience	<p>Prof. Peter Jacobsen, Lektor Ph.D., Civ.Ing. Research Associate Professor at Department of Manufacturing Engineering (IPT/DTU) Ass. Prof. Martin Philip Kidd Teach Supply chain management, Introduction to operations management</p>	<p>Prof. Federico Francesco Angelo Caniato, Ph.D. in Management Engineering Assistant Professor Antonella Moretto, Ph.D in Management and private Consultant</p>	<p>Challoch Energy is a bespoke specialist in energy research and consulting. Based in Belgium, with clients in Europe and North America, its core expertise is in low carbon energy options: Energy Efficiency, Combined Heat and Power and Renewable Energy in addition to storage &amp; grid flexibility and looking at the crossover between energy and transport.</p> <p>Challoch Energy was established to assist organisations in responding to energy and environmental challenges. It is an independent company that provides high quality research, analysis and strategic solutions for commercial clients, governments and NGOs.</p>	<p>Fiona Riddoch (TP) is based in Edinburgh UK. She worked for 13 years in the manufacturing sector for Honeywell Control Systems Ltd, covering research, product development, quality, and production. She has worked with the FC mCHP sector through her role in the Brussels based Industry association COGEN Europe.</p>



Team – to be hired	Postdoc (contract will be of 12+6 months)	Graduated Student (fellowship will be proposed for a period of 12 months minimum, that can be extended of 12 more months)
Field of Interest	<p>Prof. Peter Jacobsen Operations and Logistics for Healthcare, Design of Production Systems, Lean production, Reverse Supply Chain</p> <p>Ass. Prof. Martin Philip Kidd Train Integration Management, Railway Operations</p>	<p>Prof. Federico Francesco Angelo Caniato Supply Chain Management and Sustainability, Purchasing Management, Manufacturing Strategies, Demand Forecasting, Supply Chain Finance</p> <p>Assistant Professor Antonella Moretto Purchasing and Supply Management, Process Management and Organization Design, Supply Chain Finance, Sustainable Supply Chain Finance</p>

Relevant  
Publications

Prof. Peter Jacobsen  
"How the reverse supply chain contributes to a firm's competitive strategy: a strategic alignment perspective" 2018

"Revenue in reverse? An examination of reverse supply chain enabled revenue streams" 2016

"Philosophy Regarding the Design of Production Systems" 2012

Ass. Prof. Martin Philip Kidd  
"A railway timetable rescheduling approach for handling large scale disruptions" 2016

"An overview of recovery models and algorithms for real-time railway rescheduling" 2014

Prof. Federico Francesco Angelo Caniato

"Measuring supply chain performance: a lifecycle framework and a case study" 2018

"Manufacturing Strategy" 2017

"Linking global value chains and supply chain management: evidence from the electric motors industry" 2016

"The path of innovation: Purchasing and supplier involvement into new product development" 2015

"Governance choice in global sourcing of services: the impact on service quality and cost saving performance" 2014

"Past, present and future trends of purchasing and supply management: An extensive literature review" 2013

Assistant Professor Antonella Moretto

“Supply chain finance: From traditional to supply chain credit rating” 2018

“Increasing the effectiveness of procurement decisions: The value of big data in the procurement process” 2017

“The benefits of supply chain visibility: A value assessment model” 2013

Key Deliverable	DTU		POLIMI	
People and Fees €	Professor	6.974,00	Professor	7.642,00
	Assistant Professor / Researcher	6.974,00	Assistant Professor / Researcher	3.764,00
	Postdoc	5.980,00	Research Student / Fellowship	2.084,00
Cost of the activities €	Postdoc Salary (12 months)	71.760,00	Fellowship grant money (12 month-full time) – estimation	30.000,00
	Project work, Professor and Assistant Professor contribution (3 month) – estimation	20.922,00	Project work, Professor and Assistant contribution (12 month-supervision) – estimation	20.000,00
	Overhead for Postdoc (laptop included)	19.940,00	Overhead included	
	Overhead for Professors	5.230,00	Travel Expenses excluded	
	Yearly costs	117.852,00	Yearly costs	50.000,00

	DTU	POLIMI
PROs	<p>They are already partner of the PACE</p> <p>If we start working with them they will complete the Postdoc hiring in around 2 months</p>	<p>They have an extensive and documented experience in Supply Chain Management studies and consultancies</p> <p>They proposed a costs plan that makes the activity affordable for 24 months</p>
CONS	<p>The overall costs presented for the activity are not covered by the available funds for WP5</p>	<p>They have to apply to become partner of the PACE, and it will take more or less 3 months</p>
Bottom line		

## Annex 5: Revised DoA WP5

<b>Work package number</b>	WP5		<b>Start date or starting event</b>				Month 1	
<b>Work package title</b>	EU supply chain standardisation							
<b>Workpackage leader</b>	COGEN Europe							
<b>Participant number</b>	10	1	3	4	6	9		
<b>Participant short name</b>	SUN	COGEN	BOSC H	SP	VIESS	SENT EC		
<b>Person-months per participant</b>	1	5	4	12.5	4	4.10		

### Objectives

- Understand the potential for standardisation within the European mCHP supply chain.
- Recognising that past attempts at standardisation within the European domestic heating sector have not been successful, focus on identifying the barriers to standardisation in the sector and in particular to mCHP.
- Develop proposals for standardisation activity amongst European mCHP manufacturers.
- Develop technical proposal for new IPs for new cost-effective components developed in collaboration with the supply chain in PACE demonstration systems, if opportunities for this are confirmed.

### Task 5.1 – Potential for supporting the European supply chain through joint action by manufacturers (leader: SP)

In this task, SP will lead discussions between stakeholders to understand the potential for standardisation within the European mCHP sector and the standardisation priorities of OEMs.

Before engaging in these discussions, SOLIDpower will seek support from a lawyer to comply with antitrust requirements.

The law firm Crowell & Moring was selected following the comparison of bids from two law firms. As part of Task 5.1, Crowell & Moring carried out an anti-trust training for the PACE partners.

### Task 5.2 – Identify and compare barriers to standardisation (leader: COGEN with support from subcontractor)

Given the WP5 objectives and the constraints imposed by anti-trust law (i.e. no sharing of commercially sensitive information between manufacturers), the PACE Consortium will identify a third party to carry out the data collection and analysis work as part of WP5.

Activities to be completed by hired third party (Challoch Energy, selected following the comparison of four bids) in the first phase, as defined by SOLIDpower, will include:

- Investigate studies that are already available about standardization in different industries (automotive, heating, electronics) to present some suggestion/best practice

- Collect data from the Fuel Cell mCHP manufacturers about their technical barriers for standardisation
- Analyse the current Fuel Cell mCHP supply and value chain
- Prepare a study on the collected data and build recommendations on the best ways to proceed through development, components, process, customer service standardisation (D5.2)

The first sub-task (part of D5.2) focuses on identifying barriers to standardisation. It will:

- review all studies relating to FC mCHP supply and value chains including work undertaken by E4tech and perform a gap analysis;
- discuss the results of the gap analysis with the OEMs and develop a list of items to study further from initial results already assessed. The following two items are already identified;
  - identify status of grid connection and installation procedures and regulations in target countries;
  - assess the desulphurisation recycling economy linked to standards;
- record known barriers to standardisation in the FC mCHP sector, through interviews with CHP system and FC manufacturers as well as standardisation bodies;
- identify where the major costs are and where standardisation can help

Input from the first sub-task will guide the work of the second sub-task (part of D5.2). The second sub-task will outline best practice and recommend further steps to standardisation. It will:

- Following, the first sub-task, the work shall focus on the identification and analysis of current FC mCHP installation procedures to consider streamlining and coordination of installation, documentation, notifications and operations and maintenance including recommending opportunities for further standardisation;
- Assess how the infrastructure/installation could be harmonised;
- Illustrate OEM responses with specific case study examples to demonstrate best practices and areas where there are gaps in the standardisation. These case studies will respect confidentiality and commercially sensitive data.

This work will be summarised through a recommendations report, which will form the basis for future standardisation activity.

A second phase of the work (D5.3) might be launched depending on interest from OEMs and results of the first phase to build on the recommendations provided in the first phase and look at recommendations for practical implementation. The second phase of work will define an additional set of deliverables

Should this be appropriate based on the findings of the first phase, Challoch Energy may then provide in the second phase:

- Technical proposal for new IPs
- Theoretical Supply Chain Plan
- Best practice for the Fuel Cell mCHP production process
- Recommendations for the improvement of the installation and service activities

Whilst the actual implementation of the standardisation recommendations is beyond the scope of this project, as a third phase the partners may be start to cooperate to apply the best practice suggestion to their individual Supply Chains (testing phase) based on the work conducted during Phase 2.

**Task 5.3 – Launch event + Next steps** (leader: COGEN)

Having established a working group to debate standardisation issues and a report which clearly sets out recommendations for the mCHP sector, the partners will work to implement the recommendations of the standardisation report. Whilst the actual implementation of the standardisation recommendations is beyond the scope of this project, two activities will be undertaken as a part of WP5:

1. A launch event for the wider sector (with a focus on supply chain partners) explaining the planned activities to promote common standards for components in the mCHP sector – this event will be held in Brussels and will aim at high profile speakers and substantial representation from the European supply chain (20+ delegates).
2. Formalisation of the working group as a body which will continue to work together beyond the remit of the PACE project and begin the collective efforts to implement the recommendations on moves towards increased standardisation within the sector. The working group discussions will continue as part of the established FCH JU Regulations, Standards and Codes workshop.

**General Description of All Deliverables**

D5.1- Definition of opportunities for joint actions on standardisation and approach for work package -SP-R-PU-M8

D5.2- Report on recommendations for future standardisation activities-COGEN-R-PU-M44

D5.3- Summary report on joint activities for standardisation and on recommended approach to standardisation-COGEN-R-PU-M56

D5.4-Workshop on standardisation -COGEN-DEC-PU-M61



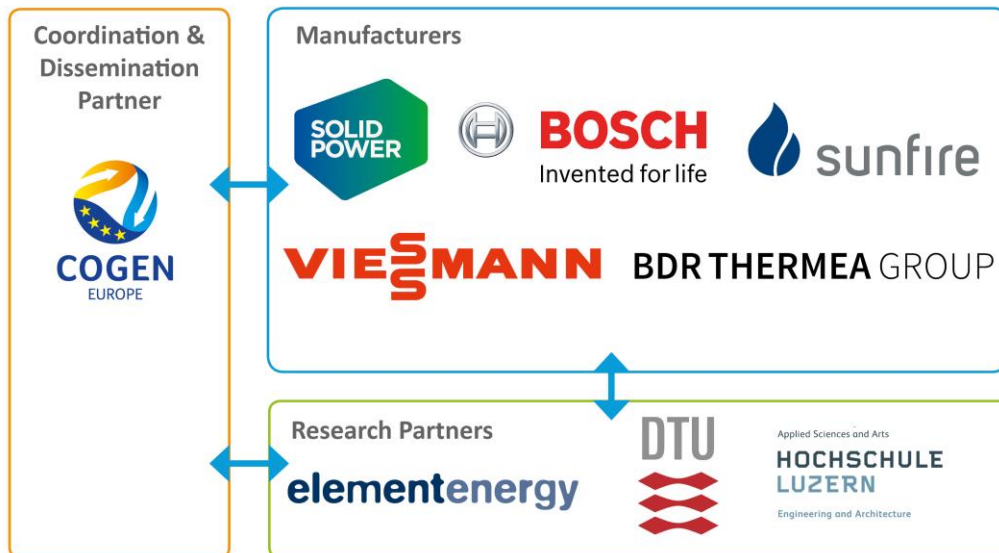
## About PACE

PACE is a major EU project unlocking the large-scale European deployment of the state of the art smart energy solution for private homes, Fuel Cell micro-Cogeneration. PACE will see over 2,500 householders across Europe reaping the benefits of this home energy system. The project will enable manufacturers to move towards product industrialisation and will foster market development at the national level by working together with building professionals and the wider energy community. The project uses modern fuel cell technology to produce efficient heat and electricity at home, empowering consumers in their energy choices.

PACE project, which stands for “Pathway to a Competitive European Fuel Cell micro-Cogeneration market”, is co-funded by the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) and brings together European manufacturers, research institutes and other key energy stakeholders making the products available across 11 European countries.

For more information, visit [www.pace-energy.eu](http://www.pace-energy.eu)  
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## The PACE partners are



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