Fuel cells & hydrogen research and innovation in Horizon 2020

Hydrogen is one of the few near-zero-emissions energy carriers that could play an important part of the future EU low-carbon energy and transport sectors. Hydrogen can be used as a medium storage for intermittent power sources, allowing for a better exploitation of renewable energy; due to their high efficiency, fuel cells are considered a very efficient means of converting any fuel to energy; if fuelled with hydrogen produced through clean electricity, fuel cell electric vehicle emission will be minimal. Therefore, a competitive fuel cell and hydrogen industry has the potential to contribute to the ambitious energy and climate objectives for 2020 – to reduce greenhouse gas emissions by 20%, to increase the share of renewable energy to 20% and to make a 20% improvement in energy efficiency. At longer term, this technology could play a significant role in supporting Europe and industrialised countries meeting the 2050 targets of 80 to 95% cuts in CO2 emissions.

Fuel cell and hydrogen technologies are part of the European Strategic Energy Technology Plan (SET-Plan), the technology pillar of the EU’s energy and climate policy. This plan aims at accelerating the development and deployment of cost-effective low carbon technologies and comprises measures relating to planning, implementation, resources and international cooperation in the field of energy technology.

The Commission proposal for Horizon 2020, the next EU multi-annual Framework Programme for research & innovation and a pillar of Europe 2020, reiterates the need to achieve the transition to a reliable, sustainable and competitive energy system. The proposed regulation for Horizon 2020 lists hydrogen and fuel cell as one of the solutions to reach this goal. It also emphasizes the need to reinforce public private partnerships, including the potential continuation of support to Joint Undertakings established under the 7th Framework Programme on the basis of article 187 of the TFEU. Fuel cell and hydrogen technologies have the potential to fulfill several of the Innovation Union objectives. These technologies have in particular a clear potential to develop new products and services that will create growth and jobs.

In 2008 the Fuel Cell and Hydrogen Joint Undertaking (FCH JU), a Public Private Partnership between the European Commission and the industry was established through the Council Regulation (EC)521/2008. The research community later joined the initiative. Its objective was to significantly accelerate the market introduction of the fuel cell and hydrogen technologies, in order to realise their potential as an instrument to achieve a lower carbon energy system. €470 million of EC support was allocated to the FCH JU, with the stakeholders (industry, research) expected to match this amount with in-kind contributions. Since then, the FCH JU has been the main tool for implementing European research on fuel cell and hydrogen technologies. An interim independent evaluation completed in May 2011 concluded that the establishment of the FCH JU has provided the legal and financial framework required for the industrial and research communities to work together under a stable financial environment towards a common objective. It also recommended the current FCH JU to be maintained and supported during the entire course of FP7, to implement its work as originally envisaged.

The present consultation aims at collecting the views of the wider public on the fuel cells and hydrogen sector, on research & innovation in this field in Europe, and in particular on the possible continuation of the FCH JU for the implementation of research and innovation activities on fuel cells and hydrogen in Horizon 2020.

You have 90 minutes to complete this questionnaire. After this timeframe, the IPM application will not be active anymore and you will have to restart from the beginning.

Questions marked with an asterisk * require an answer to be given.

A. Respondent profile

In this section you are asked to provide information to help us build the profile of respondents, such as their background and affiliation. Please be aware that in accordance with Regulation 45/2001, all personal data collected through this survey will be kept securely and ultimately erased.
A.1. Please enter your organisation's name or your name (for individual citizen), address and e-mail address  
* (maximum 300 characters)

<table>
<thead>
<tr>
<th>My contribution can be published under the name indicated</th>
<th>My contribution can be published but my name should be kept anonymous</th>
<th>I do not agree that my contribution is published at all</th>
</tr>
</thead>
</table>

A.2. Received contributions together with the identity of the contributor may be published on the Commission's website. Do you agree to your contribution being published under your name? *

- Austria
- Belgium
- Bulgaria
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Malta
- Netherlands
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- United Kingdom
- Candidate country
- Associated country
- Other

A.3. Please indicate your current country of residence or where your organisation is based. *

- Large business
- Member State administration
- Individual citizen
- SME (less than 250 employees)
- Regional/local administration
- Other
- Business organisation
- Non-governmental organisation (NGO)

A.4. Who do you represent? *

- Not familiar at all
- Somewhat Familiar
- Familiar
- Very familiar
A.6. Have you applied for funding from the FCH JU?*

- Yes
- No

A.7. Have you received funding from FCH JU?*

- Yes
- No

B. Relevance of the sector

B.1. What is your opinion regarding the following statement: Fuel cell and hydrogen will have a notable role in the future EU low-carbon energy and transport sectors.*

- Strongly agree
- Agree
- No opinion
- Disagree
- Strongly disagree

B.2. What is your opinion regarding the following statement: Fuel cell and hydrogen will notably contribute to the future EU energy security of supply.*

- Strongly agree
- Agree
- No opinion
- Disagree
- Strongly disagree

B.3. What is your opinion regarding the following statement: Fuel cell and hydrogen will notably contribute to the future EU industrial competitiveness in the energy and transport sector.*

- Strongly agree
- Agree
- No opinion
- Disagree
- Strongly disagree

B.4. What are your views on the potential socio-economic importance of the following applications by 2020: (rate from 1 –very positive- to 5 –very negative-)

- a: 1- Very positive
- b: 2- Positive-
- c: 3- Neutral
- d: 4- Negative
- e: 5- Very negative
<table>
<thead>
<tr>
<th>B.4.1. Light duty vehicles (passenger cars), with refuelling stations.</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
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<tr>
<td>B.4.2. Heavy duty vehicles (e.g. buses), with refuelling stations</td>
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<td>B.4.3. Transport Auxiliary Power Unit (for trucks, ships and aircraft)</td>
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<td>B.4.4. Energy: hydrogen as a medium for storage of renewable energy</td>
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<td>B.4.5. Hydrogen production: biogas reforming</td>
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<td>B.4.6. Hydrogen production: water electrolysis</td>
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<td>B.4.7. Stationary: micro/residential CHP</td>
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<tr>
<td>B.4.8. Stationary: Industrial/commercial CHP</td>
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<td>B.4.9. Material handling equipment</td>
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<td>B.4.10. Back-up power systems</td>
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<td>B.4.11. Micro fuel cells</td>
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</table>

C. Identification of the problems
C.1. What are your views on the European FCH industry?

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<tr>
<th>Statement</th>
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<th>b</th>
<th>c</th>
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<tbody>
<tr>
<td>C.1.1. Today, it is competitive on the worldwide scene</td>
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<td>C.1.2. It is more competitive than 5 years ago</td>
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<tr>
<td>C.1.3. It has the potential to be more competitive in the foreseeable future (2020).</td>
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</table>

C.2. What are your views on the European FCH research

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<th>Statement</th>
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<th>d</th>
<th>e</th>
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</thead>
<tbody>
<tr>
<td>C.2.1. Today, it is competitive on the worldwide scene</td>
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<td>C.2.2. It is more competitive than 5 years ago</td>
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<tr>
<td>C.2.3. It has the potential to be more competitive in the foreseeable future (2020).</td>
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</tbody>
</table>
C.3. What do you think are the main problems for the development of the European FCH sector and deployment of the technology?

<table>
<thead>
<tr>
<th>a: Strongly agree</th>
<th>b: Agree</th>
<th>c: No opinion</th>
<th>d: Disagree</th>
<th>e: Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C.3.1. Lack of access to risk finance for deployment activities</strong></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
</tr>
<tr>
<td><strong>C.3.2. Lack of technological competitiveness</strong></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
</tr>
<tr>
<td><strong>C.3.3. Lack of appropriate Regulations, Codes and Standards</strong></td>
<td><img src="#" alt="Circle" /></td>
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<td><img src="#" alt="Circle" /></td>
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<tr>
<td><strong>C.3.4. Lack of public awareness</strong></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
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<tr>
<td><strong>C.3.5. Lack of public acceptance, problem of perception of safety</strong></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
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</tr>
<tr>
<td><strong>C.3.6. Lack of awareness and support of decision makers</strong></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
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<tr>
<td><strong>C.3.7. Lack of educated personnel</strong></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
<td><img src="#" alt="Circle" /></td>
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</tbody>
</table>
C.4. Do you think that the following aspects are part of the main reasons behind the problems of deployment of the technology?

<table>
<thead>
<tr>
<th>a: Strongly agree</th>
<th>b: Agree</th>
<th>c: No opinion</th>
<th>d: Disagree</th>
<th>e: Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.4.2. Lack of private RD&amp;D funding</td>
<td>![ ]</td>
<td>![ ]</td>
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</tr>
<tr>
<td>C.4.3. Lack of coordination between MS and the EU</td>
<td>![ ]</td>
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</tr>
<tr>
<td>C.4.4. Lack of cooperation between publicly funded and privately funded research</td>
<td>![ ]</td>
<td>![ ]</td>
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<tr>
<td>C.4.5. Lack of cooperation between different industry sectors</td>
<td>![ ]</td>
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<tr>
<td>C.4.7. Lack of support to SME</td>
<td>![ ]</td>
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</tbody>
</table>

D. European added value
D.1. The industry alone is able to address the relevant problems.*

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>No opinion</th>
</tr>
</thead>
</table>

D.2. An intervention at the level of regions or of Member States would be sufficient to help industry address the problems.*

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>No opinion</th>
</tr>
</thead>
</table>

D.3. An intervention at EU level is needed to help industry address the problems.*

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>No opinion</th>
</tr>
</thead>
</table>

D.4. What may be the added value of EU level public intervention in the FCH sector?*

- Ensure that all relevant European stakeholders cooperate towards defined goals
- Help to achieve the critical mass required for breakthroughs
- Contribute to the required large-scale investment in RD&D
- Ensure harmonisation of this emerging market
- Improve the capability of firms to innovate
- Support better SMEs access to research in the sector
- Provide better opportunity for market growth and diversity
- Provide better opportunity for EU12 participation
- Provide better conditions to foster EU competitiveness in the sector

E. Objectives

E.1. What should be the main content of FCH research & innovation?*

- Research & Development aiming at further improving the technology
- Demonstration projects aiming at proving the potential of FCH in different applications
- Both activities are necessary, a FCH programme should include both
E.2. On what applications should the action at European level focus on? *

- Light duty vehicles (passenger cars)
- Heavy duty vehicles (e.g. buses)
- Refuelling stations
- Transport auxiliary power units (for trucks, ships and aircraft)
- Energy: hydrogen as a medium for storage of renewable energy
- Hydrogen production: biogas reforming
- Hydrogen production: water electrolysis
- Stationary: micro/residential combined heat and power
- Stationary: Industrial/commercial combined heat and power
- Material handling equipment
- Back-up power systems
- Micro fuel cells
- Other

E.3. If "other", which one(s)?  

(maximum 50 characters)

F. Options and impact

This section asks for your opinion on the possibilities for the mechanisms to implement research & innovation in FCH under Horizon 2020, in particular the continuation of a Public-Private Partnership. A group of experts (Sherpa's group) had made recommendations for implementing Joint Technology Initiatives in the future[^1].

F.1. The Commission has listed four possible implementation modalities for research & innovation in the area of fuel cells and hydrogen under Horizon 2020. For each option, would you agree that it is a valuable mechanism to implement the specific programme for this technology?

a: Strongly agree  
b: Agree  
c: No opinion  
d: Disagree  
e: Strongly disagree

<table>
<thead>
<tr>
<th>Option</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
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<tbody>
<tr>
<td>F.1.1. Continue with a Joint Undertaking in the current form of Public-Private Partnership</td>
<td></td>
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<tr>
<td>F.1.2. Use of the collaborative research projects under the EU Framework programme</td>
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<td>F.1.3. Establish a Contractual Public-Private Partnership</td>
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<tr>
<td>F.1.4. Continue with a Joint Undertaking but with a different scope and simplified implementation</td>
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</table>

F.2. Which one is your favoured option?

- Continuation of current Joint Undertaking
- Collaborative research
- Contractual Public-Private Partnership
- Modernised Joint Undertaking
- No opinion
F.3. If the FCH JU was to be continued, which of the following topics should be improved compared to the current initiative?

- Aim and scope of the initiative, which should go beyond RD&D and include support to deployment activities
- Technology objectives
- Governing structure
- Budget
- Rules for participation and dissemination
- No opinion

F.4. Can a FCH JU contribute to improving the competitiveness of Europe in this sector?

a: 1- no impact at all
b: 2- low impact
c: 3- neutral
d: 4- will have an impact
e: 5- will have a strong impact
f: 6- no opinion

F.4.1. Short term: over the next five years

F.4.2. Medium term: over the next ten years

F.4.3. Long term: over the next twenty years

F.5. Based on the report of the Sherpa group, it should be possible for JUs to support to a certain extent activities which do not directly qualify as R&D, provided they contribute to the achievement of their innovation ecosystem goals. Do you agree with this suggestion?

- Strongly agree
- Agree
- No opinion
- Disagree
- Strongly disagree
F.6. Under FP7, the Joint Technology Initiative has been set up as a legal structure based on an article of the EU treaty (Article 187 of the Treaty on the Functioning of the European Union). A dedicated budget for the initiative is defined from the outset. The legal structure enjoys the rights and has the obligations of an EU institution. For example, it needs to follow the internal staff rules of the EU and the Executive Director of the FCH JU has to ask for discharge from the European Parliament. What is your opinion on the experience with this set-up?

[1] Article 187 (ex Article 171 TEC) : The Union may set up joint undertakings or any other structure necessary for the efficient execution of Union research, technological development and demonstration programmes.

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Very positive</th>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
<th>Very negative</th>
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<tbody>
<tr>
<td><strong>F.6.</strong></td>
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</table>

F.7. Regarding the performance of the FCH JU, what would you say regarding the following statements?

- a: Strongly agree
- b: Agree
- c: Neutral
- d: Disagree
- e: Strongly disagree
- f: No opinion

<table>
<thead>
<tr>
<th>Statement</th>
<th>a</th>
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<tbody>
<tr>
<td><strong>F.7.1.</strong> It has contributed to the objective of significantly accelerate the market introduction of the fuel cell and hydrogen technologies</td>
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<td><strong>F.7.2.</strong> It has contributed to provide medium-term stability on RD&amp;D public funding for the FCH sector</td>
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<td><strong>F.7.3.</strong> It has triggered additional private RD&amp;D funding</td>
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<td><strong>F.7.4.</strong> It has contributed to increase European competitiveness</td>
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<td>F.7.5.</td>
<td>It has contributed to increase and improve coordination between stakeholders at EU level</td>
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<td>F.7.6.</td>
<td>It has contributed to simplify the management and access to EC funding for RD&amp;D on FCH</td>
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<td>F.7.7.</td>
<td>It is a useful single entry point for support on RD&amp;D for FCH for different applications</td>
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<td>F.7.8.</td>
<td>It has contributed to increase the involvement of the industry in RD&amp;D on FCH</td>
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<td>F.7.9.</td>
<td>It has contributed to increase the involvement of SMEs in RD&amp;D on FCH</td>
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<td>F.7.10.</td>
<td>It has contributed to increase the EU-12 involvement in RD&amp;D on FCH</td>
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<td>F.7.11.</td>
<td>It has contributed to improve the EU presence at international level</td>
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<td>F.7.12.</td>
<td>It has contributed to increase the outreach of the FCH sector to less-informed publics (wider public)</td>
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<tr>
<td>F.7.13.</td>
<td>It has contributed to increase the outreach of the FCH sector to decision makers</td>
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</table>

G. Conclusion
G.1. Do you have further comments? Please upload a position paper, if any. (maximum 2000 characters)