



# ANNUAL ACTIVITY REPORT 2014



**FUEL CELLS AND HYDROGEN**  
JOINT UNDERTAKING

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FCH JOINT UNDERTAKING



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In accordance with Article 17 of the Statutes of the FCH 2 JU annexed to the Council Regulation (EU) No 559/2014 and with Article 20 of the Financial Rules of the FCH 2 JU

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# FOREWORD

The **Fuel Cells and Hydrogen 2 Joint Undertaking** (FCH 2 JU) is a fact. With the adoption of the Council Regulation in May 2014, the European FCH community now has a renewed vigour with a secured European financial commitment of EUR 665 million until 2020. However, at the same time, this poses a new challenge for industry and research partners with high financial and technical expectations.

Now even more than in the past, 'Joint' will be the password for success for the whole European FCH community: not only will FCH industry partners from the 28 EU Member States have to work closely together, but they will have to join forces with the world class European research community, with the European regions interested in fuel cells and hydrogen applications, with respective national initiatives and with other European Commission financing instruments. Only together can we make the difference: aligning strategies, aligning financial resources.

I have observed a small but steady inflow of **newcomers** to our projects and community: a sign of vital innovation. Some of them have backgrounds in less 'obvious' applications (aviation or maritime, ...); others do not necessarily hail from the centre of Europe, and yet others are from appealing sectors like energy utilities, gas & electricity grid operators and heavy industries. This is another sign that the technology and interest in its development are spreading wider.

With the signature of a Letter of Understanding on 12 November 2014, five leading European bus manufacturers highlighted their **commitment towards the commercialisation and market introduction** of fuel cell electric buses in urban — zero emission — public transport. In a symbolic ceremony, the letter was handed over to Mr Scholz, First Mayor of the City of Hamburg and Mr Malthouse, Deputy Mayor of London, representing two major European cities at the forefront of low emissions public transport systems.

These are just some of the indicators showing that the European Fuel Cell and Hydrogen community is very much alive, and is again squarely located on the European platform: the **Joint Undertaking**.

Only together, can we make a difference.

**Brussels, 27 February 2015**

**Bert DE COLVENAER**  
Executive Director  
Fuel Cells and Hydrogen Joint Undertaking



# EXECUTIVE SUMMARY

The year 2014 was the **cornerstone** of the new mandate of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU), with the adoption of Council Regulation 559/2014 on 6 May 2014. With a **total budget of EUR 1.33 billion** (EUR 665 million from the Horizon 2020 (H2020) Programme and EUR 665 million from private members through contributions in kind for operations and additional activities contributing to its objectives), the FCH JU aims to accelerate the commercial deployment of hydrogen-based energy and transport solutions across Europe.

The year saw several notable **key achievements**, described briefly below.

- **The launch of the 2014 call** on 9 July (the first call under H2020), with a budget of EUR 95.5 million.
- The successful negotiation and signature of 23 grant agreements of Call 2013-1 and of 2 grant agreements of Call 2013-2, for EUR 75.2 million and EUR 7 million respectively, and with a significant improvement in the time to grant (TTG).
- Adoption of a **new logo** and a **new visual identity**.
- **The website's** redesign: new **interactive tools** and a **modern look** in line with the new visual identity.
- The Stakeholders' Forum, featuring more than 280 European and international stakeholders. The event was marked by **five major European bus manufacturers** underlining their commitment to the commercialisation and market introduction of fuel cell electric buses in urban public transport: they signed a **joint letter** and presented it to the Mayor of Hamburg and to the Deputy Mayor of London.
- The Programme Review Days **showcased achievements** of the 155 FCH-FP projects: (1) a reduction of the electrolyser costs, (2) improved performance of fuel cells through increasing efficiency, and (3) increased component and system lifetimes. For example, **in the area of energy**, as regards hydrogen production, proton exchange membrane (PEM) electrolysers have shown a 70 % reduction in platinum loading, and on average a 30 % increase in current density compared to the 2008 baseline, while stack costs have almost halved. **In the area of transport**, the number of vehicles deployed on the road each year increased from a few units in 2010, to almost 40 cars, 50 buses and around 20 material handling vehicles (MHVs). Deployment from the first phase will continue beyond 2014, observing the timeline of the projects started under FCH 1 JU, with around 70 buses, 250 cars and over 400 MHVs expected to be deployed by 2017.
- Conclusion of a study on the commercialisation strategy for fuel cell stationary applications, including a clear assessment of the market readiness of fuel cells in three market segments (residential, commercial and industrial) and recommendations on FCH support.
- Validation of 61 cost claims (38 in 2013 and 29 in 2012) for 551 beneficiaries (326 in 2013, and 209 in 2012), leading to payments for EUR 30.3 million and to clearing of pre-financing of EUR 26 million.
- Organisation of a new session of the communication campaign to prevent errors in cost reporting with 'on-site' and 'online' participation of beneficiaries, and of certificate of financial statements (CFS) auditors. This year, there was a particular emphasis on eligibility aspects in 'Demonstration' projects.



- Continuation of the *ex post* audit effort with the launch of 22 new audits, and confirmation of the positive trend in terms of low error rates, resulting in a residual error rate below 2 %.
- Active contribution to the task force set up by the Governing Board: the task force comprises representatives from the Commission, from the Industry Grouping (IG), from the Research Grouping (RG) and from the Programme Office. It was mandated to prepare a process/methodology for in-kind contributions in operational activities (IKOP) and in-kind contributions in additional activities (IKAA) under H2020. Both methodologies are quite advanced and are expected to be adopted by June 2015.

The 2014 risk management exercise identified two elements as 'high risk': (1) the uncertainties on the readiness of H2020 new IT tools, and (2) the parallel running of two programmes with different rules. To mitigate this risk, several measures were implemented: (1) the set-up of a working group to review the manual of procedures and to identify procedures to be updated; (2) maintaining close contact with the Common Support Centre, specifically in IT and business processes; and (3) staff training for H2020.

# 01 OPERATIONS

## 1.1 OVERVIEW

The European Union (EU) is committed to transforming its transport and energy systems as part of low-carbon economy by 2050<sup>1</sup>, whilst decoupling economic growth from resource and energy use, reducing greenhouse gas emissions, increasing energy security and maintaining a strong competitive global position<sup>2</sup>. Recent studies<sup>3</sup> have concluded that hydrogen, together with electricity, sustainable biofuels and natural gas, will gradually become a much more significant component of the European energy mix. At the same time, fuel cells are the most efficient means of converting various fuels, especially hydrogen, to clean/cleaner, efficient, reliable power and heat for a wide range of energy-related applications; these include portable devices, combined heat and power (CHP), stationary power generation, and road and non-road transport. Recent International Energy Agency (IEA) reports<sup>4</sup> have concluded that hydrogen, as an energy vector and storage medium, will substantially reduce the need for ever greater quantities of renewable electricity, biofuels and bioenergy necessary to create a sustainable low-carbon energy system after 2030. Furthermore, independent near-to-midterm market projections worldwide indicate a substantial growth in the sector, with positive impacts on direct industry and associated supply-chain jobs.

For these many reasons, fuel cells and hydrogen are part of the portfolio of technologies identified in the European Strategic Energy Technology Plan (SET Plan)<sup>5</sup>. They are expected to contribute to a sustainable and secure European energy system in the medium to long term. This is consistent with the goals of the Europe 2020 Strategy, the Communication *Energy Roadmap 2050*<sup>6</sup>, the White Paper *Roadmap to a Single European Transport Area*<sup>7</sup>, the Communication *Research and Innovation for Europe's Future Mobility* (Strategic Transport Technology Plan (STTP))<sup>8</sup>, the Communication *Energy Technologies and Innovation of 2 May 2013*<sup>9</sup> and the Communication *Clean Power for Transport*<sup>10</sup> (CPT) which outlines the European alternative fuels strategy.

Europe is a technology leader in certain FCH applications, and holds a highly competitive position in others. European companies have made notable technological progress in all sectors, particularly road transport, thanks in part to consistent and long-term public support for projects funded by the countries, the European Research and Development Framework Programmes and the FCH 1 JU. However, other world regions are developing rapidly, and there is a risk that Europe will fall behind regions such as Japan, Korea or the United States. Significant public intervention through substantial financial support and favourable policies for market pull measures (subsidies, feed-in-tariffs, etc.) have placed these regions in lead positions for commercialising applications like residential and industrial CHP, fuel cell electric vehicles (FCEVs), and fuel cell back-up units.

In May 2008, the Council adopted a regulation<sup>11</sup> setting up a Joint Undertaking for the implementation of the JTI on Fuels Cells and Hydrogen on the basis of Article 171 of the EC Treaty, now replaced by Article 187 of the Treaty on the Functioning of the European Union. The aim of the FCH JU under the Seventh Framework Programme (FP7) was to accelerate the development and deployment of fuel cells and hydrogen technologies by executing an integrated European programme of research technology development (RTD) activities from 2007 to 2013.

1 European Council Conclusions of 23/10/2014 (EUCO 169/14).

2 Communication COM(2009) 519 final.

3 'Infrastructure for Alternative Fuels' – Report of the European Expert Group on Future Transport Fuels, December 2011.

4 *Energy Technology Perspectives 2012: Pathways to a Clean Energy System* (ISBN: 978-92-64-17488-7) *Hydrogen and Fuel Cells Technology Roadmap 2015*.

5 A European strategic energy technology plan (SET Plan) - Towards a low carbon future' COM(2007) 723.

6 Communication COM(2011) 885 final.

7 White Paper COM(2011) 144 final.

8 Communication COM(2012) 501 final; SWD(2012) 260 final.

9 See [http://ec.europa.eu/energy/sites/ener/files/comm\\_2013\\_0253\\_en.pdf](http://ec.europa.eu/energy/sites/ener/files/comm_2013_0253_en.pdf) online. Communication COM(2013) 253 final.

10 Communication COM(2013) 17 final.

11 (EC) N° 521/2008 (EU Official Journal 2008 - L 153).

The initial phase of the FCH 1 JU<sup>12</sup> enabled the development of a strategic programme of activities, comprising long-term, breakthrough-oriented research, applied research and technology development, demonstration and supporting actions, including strategic studies, pre-normative actions and technology assessment. However, taking to market those applications with the strongest potential to address energy security and climate change issues (e.g. road transport, public urban transport, stationary power generation, CHP, hydrogen from renewable energy sources and electricity storage) necessitates further key technical developments. Prototyping, piloting, testing and demonstrations, for instance, should accelerate the achievement of large-scale production volumes, taking into account issues around simplifying and harmonising regulation (for example in authorisation processes for refuelling stations), standardisation, consumer awareness and public procurement. All research and innovation actions should document progress beyond the state of the art. Some 155 projects with 545 different beneficiaries (28 % of which are small and medium-sized enterprises (SMEs)) from 22 EU Member States have been funded under FP7, and are presently monitored by the Programme Office.

As a public-private partnership (PPP), the FCH 1 JU has enabled a range of businesses and industry (in particular SMEs) to develop, and research communities to commit to longer-term developments. It has fostered an impressive level of collaboration between the research and industry community. The current members of the FCH JU represent a major share of Europe's stakeholders from across the fuel cells and hydrogen value chain. The New Energy World Industry Grouping (NEW-IG) brings together over 80 companies of all sizes, including car manufacturers, oil and gas companies, utilities, industrial gas companies and highly innovative SMEs developing and integrating FCH technologies. The New European RG on fuel cells and Hydrogen (N.ERGHY) comprises about 60 reputable research institutions and universities.

The new phase of the FCH JU under H2020<sup>13</sup> will build on the experience gained in the period from 2008 to 2013, to allow for a leaner governance structure, involvement of a broader range of stakeholders, more efficient operations and optimal management of human and financial resources. In this respect, the FCH 2 JU will aim to achieve improved alignment and consistency between national, regional and its own programmes. It will explore the synergies with national and regional initiatives in order to leverage their action at the European scale, particularly through large demonstration projects.

## 1.2 RESULTS OF CALLS AND OPERATIONAL ACHIEVEMENTS

At operational level, the 2014 activities were linked to the last FCH JU calls for proposals (under FP7 rules) and to the start of the FCH 2 JU activities (under H2020 rules) (see footnote 12).

Negotiations for the successful proposals of Call 2013-1 (the call closed on 22 May 2013) were carried out during the second half of 2013 and the first months of 2014. The objective was to reduce the TTG for this call, in comparison with previous calls.

On 26 August 2013, the Governing Board adopted by written procedure a decision to use the remaining budget of Call 2013-1 to open a new limited call for proposals (2013-2). The second amendment to the Annual Implementation Plan (AIP) 2013 was adopted by written procedure on 25 November 2013. On 30 April 2014, the Governing Board approved the selection of two proposals to be funded with a correction factor of 1.00. For this 2013-2 call, the objective was to not only reduce the TTG, but also to finalise the signature of the related grant agreements by the end of 2014.

The adoption of a reserve list was not possible, as all other proposals of Call 2013-2 were below the evaluation thresholds. Consequently, with a view to consuming as much as possible, two proposals were selected to be funded from the Call 2013-1 reserve list. Here also, the challenge lay in negotiating the proposals and signing the grant agreements before the end of 2014.

Monitoring of the 155 projects funded under FP7 rules was performed continuously with midterm meetings, reporting period analyses (technical and financial), and preparation of amendments.

The Programme Unit contributed to communication on fuel cells and hydrogen technologies via the preparation of the Programme Review Day 2014, the monitoring of different studies funded by the FCH JU, participation in different workshops and international conferences and via the implementation of the TEMONAS IT tool for knowledge management.

As regards FCH 2 JU activities, the Programme Unit prepared the Multi-Annual Work Plan (MAWP) that replaced the Multi-Annual Implementation Plan (MAIP) under the H2020 Programme. The Programme Unit also prepared the Annual Work Plan (AWP) 2014, including the 2014 call for proposals (with all supporting documents), with the help of the Industry and Research Groupings and the European Commission representatives. The challenge lay in launching the 2014 call for proposals on 9 July 2014 as requested by the European Commission, and in successfully utilising and interacting with the new structure put in place for the H2020 grants management, the Common Support Centre. Due to the entry into force of the Council Regulation on FCH 2 JU under H2020 in June 2014, the 2015 call for proposals was prepared in parallel with the 2014 call follow-up.

<sup>12</sup> The Fuel Cells and Hydrogen Joint Undertaking (FCH JU) set up by the 2008 Council Regulation was financially supported by FP7 and is referred to in the text as FCH 1 JU. The 2014 Council Regulation set up the prolongation of the activities with financial support under the H2020 Programme. This second range of activities is referred as FCH 2 JU.

<sup>13</sup> (EC) N°559/2014 (EU Official Journal 07/06/2014 – L169/108).

## 1.2.1 RESEARCH ACTIVITIES

At operational level, the activities carried out during 2014 are in line with the AIP 2013, the amended AIP 2013, the AIP 2014 and the AWP 2014, as approved by the Governing Boards for the FCH 1&2 JUs.

Call 2013-2 was published on 28 November 2013 and closed on 27 February 2014. Proposals were evaluated in March 2014 with the help of seven external experts, one chair and one observer. The negotiation phase was short (see Table 4.1.1 (j)).

The 25 projects from the 2013-1 and 2013-2 calls were signed, and the related pre-financing amounts were paid before the end of 2014.

The KPIs set out in the risk management activity for the operational unit include targets, most of which apply either to a full year or to a fully negotiated call for proposals. Consequently, the statistics for the calls 2013-1 and 2013-2 were added together to produce the 2013 calls KPIs (see Table 1.2.1 (a)).

**TABLE 1.2.1 (A) | 2013 CALLS KPIs**

INDICATOR	RESULTS	TARGET
Indicator 1: Member States represented in the 2013 proposals	18	15
Indicator 2: Matching correction factor for the 2013 call	0.8 and 1.0	$\geq 67\%$
Indicator 3: Coverage of 2013 topics by proposals	70 %	$> 90\%$
Indicator 4: Observers report 2013 calls	Positive	Positive/good
Indicator 5: Minimum score of selected projects	On 25 projects, 16 with score higher or equal to 11.5 9 projects between 10 and 11.5	$\geq 11.5$
Indicator 6: Number of projects that post a complaint (2013 calls)	6.3 %	$< 10\%$
Indicator 7: Redress procedure (i.e. number of complaints which led to re-evaluation)	None	None

Monitoring of projects from previous calls (2008–12) was performed continuously. From January to December 2014, a reporting period ended for 71 projects. The project officers were responsible not only for monitoring related (if any) midterm meetings with the external experts and technical reports and deliverables for these projects, but also for assessing the financial reports linked to these projects, alongside the financial officers. During the first half of 2014, 29 midterm meetings were held in the FCH JU premises, and the project officers monitored 39 amendments. The help of trainee and interim persons in preparing the related documents was welcomed. In 2014, project officers participated in 12 projects' kick-off meetings.

Some of the project officers were involved in the procurement negotiations (see the section on tendered studies - 1.2.2 Operational achievements) and in the related discussions (Development of a European Fuel Cell and Hydrogen Vehicles Roll Out Plan including support to national rollout strategies, Development of a European Urban Fuel Cell Bus Commercialisation Strategy based on the results of the fact based comparison of alternative power trains carried out in 2012, Development of a European commercialisation strategy for fuel cell stationary applications (distributed power generation), Study on development of electrolysis in the EU, Economic and technical assessment of the role of Hydrogen in Energy Storage, Financing Hydrogen Refuelling Infrastructure: conditions for private investments and required forms of public support).

The third Programme Review Days took place on 10 and 11 November 2014 (see the section on communication - Section 2.2.3, part 3). The Knowledge Manager, with the assistance of an external expert, is preparing the final report to be published in 2015. The projects involved in these fourth Programme Review Days were evaluated with the help of the Scientific Committee (SC) members.

The visibility of the FCH JU in Europe and worldwide was improved thanks to Programme Unit members' participation in different events (Hannover Messe, the European Hydrogen Energy Conference, the World Hydrogen Energy Conference, the 11<sup>th</sup> EU Solid Oxide Fuel Cell (SOFC) Forum, British and French mobility meetings, and the Fuel Cell Bus and Auxiliary Power Unit workshops).

The Programme Office was also invited to participate in the US DoE (Department of Energy) Merit Review days: two members of the unit were nominated as reviewers for two different sessions. The office maintained regular contact with colleagues from the US DoE. For topics of DoE interest in the 2013 calls, contact with the related and selected project coordinators was initiated. The cooperation with the United States may be considered effective.

Work has been started, using the technology monitoring and assessment software developed through the FCH JU-funded TEMONAS project, on the analysis of results coming out of finished projects (albeit the number of finished projects is currently relatively limited). A server was used to host the new software, which was then tested. Templates for recording data in different activity areas were produced and the first data were extracted from the public reports and deliverables. This activity progressed and was boosted thanks to work performed by the knowledge manager.

The *ex post* audit reports were received. Corrections to the costs declarations were implemented, and the auditors' recommendations were communicated to project coordinators.

Following the Internal Audit Service (IAS) Draft Limited Review Report on Use and Dissemination of Research results in the FCH JU, new guidelines and templates were prepared for the midterm review meetings with external reviewers. They will be adopted by Q1 2015.

Bankruptcy of some beneficiaries was implemented via amendments in the related projects. The amendment dealt with instances on a case-by-case basis: besides the withdrawal of the bankrupt beneficiary, it managed either its replacement by another beneficiary or the takeover of tasks by another consortium member. Where needed, the recovery of financial support to the bankrupt beneficiary was attempted. Bankruptcy of beneficiaries is not an extraordinary event in the consolidation of the hydrogen and fuel cells market. The withdrawal of some big FCH JU partners (notably AREVA and TOPSOE FUEL CELL) from the FCH JU projects, and the interest in FCH JU funding expressed by new companies (SAFRAN and General Electric) are signs that the market is not yet stable. Such signs must be carefully monitored in order to retain full chains of fuel cell and electrolyser production in Europe.

Moreover, during 2014, the opening of new fuel cells markets (in this case, the aeronautical market) was expressed by various stakeholders, either during face-to-face meetings (SAFRAN and DLR) or during international meetings (e.g. the World Hydrogen Energy Conference (WHEC) meeting in South Korea). As the Cleansky Joint Undertaking is supporting projects for greener aviation, and is dealing particularly with the development of on-flight test platforms for new technologies, cooperation between Cleansky and FCH JUs is an interesting prospect. First contact was made with companies interested in fuel cells aeronautical applications and with colleagues from the other JU. An agenda for a workshop similar to that on maritime applications of fuel cells was drafted during the second half of 2014, with the intent of organising the meeting in 2015. This workshop will focus on how the two JUs could cooperate and partially finance projects on fuel cells applications in the aeronautical sector.

As regards the FCH 2 JU activities, the Programme Unit successfully monitored the preparation of the MAWP, adopted by the Governing Board on 30 June 2014. In parallel, the Programme Unit, with the help of the Industry and Research Groupings and the European Commission representatives, prepared the AWP 2014, including the 2014 call for proposals (see below). This AWP 2014 was adopted by the Governing Board on 30 June 2014.

A public information session on the 2014 call was held on 10 July in Brussels. The Programme and the Finance Units contributed to the preparation of this full day meeting that highlighted not only the call topics, but also all the differences between the FP7 and H2020 submission rules for the preparation of successful proposals. The related documents were also used for in-person meetings or webinars for the following countries' beneficiaries: Germany (22/07/2014), Spain (16/07/2014), France (03/07/2014), Italy (25/07/2014), Portugal (12/09/2014) and the United Kingdom (15/07/2014).

One of the operational challenges was the timely preparation of the new rules, documents and IT tools for the management of projects under H2020. At the level of proposal submission, everything ran smoothly with the cooperation of the Commission services. Experience gained through Call 2013-2, involving the use of an IT tool adapted (to FP7 rules) and designed for H2020, for proposal submission and evaluation, highlighted some difficulties. These difficulties were discussed and resolved with the responsible persons in the Commission and with responsible agencies (nevertheless, during the 2014 call evaluation, the evaluation IT tool was observed to be slow and this was reported to the relevant unit).

The 2014 call for proposals was launched on 9 July 2014 (as requested by the European Commission) and was closed on 6 November 2014. All supporting documents, like the vade mecum for proposals submission, the guide for applicants and the model grant agreement, were adapted to the new H2020 rules. The topics and corresponding type of actions addressed by this call are set out below.

**TABLE 1.2.1 (B) | TOPICS AND TYPES OF ACTIONS ADDRESSED BY THE 2014 CALL AND THEIR INDICATIVE BUDGET**

TOPIC	TYPE OF ACTION	INDICATIVE BUDGET (million EUR)
<b>1. TRANSPORT PILLAR</b>		
FCH-01.1-2014: Standardization of components for cost-efficient fuel cell systems for transportation applications	Innovation (IA)	10
FCH-01.2-2014: Cell and stack components, stack and system manufacturing technologies and quality assurance	Research & Innovation (RIA)	
FCH-01.3-2014: Development of advanced fuel cell systems and system components	Research & Innovation (RIA)	
FCH-01.4-2014: Hydrogen storage standardisation and components optimization for mass production	Research & Innovation (RIA)	
FCH-01.5-2014: Development of cost-effective and reliable hydrogen refuelling station technologies and systems for fuel cell vehicles	Research & Innovation (RIA)	
FCH-01.6-2014: Engineering studies for large scale bus refuelling	Research & Innovation (RIA)	
FCH-01.7-2014: Large scale demonstration of refuelling infrastructure for road vehicles	Innovation (IA)	32
<b>2. ENERGY PILLAR</b>		
FCH-02.1-2014: Research in electrolysis for cost-effective hydrogen production	Research & Innovation (RIA)	16
FCH-02.2-2014: Decentralized hydrogen production from clean CO <sub>2</sub> -containing biogas	Research & Innovation (RIA)	
FCH-02.3-2014: Stationary fuel cell system diagnostics: development of online monitoring and diagnostics systems for reliable and durable fuel cell system operation	Research & Innovation (RIA)	
FCH-02.4-2014: Robust production of stationary fuel cells with reduced quality control costs	Research & Innovation (RIA)	
FCH-02.5-2014: Innovative fuel cell systems at intermediate power range for distributed combined heat and power generation	Research & Innovation (RIA)	
FCH-02.6-2014: Development of centrifugal hydrogen compressor technology	Research & Innovation (RIA)	
FCH-02.7-2014: Stand-alone hydrogen purification systems for new hydrogen pathways	Research & Innovation (RIA)	
FCH-02.8-2014: Improvement of electrolyser design for grid integration	Research & Innovation (RIA)	
FCH-02.9-2014: Significant improvement of installation and service for fuel cell systems by Design-to-Service	Innovation (IA)	25.5
FCH-02.10-2014: Demonstrating the feasibility of central large scale electrolysers in providing grid services and hydrogen distribution and supply to multiple high value markets	Innovation (IA)	
FCH-02.11-2014: Large scale fuel cell power plant demonstration in industrial/commercial market segments	Innovation (IA)	
<b>3. OVERARCHING PROJECTS</b>		
FCH-03.1-2014: Hydrogen territories	Innovation (IA)	5
<b>4. CROSS-CUTTING</b>		
FCH-04.1-2014: Educational initiatives	Coordination and Support (CSA)	4.5
FCH-04.2-2014: Develop strategies to raise public awareness of fuel cell and hydrogen technologies	Coordination and Support (CSA)	
FCH-04.3-2014: Pre-normative research on vented deflagrations in containers and enclosures for hydrogen energy applications	Research & Innovation (RIA)	
<b>TOTAL</b>		<b>93</b>

The total indicative budget for the call was EUR 93 million. In line with the call for proposals, proposal submissions were carried out in one stage, i.e. complete proposals were submitted.

The number of proposals received in response to the call for proposals was 57. The total FCH JU contribution requested by all received proposals amounted to EUR 235 977 050.

The proposals were first verified for their compliance with the pre-announced admissibility requirements: all submitted proposals were found to be admissible and would be subject to further review. The proposals were verified for their compliance with the pre-announced eligibility criteria: it was concluded that none of the proposals should be rejected. The proposals were verified for their compliance with the pre-announced selection criteria. While the operational capacity of participants was verified during the evaluation process, the financial capacity of coordinators will be assessed during the grant preparation phase in 2015. It was concluded that none of the participants should be rejected based on the operational capacity selection criterion in proposals which were below the thresholds.

Table 1.2.1 (c) summarises the number of proposals received in response to this call, the number of proposals found non-admissible, the number of proposals found ineligible, and the number of proposals finally evaluated.

**TABLE 1.2.1 (C) | NUMBER OF PROPOSALS: RECEIVED, NON-ADMISSIBLE, FOUND INELIGIBLE AND EVALUATED**

TOPIC CODE	TOTAL NUMBER OF PROPOSALS RECEIVED	NUMBER OF PROPOSALS FOUND NON-ADMISSIBLE	NUMBER OF PROPOSALS FOUND INELIGIBLE	NUMBER OF PROPOSALS EVALUATED
FCH-01.1-2014	1	0	0	1
FCH-01.2-2014	2	0	0	2
FCH-01.3-2014	3	0	0	3
FCH-01.4-2014	0	0	0	0
FCH-01.5-2014	2	0	0	2
FCH-01.6-2014	1	0	0	1
FCH-01.7-2014	1	0	0	1
FCH-02.1-2014	6	0	0	6
FCH-02.2-2014	7	0	0	7
FCH-02.3-2014	5	0	0	5
FCH-02.4-2014	1	0	0	1
FCH-02.5-2014	6	0	0	6
FCH-02.6-2014	0	0	0	0
FCH-02.7-2014	1	0	0	1
FCH-02.8-2014	3	0	0	3
FCH-02.9-2014	3	0	0	3
FCH-02.10-2014	3	0	0	3
FCH-02.11-2014	3	0	0	3
FCH-03.1-2014	2	0	0	2
FCH-04.1-2014	1	0	0	1
FCH-04.2-2014	3	0	0	3
FCH-04.3-2014	3	0	0	3
<b>TOTAL</b>	<b>57</b>	<b>0</b>	<b>0</b>	<b>57</b>

Table 1.2.1 (d) presents the distribution of proposals by topic and type of action, as presented to independent experts for evaluation.

At call submission level, no proposals were received for topics related to hydrogen storage (01.4) and hydrogen compressor technology (02.6).

Most of the proposals (38 of a total of 57 (66.6 %)) were received for 11 topics published in the energy pillar activities, while only 10 (17.5 %) were received for 7 topics published under the transport pillar activities. An additional 2 (3.6 %) were received for the topic under overarching activities, and 7 (12.3 %) for the 3 topics published under cross-cutting issues; in summary, 57 proposals were received for the 22 topics.

**TABLE 1.2.1 (D) | DISTRIBUTION OF PROPOSALS PER TOPIC AND TYPE OF ACTION**

TOPIC CODE	SUBMITTED ADMISSIBLE PROPOSALS		RESEARCH & INNOVATION ACTIONS	INNOVATION ACTIONS	COORDINATION & SUPPORT ACTIONS
	TOTAL	%	PROPOSALS SUBMITTED		
FCH-01.1-2014	1	1.8 %	0	1	0
FCH-01.2-2014	2	3.5 %	2	0	0
FCH-01.3-2014	3	5.3 %	3	0	0
FCH-01.5-2014	2	3.5 %	2	0	0
FCH-01.6-2014	1	1.8 %	1	0	0
FCH-01.7-2014	1	1.8 %	0	1	0
FCH-02.1-2014	6	10.5 %	6	0	0
FCH-02.10-2014	3	5.3 %	0	3	0
FCH-02.11-2014	3	5.3 %	0	3	0
FCH-02.2-2014	7	12.3 %	7	0	0
FCH-02.3-2014	5	8.8 %	5	0	0
FCH-02.4-2014	1	1.8 %	1	0	0
FCH-02.5-2014	6	10.5 %	6	0	0
FCH-02.7-2014	1	1.8 %	1	0	0
FCH-02.8-2014	3	5.3 %	3	0	0
FCH-02.9-2014	3	5.3 %	0	3	0
FCH-03.1-2014	2	3.5 %	0	2	0
FCH-04.1-2014	1	1.8 %	0	0	1
FCH-04.2-2014	3	5.3 %	0	0	3
FCH-04.3-2014	3	5.3 %	3	0	0
<b>TOTAL</b>	<b>57</b>	<b>100.0 %</b>	<b>40</b>	<b>13</b>	<b>4</b>

Proposals were evaluated from 17 November 2014 to 19 December 2014 with the assistance of 35 independent experts, in line with the procedures laid down in the FCH 2 JU rules (vade mecum) on proposal submission and evaluation, as approved by the FCH JU Governing Board. In selecting experts, the primary objective was to ensure a high level of skills, experience and knowledge in the areas of the topics of the call (including project management, innovation, exploitation, dissemination and communication). It was particularly important to achieve an appropriate balance in terms of skills, experience and knowledge, and of geographical diversity and gender, and the private–public sector. Experts were also regularly rotated (see Table 1.2.1 (e)).

Of the 35 experts, 6 (17.1 %) were women. Of the 35 invited experts, 21 (60 %) came from universities and research institutes (public or private), and 14 (40 %) hailed from private commercial firms. A total of 7 experts (20 %) were supporting the FCH JU for the first time with the evaluation of this call (in comparison to similar calls under previous years).

The 35 experts include the 2 chairs, who were appointed by the FCH JU to assist with management of the experts and the overall evaluation process. In addition, one independent expert was appointed by the FCH JU to observe and offer independent advice on the conduct and fairness of the evaluation sessions, on the application of the evaluation criteria and on ways to improve processes.



**TABLE 1.2.1 (E) | OVERVIEW OF THE EXPERTS' GENDER AND GEOGRAPHIC ORIGIN**

COUNTRY		FEMALE		MALE		TOTAL
GROUP	NAME	TOTAL	%	TOTAL	%	
EC Member States	Belgium	0	0 %	1	100 %	1
	Finland	0	0 %	1	100 %	1
	France	1	20 %	4	80 %	5
	Germany	0	0 %	5	100 %	5
	Greece	1	100 %	0	0 %	1
	Hungary	1	100 %	0	0 %	1
	Italy	0	0 %	2	100 %	2
	Lithuania	0	0 %	1	100 %	1
	Portugal	1	50 %	1	50 %	2
	Spain	1	20 %	4	80 %	5
	United Kingdom	0	0 %	3	100 %	3
EC Member States	TOTAL	5	18.5 %	22	81.5 %	27
Other Countries which get exceptional funding	India	0	0 %	2	100 %	2
	Switzerland	0	0 %	2	100 %	2
	United States	1	25 %	3	75 %	4
Other Countries which get exceptional funding	TOTAL	1	12.5 %	7	87.5 %	8
	GRAND TOTAL	6	17.1 %	29	82.9 %	35

At the start of the evaluation, all independent experts were briefed on process and procedures as well as on the applicable evaluation criteria and the objective(s) of the research area under consideration. The main differences between the calls under FP7 and H2020 were highlighted. A special briefing was held on 17 November 2014 on FCH JU premises for the chairs and observers, followed by a webinar with all the experts chosen. The confidentiality requirements of the whole process, including conflicts of interests and the respective obligations of the experts, were emphasised during the briefing. All experts received the relevant topic-specific documentation with respect to the programme and the call (AWP2014, Guides for Applicants, etc.).

Each proposal was assessed independently by at least three experts chosen by the FCH JU from the pool of experts taking part in this evaluation.

The evaluation was performed according to the award criteria, scoring, thresholds and weights, as published in General Annex F of the FCH JU AWP 2014, approved by the FCH JU Governing Board.

Overall, from a total of 57 proposals evaluated by 33 independent experts, 23 (40.4 %) were above the thresholds set out in the call. An additional six topics were not covered with any proposal above all thresholds. Should these topics be republished, a further check for overlaps with existing topics of the AWP 2015 should be performed.

Table 1.2.1 (f) provides an overview of the proposals evaluated and the evaluation outcome, including success rates by topic.

**TABLE 1.2.1 (F) | EVALUATION OUTCOME BY TOPIC**

TOPIC CODE	PROPOSALS SUBMITTED TO EVALUATORS	BELOW-THRESHOLD PROPOSALS		ABOVE-THRESHOLD PROPOSALS	
			%		%
FCH-01.1-2014	1	1	100 %	0	0 %
FCH-01.2-2014	2	1	50 %	1	50 %
FCH-01.3-2014	3	3	100 %	0	0 %
FCH-01.4-2014	0	-	-	-	-
FCH-01.5-2014	2	1	50 %	1	50 %
FCH-01.6-2014	1	0	0 %	1	100 %
FCH-01.7-2014	1	0	0 %	1	100 %
FCH-02.1-2014	6	1	16.7 %	5	83.3 %
FCH-02.2-2014	7	4	57.1 %	3	42.9 %
FCH-02.3-2014	5	3	60 %	2	40 %
FCH-02.4-2014	1	1	100 %	0	0 %
FCH-02.5-2014	6	3	50 %	3	50 %
FCH-02.6-2014	0	-	-	-	-
FCH-02.7-2014	1	1	100 %	0	0 %
FCH-02.8-2014	3	2	70 %	1	30 %
FCH-02.9-2014	3	2	70 %	1	30 %
FCH-02.10-2014	3	2	70 %	1	30 %
FCH-02.11-2014	3	2	70 %	1	30 %
FCH-03.1-2014	2	2	100 %	0	0 %
FCH-04.1-2014	1	1	100 %	0	0 %
FCH-04.2-2014	3	2	70 %	1	30 %
FCH-04.3-2014	3	2	70 %	1	30 %
<b>TOTAL</b>	<b>57</b>	<b>34</b>	<b>59.6 %</b>	<b>23</b>	<b>40.4 %</b>

All proposals that were over the pre-announced minimum quality threshold, by award criterion and overall (above-threshold proposals), were initially prioritised by the evaluating experts and listed as required by the sub-budgets of the call, in order of overall score. These lists were submitted to the Governing Board for approval by Q1 2015.

All above-threshold proposals are subject to an ethics screening. This will be performed in parallel with the grant preparation step and will be concluded prior to the grant signature.

In cases of serious or complex ethical issues requiring more in-depth analysis, proposals may be subject to an ethics assessment performed by external ethics experts. Any recommendations arising from this review will be taken into account in grant agreement preparations.

The total cost of the 57 eligible proposals was EUR 303 604 586, with a total requested FCH JU contribution of EUR 235 977 050. The proposed FCH JU contribution to proposals in the ranked lists was EUR 82 141 097. Therefore, a budget of EUR 10 858 903 (about 11.68 %) remains, which cannot be consumed due to the restricted number of projects to be funded across the topics, as described in the AWP 2014 (mainly in the Energy – Innovation Activities (-10.81 %)). The question of how to utilise the remaining budget will be submitted to the Governing Board, with a decision to be taken during Q1 2015.

## 1.2.2 OPERATIONAL ACHIEVEMENTS

The operational achievements of 2013 are presented and structured according to the four objectives of the FCH JU described in the revised MAIP adopted by the Governing Board in November 2011. Where relevant, the development of various indicators (over the period from 2008 to 2013) is presented.

## OBJECTIVE 01 | Place Europe at the forefront of FCH technologies worldwide, and enable the market breakthrough of FCH technologies

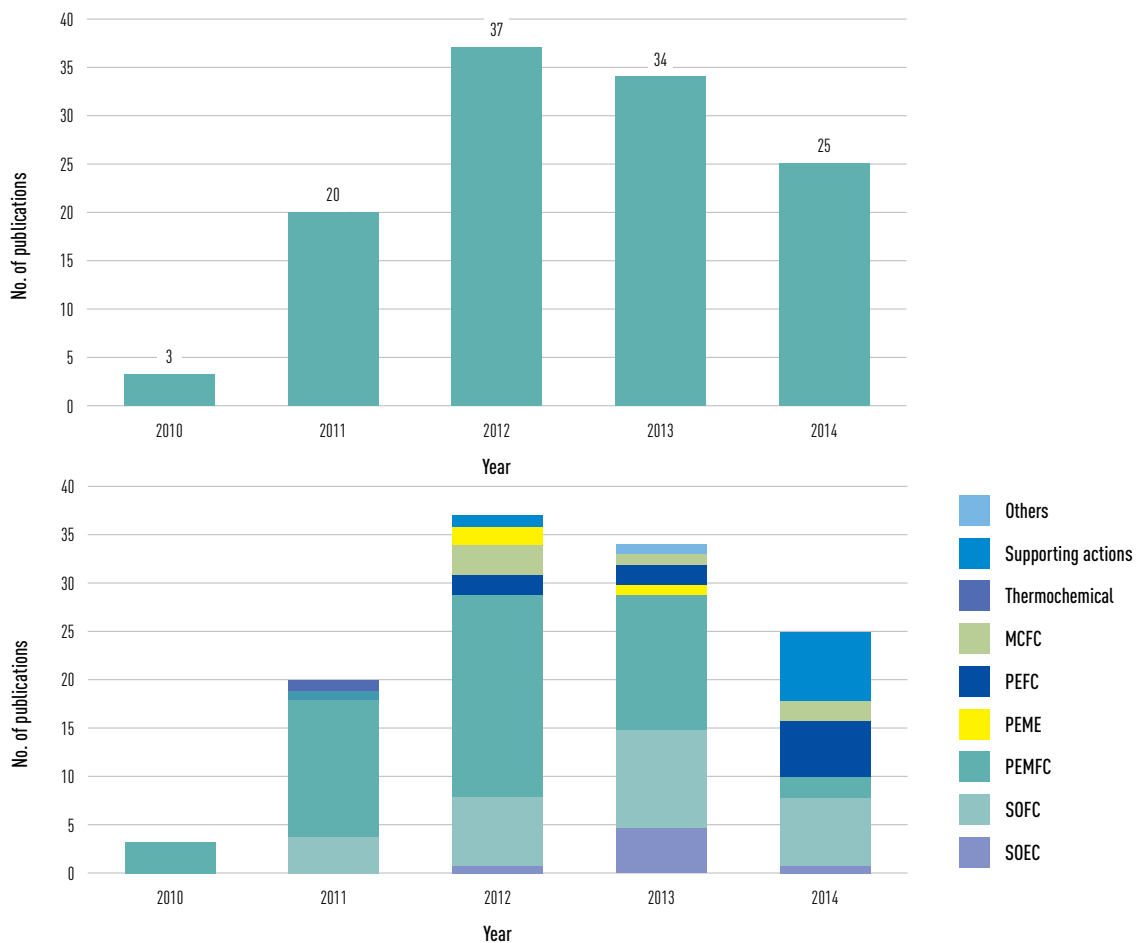
The FCH JU has provided EUR 450 million in funding over the period from 2008 to 2013 for projects dedicated to enhancing Europe's technological know-how in FCH technologies, towards their more rapid commercialisation.

These projects have produced and are still generating research work for technological advancement, and are fostering the development of new technologies and concepts enhancing the competitiveness of European industry in the field. In addition to numerous presentations made at international conferences, fairs and workshops, FCH JU-funded projects have produced 114 research publications in peer-reviewed journals, with a high citation index (of these, 11 are highlighted as open access) (see Annex A: Publications resulting from FCH JU-funded projects), and 14 patent applications (see Annex B: Patent applications through FCH JU-funded projects). Table 1.2.2 (a) highlights the trend in the number of publications and patents of FCH JU-funded projects from 2013 (first reporting year) to 2014, while Figure 1.2.2 (a) and Figure 1.2.2 (b) show the number and type of publications and patents produced to date by FCH JU-funded projects. Most of these publications are available through the websites of the related projects, which may be accessed via the FCH JU website. In 2014, the FCH JU website was consulted more than 76 350 times (by almost 44 350 distinct entities), over 56 % of which were new visitors to the site.

**TABLE 1.2.2 (A) | INDICATORS RELATED TO PUBLICATIONS AND PATENTS OF FCH JU-FUNDED PROJECTS**

INDICATOR	2013	2014
Number of projects with publications in peer-reviewed journals	9	21
Number of publications in peer-reviewed journals	70	115
Number of projects generating one or more patent applications	4	6
Number of patent applications	12	14

**FIGURE 1.2.2 (A) | PUBLICATIONS FROM FCH JU-FUNDED PROJECTS BY YEAR (TOP) AND BY ACTIVITY TYPE (BOTTOM)**



**FIGURE 1.2.2 (B) | PATENTS FROM FCH JU-FUNDED PROJECTS BY YEAR (LEFT) AND BY ACTIVITY TYPE (RIGHT)**



In addition to the intellectual property generated through FCH JU projects, the FCH JU Programme has produced a number of technical achievements as well.

The Programme Review Days (2014 edition), the FCH JU’s annual flagship event for projects, showcased a number of these achievements. Overall, projects’ results reveal that they are at the forefront of the European state of the art, and are competitive at international level. Significant advances are being made in key areas: reduction of FC electrolyser costs through decreased platinum loading, improved performance of fuel cells through increasing efficiency, and increased component and system lifetimes. And all this occurring while bringing down capital costs of electrolysers and fuel cells (whether for stationary or transport sectors).

In terms of energy, for hydrogen production, PEM electrolysers have shown a 70 % reduction in platinum loading, and on average a 30 % increase in current density compared to the 2008 baseline, while stack costs have almost halved.

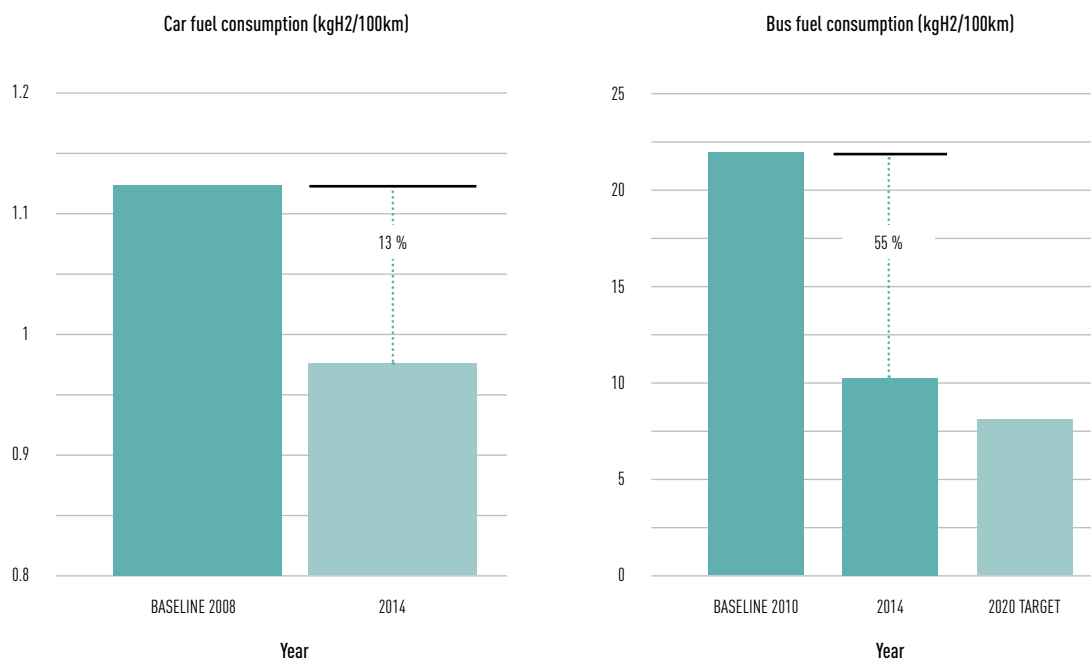
**FIGURE 1.2.2 (C) | COST ACHIEVEMENTS FOR ELECTROLYSERS (LEFT) AND FUEL CELLS (RIGHT) UNDER FCH JU (2008–13)**



In terms of stationary energy applications, both PEM FC and SOFC technology have shown a 5 % increase in system electrical efficiency. SOFC systems show a 50 % decrease in costs, and are achieving costs comparable with programme targets.

At the same time, the FCH JU Programme has significantly impacted performance and costs in the transport sector (refer to tables and figures below): fuel consumption for both cars and buses has decreased, while range has increased. Buses also show a decrease in FC and overall vehicle costs, as well as increased lifetimes. And while hydrogen refuelling station (HRS) availability has risen, hydrogen fuel prices have fallen.

**FIGURE 1.2.2 (D) | IMPROVEMENTS IN FCEV HYDROGEN CONSUMPTION (EFFICIENCY) UNDER FCH JU (2008–13)**



**TABLE 1.2.2 (B) | KEY ACHIEVEMENTS IN FCEV PERFORMANCE UNDER FCH JU (2008–13)**

CAR AND BUS PERFORMANCE		% IMPROVEMENT	
Car range	km	100 %	increase
Bus FC system cost	EUR/kW	29 %	decrease
Bus Vehicle cost	kEUR	40 %	decrease
Bus FC system lifetime	h	400 %	increase

**TABLE 1.2.2 (C) | KEY ACHIEVEMENTS IN HRS PERFORMANCE UNDER FCH JU (2008–13)**

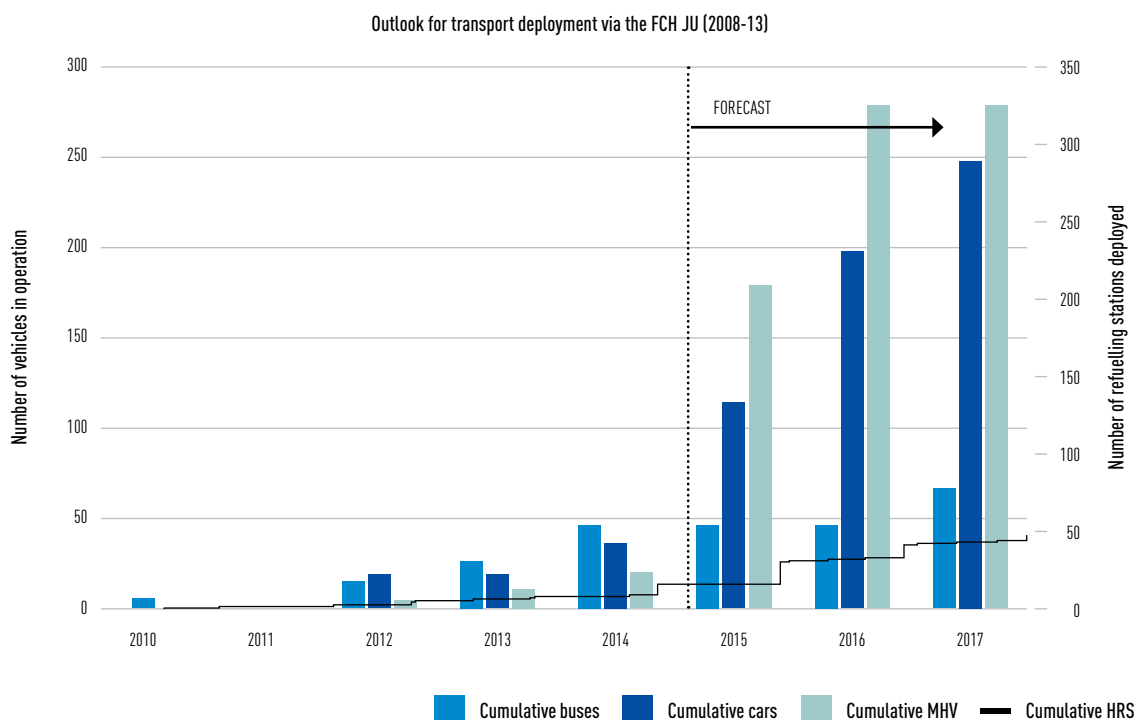
HRS PERFORMANCE		% IMPROVEMENT	
Availability	%	10 %	increase
H <sub>2</sub> price at pump	EUR/kg	41 %	decrease

Overall, the FCH JU Programme has made significant strides towards achieving market commercialisation through technological progress. This technological progress has been accompanied by progressive deployment of transport vehicles and infrastructure.

The first phase of the FCH JU (2008–13) saw a progressive increase in the number of vehicles deployed on the road each year, from a few units in 2010, to close to 40 cars, 50 buses, and to around 20 MHVs. Deployment from the first phase will continue beyond 2014, following the timeline of the projects started under FCH 1 JU, with around 70 buses, 250 cars and over 400 MHVs planned to be deployed by 2017.

The deployment of hydrogen transport infrastructure has seen a similar growth from 2010 to now and for the future. Some 20 HRSs (whether for cars, buses or MHVs) are currently in service, and a further 28 are expected to be operative between now and 2017.

FIGURE 1.2.2 (E) | TRANSPORT DEPLOYMENT, PAST AND PROJECTED, AS A RESULT OF THE FCH JU PROGRAMME (2008–13)



Overall, it is clear that the FCH JU Programme is contributing significantly to achieving EU goals for the sector. Table 1.2.2 (d) highlights the expected contribution of FCH JU projects to 2015 targets at EU level for various market applications.

TABLE 1.2.2 (D) | FCH JU CONTRIBUTION TO THE EU-TARGETS IN DIFFERENT MARKET APPLICATIONS OF THE FUEL CELL AND HYDROGEN TECHNOLOGIES

APPLICATION AREA	MARKET APPLICATION	VOLUME	
		TARGET INCREASE, EU LEVEL (2010–15)	PLANNED FCH JU PROJECTS CONTRIBUTION TO TARGETS
Transport	Cars	> 4 000 vehicles	246 vehicles
	Buses	~ 400 vehicles	67 vehicles
	Refuelling stations	~ 200	48 stations
H <sub>2</sub> production and distribution	Distributed production of hydrogen by water electrolysis	Increase of 3 % efficiency	Increase of 1 %
	Residential micro-CHP (natural gas based)	1 000 units	> 1 000
Stationary applications	Industrial/Commercial (H <sub>2</sub> based)	> 5 MW	2 MW
	Industrial/Commercial (natural gas based)	> 5 MW	0 MW
Early markets	Material handling vehicles (MHVs)	1 500 units	409 units

**OBJECTIVE 02 | Support RTD in Member States and countries associated with FP7 in a coordinated manner, to facilitate additional industrial efforts towards rapid development of FCH technologies**

The FCH JU has helped foster a Europe-wide community in the field of FCH technologies (see Figure 1.2.2 (f)). FCH JU support for RTD aims to have a broad reach across all EU Member States and Associated Countries, thereby reinforcing Europe’s position overall. From 2008 to 2013, the FCH JU has provided RTD support to 22 Member States and 6 Associated Countries through projects. Three third country beneficiaries participate in the 2008-to-2013 FCH JU projects. The number of entities participating per country and the overall funding provided varies by country (see Figure 1.2.2 (g)), with Germany and the United Kingdom being the two frontrunners in both respects (see Figure 1.2.2 (h)).

**FIGURE 1.2.2 (F) | GEOGRAPHIC SPREAD OF FCH JU-FOSTERED COMMUNITY IN FCH RTD**



Circles denote geographic concentrations of FCH JU-funded projects. Blue indicates areas where the number of FCH JU-funded projects is fewer than 10, and yellow indicates areas where the number of FCH JU projects is 10 or more.

FIGURE 1.2.2 (G) | TOTAL GRANT FUNDING AWARDED TO MEMBER STATES AND ASSOCIATED COUNTRIES (2008-13)

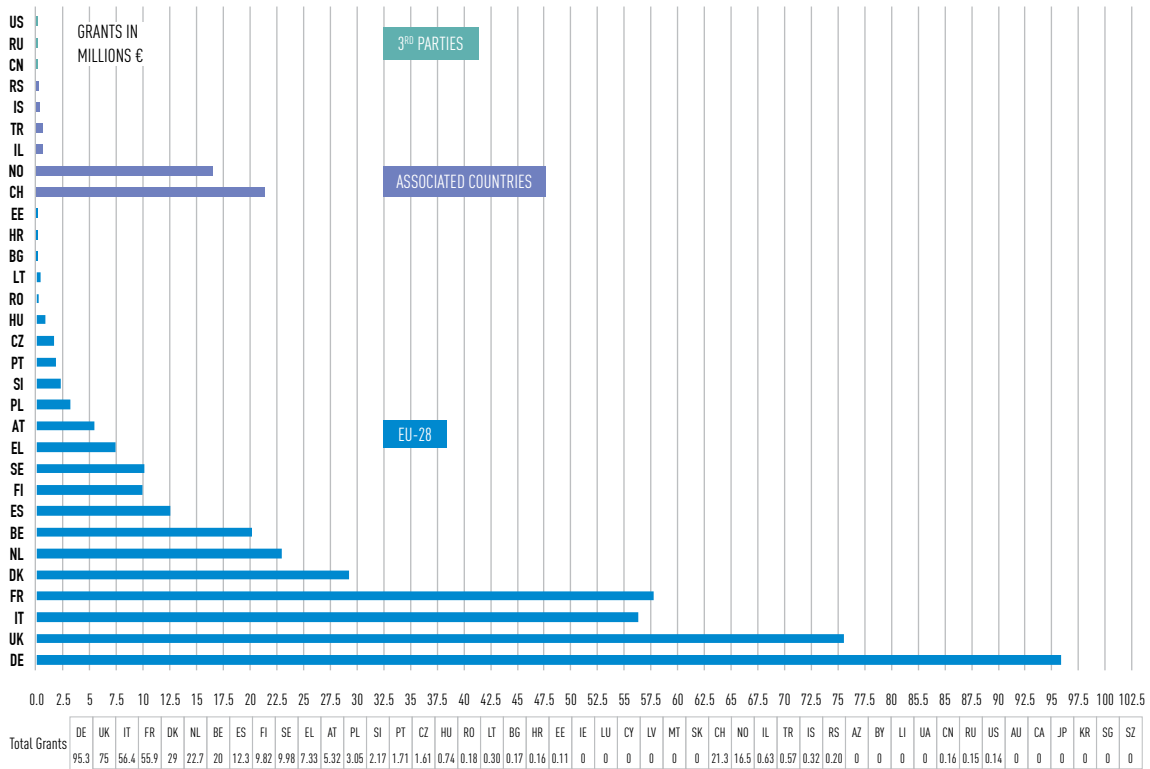
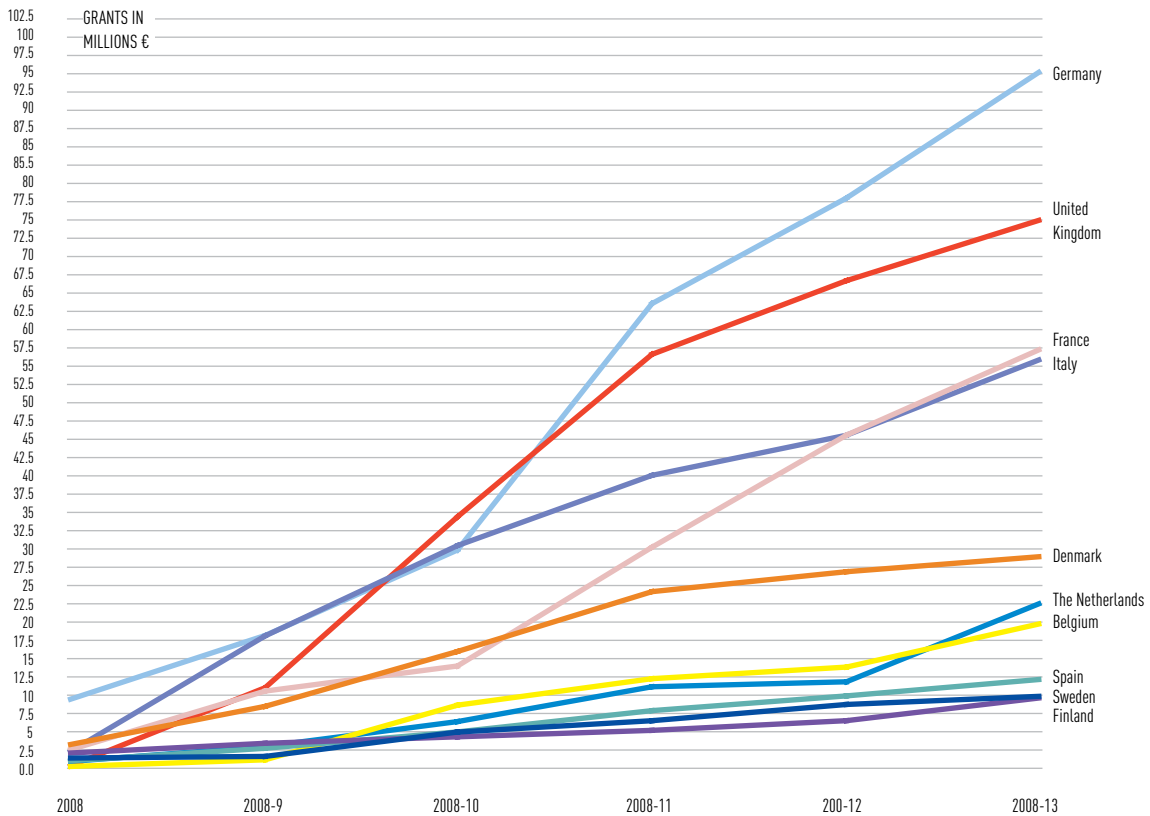


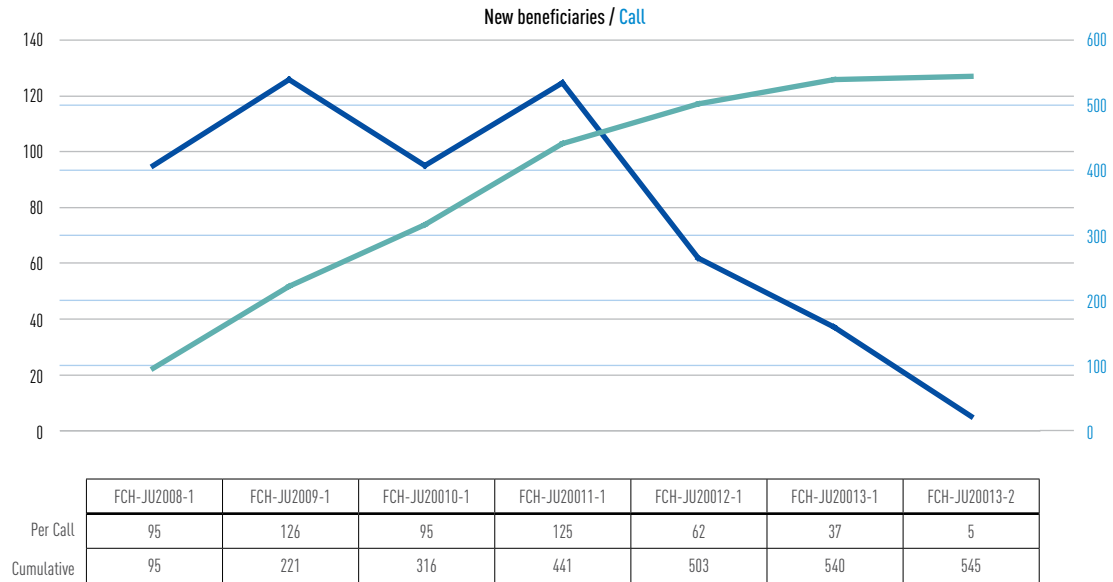
FIGURE 1.2.2 (H) | THE 10 HIGHEST BENEFICIARY COUNTRIES OF FCH JU GRANT FUNDING, THROUGH PARTICIPATION IN FCH JU CALLS (2008-13) — CUMULATIVE TOTAL GRANT FUNDING





In all cases, it is clear that the FCH JU is contributing to the expansion of the research and technological development community in the field of FCH. A total of 545 different entities participate in the selected proposals for the 2008-to-2013 calls (see Figure 1.2.2 (i)).

**FIGURE 1.2.2 (I) | NEW FCH JU PROJECT-PARTICIPATING ENTITIES ANNUALLY SINCE INCEPTION**



Blue represents new participating entities per individual call, and turquoise represents the cumulative total number of new participating entities since the start of the FCH JU in 2008.

**OBJECTIVE 03 | Support implementation of RTD priorities of the MAIP of the FCH JU, by awarding grants following competitive calls for proposal; and undertake supporting actions where appropriate, through calls for tender**

The FCH JU has supported 155 projects through calls for proposals since its commencement in 2008 (see Figure 1.2.2 (j)).

**FIGURE 1.2.2 (J) | PROJECTS AND SUPPORTING ACTIONS SUPPORTED THROUGH THE FCH JU**

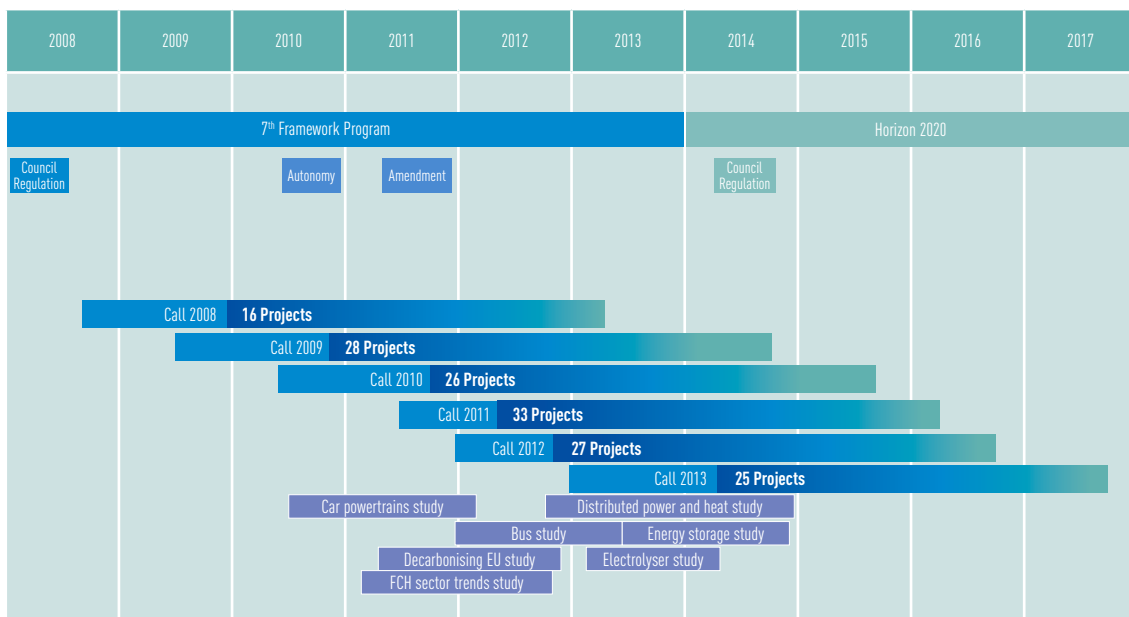


Table 1.2.2 (e) shows the extent to which the FCH JU call process has supported the RTD priorities of the MAIP. While most MAIP topics were addressed through the various calls, projects did not always materialise for each MAIP topic, either because no project proposals were submitted for the given call topic, or because submitted proposals did not pass the evaluation stage.

The coverage of topics called for in the 2008-to-2013 AIPs is 84 %.

**TABLE 1.2.2 (E) | COVERAGE OF MAIP RTD TARGET AREAS THROUGH FCH JU AIPs AND CALLS FOR PROPOSALS**

- Included in call topics for the AIP of a given year but no project awarded.
- x Included in call topics for AIPs over the period from 2008 to 2013.
- Project awarded in the call topic for the AIP of a given year/period.
- x Project awarded in the call topic for a given period.

TRANSPORT		2008	2009	2010	2011	2012	2013	PERIOD
T01	Road vehicle large scale demonstration including refuelling infrastructure	●	●	●●	●●	○	●●	x
T02	European fuel cell stack including concerted action	●						x
T03	Storage compressed gaseous H <sub>2</sub>	○				●		x
T04	Periphery - air supply module		○		○	○		x
T05	New catalysts and membrane electrode assemblies (MEA)		●	○	●●●●	●●●		x
T06	New membranes including for higher temperatures			○	○			x
T07	Investigation of degradation phenomena			○	●			x
T08	New bipolar plates			○	●		●	x
T09	Components for hydrogen refuelling stations				●		○	x
T10	Fuel cell systems for H <sub>2</sub> -fuelled airborne platforms				○	●		x
T11	Storage cryogenic H <sub>2</sub>		○					x
T12	Rail Propulsion							
T13	Periphery H <sub>2</sub> tank system & conditioning components							
T14	Auxiliary Power Units (APU) for rail and maritime application			●●			○	x
T15	H <sub>2</sub> -Internal Combustion Engine (ICE)							x
T16	PNR on composite storage		●					x
T17	PNR on fuel quality		●				●	x
	In-situ characterisation and diagnostics				○			x
	Modelling and simulation				●			x
	Next generation European automotive stack					●		x
	Measurement of the quantity of hydrogen delivered to a vehicle				○	●		x
T18	PNR on fast refuelling							
T19	PNR on vehicle safety				○			x
T20	PNR on crash tests							

TRANSPORT		2008	2009	2010	2011	2012	2013	PERIOD
T21	PNR on H <sub>2</sub> vehicles in confined spaces							
	Preparation for large-scale vehicle demo		•					X
H <sub>2</sub> PRODUCTION AND DISTRIBUTION								
H01	Low-cost, low-temperature, high-efficiency electrolyser	••		••			•	X
H02	Fuel processing catalyst, modules & systems		○	••				X
H03	Gas purification technologies		○	•				X
H04	Biomass-to-hydrogen (BTH) thermal conversion process				•			X
H05	New generation of high temperature electrolyser		•		○	○	•••	X
H06	High temperature thermo-electrical-chemical processes for water decomposition	•				•		X
H07	Underground H <sub>2</sub> storage							
H08	Low-temperature H <sub>2</sub> production processes			•	•			X
H09	Solid and liquid H <sub>2</sub> storage		•					X
H10	Large-scale H <sub>2</sub> liquefaction			•				X
H11	H <sub>2</sub> pipeline field test & safety analysis							
	Feasibility of 400b+ distribution			•				X
	Demonstration of MW capacity hydrogen production and storage for balancing the grid and supply to a hydrogen refuelling station				•	○		X
	Demonstration of hydrogen production from biogas for supply to a hydrogen refuelling station				○	•	○	X
	Novel H <sub>2</sub> storage materials for stationary and portable applications				••			X
	Measurement of the quantity of hydrogen delivered to a vehicle				○			X
	Innovative Materials and Components for PEM electrolysers				••			X
	Biomass reforming					•		X
	PNR on gaseous hydrogen transfer					•		X
	Development of improved road H <sub>2</sub> distribution						•	X
	Diagnosis and monitoring of electrolyser performance						○	X
	Validation of photoelectrochemical hydrogen production processes						•	X
H12	PNR & RCS				•			X
STATIONARY MARKETS								
S01	Degradation & lifetime fundamentals	•••••	•••			•	••	X
S02	Materials development for cells, stacks and balance of plant (BoP)		•••	••				X
S03	Next generation stack and cell designs			••	••	•	••	X

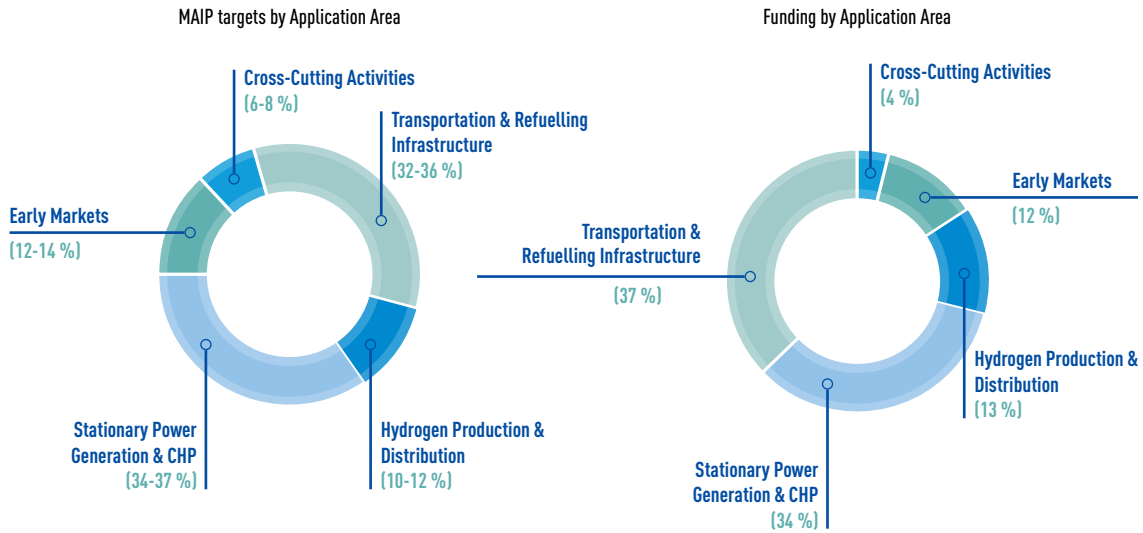
TRANSPORT		2008	2009	2010	2011	2012	2013	PERIOD
S04	Controls, modelling, diagnostics	•	••		○	•		x
S05	Improvement of components and their interaction	•	•	••	•	•	••	x
S06	System proof of concept		••	○	••	•••	••	x
S07	Validation of integrated systems readiness		•	•	○	○	○	x
S08	Market capacity build and field demonstration		○	••	••	•	•	x
S09	Development of application targets and technology benchmark		•					x
	Development of fuel cell serial production techniques and equipment for stationary fuel cell power and CHP systems						○	x
S10	PNR on H <sub>2</sub> devices for residential CHP							
S11	PNR on industrial H <sub>2</sub> systems							
	Pre-normative research on power grid integration and management of fuel cells for residential CHP, commercial and industrial applications			○	○			x
EARLY MARKETS								
E01	Demonstration of off-highway vehicles including refuelling infrastructure		•••	○	•	•	○	x
E02	Demonstration of portable generators, back-up and UPS power systems	○	•		○	○	•	x
E03	Fuel supply concepts for portable and micro FCs	••		○		○		x
E04	Durability of micro FCs under typical operating conditions			•				x
E05	Demonstration of portable and micro FCs for various applications		○	•		••		x
E06	Miniaturised BoP for special devices		○		○			x
E07	Demonstrate application readiness of stationary FCs			•				x
E08	Manufacturing, assembly and testing for micro FCs							
E09	Feasibility of a small power system platform							
	Research and development of 1-10 kW fuel cell systems and hydrogen supply for early market applications				•	○		x
	Research, development and demonstration of new portable Fuel Cell systems				••••		○	x
	Research and development of 1-30 kW fuel cell systems and hydrogen supply for early market applications						○	x
E10	PNR & RCS in-door use of FCs		○	•				x
E11	SME promotion		○					x
CROSS-CUTTING								
C01	Socio-economic planning phase 1: Data & result consolidation	•						x
C02	Socio-economic planning phase 2: Pathways and impact							

TRANSPORT		2008	2009	2010	2011	2012	2013	PERIOD
C03	Technology Monitoring Assessment -framework and development action	○	○	●				x
C04	Technology Monitoring Assessment - Execution							
C05	Sustainability assessment software	○	●●					x
C06	Impact assessment of hydrogen based economy							x
C07	SME promotion: Supply chain							
C08	Educational action with other programs		●●				○	x
C09	Educational action for specific target groups		●		○	●		x
C10	Public Awareness							
C11	Assessment of financial instruments							
C12	Recycling Technologies			○				x
C13	International Socio-economic and Policy evaluation							
C14	SME promotion: Outreach program & presentation platform		○					x
C15	Other activities							
	Assessment of H <sub>2</sub> storage of RE				●			x
	Stack testing				●		●	x
	Financing Options				○			x
	Hydrogen safety sensors					●		x
	CFD model evaluation protocol for safety analysis of HFC technologies					●		x
	PNR on fire safety of pressure vessels in composite materials					●		x
	Assessment of safety issues related to fuel cells and hydrogen applications					●		x
	Training on H <sub>2</sub> &FC technologies for operation & maintenance						●	x
	Social acceptance of FCH technologies throughout Europe						●	x
	Development of a European framework for the generation of guarantees of origin for green H <sub>2</sub>						●	x
	Pre-normative research on resistance to mechanical impact of pressure vessels in composite materials						●	x
<b>TOTAL PROJECTS FUNDED UNDER AIP TOPICS</b>		<b>16</b>	<b>28</b>	<b>26</b>	<b>33</b>	<b>27</b>	<b>25</b>	<b>155</b>

**NOTE |** Absence of an entry in the table indicates that the topic was not included as a topic for consideration within the AIP for that year, nor was it the subject of a call for proposal. Topics without an abbreviation code (leftmost column) indicate although that the topic was not originally anticipated in the MAIP when it was originally formulated, it was subsequently included as a topic for the AIP and as the subject of a call for proposal.

As shown in Figure 1.2.2 (k), based on annual cumulative budgets, the budget distribution per activity area has progressively come into line with the target range, with the exception of the area of cross-cutting activities, which is below target both in terms of representation in the AIP and with respect to realised FCH contribution. This could be due to the need to perform research and demonstration activities before initiating pre-normative research and other cross-cutting activities.

**FIGURE 1.2.2 (K) | TARGET BUDGET PER AA (LEFT) COMPARED TO ACTUAL COMMITMENTS PER AA (RIGHT) RESULTING FROM THE CALL PROCESS BASED ON CUMULATIVE RELATIVE BUDGET FIGURES WITH EACH YEAR**



In addition to the grants, the FCH JU has funded a number of studies and supporting actions through calls for tender.

The 2013 and 2014 AIPs anticipated that the following studies would be carried out.

**TABLE 1.2.2 (F) | STUDIES FORESEEN UNDER THE 2013 AND 2014 AIPs**

TOPIC	AMOUNT IN EUR
Development of a European Urban Fuel Cell Bus Commercialisation Strategy based on the results of the fact based comparison of alternative powertrains done in 2012	1 million
Development of a European commercialisation strategy for fuel cell stationary applications (distributed power generation)	1.5 million
Economic and technical assessment of the role of Hydrogen in Energy Storage	1.25 million

For these topics, intensive preparatory work had been undertaken in 2013; the studies were realised in 2014.

The European urban fuel cell bus commercialisation strategy or Bus study was officially launched in March 2014. The study is being conducted together with a growing coalition, now comprising more than 30 cities and bus operators, 5 bus original equipment manufacturers (OEMs), and a number of technology suppliers and H<sub>2</sub> infrastructure providers. The study is facilitated by Roland Berger Strategy Consultants. The objective is to develop a commercialisation strategy enabling the sector to overcome the current difficulty: bus operators keep waiting for a reduction of fuel cell buses prices before issuing orders, while bus OEMs keep waiting for a large number of orders before developing and selling affordable fuel cell buses.

To address this issue, a number of national workshops were held to boost interest in and awareness of fuel cells buses. The five bus OEMs also signed a declaration of intent, indicating their willingness to commercialise a large number of fuel cells buses in the coming years. An interim report has summarised the progress being made. The study will continue until May 2015.

The objective is to have a clear estimation of the demand for fuel cells buses in Europe, and to encourage cities and bus operators to jointly procure fuel cell buses and officialise their intention to purchase buses through declarations of intent. Based on the results of the study, the FCH JU will decide how (or if) it will support the deployment of fuel cell buses through its grant system.



FIGURE 1.2.2 (O) | COALITION OF ORGANISATIONS COLLABORATING ON THE ENERGY STORAGE STUDY



The AWP 2014 anticipated the following list of topics for studies, shown in the table below.

TABLE 1.2.2 (G) | STUDIES FORESEEN UNDER THE 2014 AWP

SUBJECT (INDICATIVE TITLE)	INDICATIVE FUNDING
Alignment on a vision on the future position of hydrogen and fuel cell technologies in a changing world	EUR 150 000
Conditions for the emergence of competitive H <sub>2</sub> -powered transportation solutions and estimation of the long-term impact of their market deployment on key macro indicators of the European Union (GDP, Employment, Trade Balance, Energy Imports, etc.)	EUR 150 000
Green hydrogen production pathways	EUR 150 000
Regulatory study: identification of EU regulations that hamper or that could facilitate the deployment of FCH technologies, and recommendations for change	EUR 150 000

The study on green hydrogen production pathways was contracted and is ongoing. The final results will be available in May or June 2015. For the three other studies, preparatory work was carried out in 2014, and they should be contracted at the beginning of 2015.

**OBJECTIVE 04 | Increased public and private RTD investment in FCH technologies in the Member States and Associated Countries**

The FCH JU has encouraged investment cooperation amongst a diverse set of organisations: industry, SMEs, research and higher education. Importantly, the programme has fostered increased SME participation throughout the calls, whilst maintaining the ever-important presence of the other sectors active in the field (see Figure 1.2.2 (p)). Please note that figures have been updated, taking into account all amendments up to 31 December 2014.



**FIGURE 1.2.2 (P) | PARTICIPATION OF VARIOUS ORGANISATION TYPES IN FCH RTD THROUGH FCH JU PROJECTS BUDGET BREAKDOWN**



Throughout all FCH JU calls, the percentage of SME participation in the projects' financial contribution is 26 %, while the percentage of industrial participation (large industry plus SMEs) in the projects is 57 % of the FCH JU financial contribution.

## 1.3 COOPERATION

### 1.3.1 INTERNATIONAL COOPERATION

International cooperation continued during 2014, mainly with the United States. The FCH JU's approach is to strengthen cooperation at operational levels, through projects and information exchange. Policy cooperation with international partners remains the EC's main prerogative.

Two members of FCH JU staff participated in the DoE Annual Merit Review, and DoE experts were in turn represented at the FCH JU's 2014 Programme Review Days and in the proposal evaluations of the 2014 call for proposals.

In addition, bilateral meetings were held, either in person or via teleconference, to discuss means of operational cooperation. The unit shared work programmes in order to identify areas of common interest at project level, and initiated contact at project coordinator level, thereby boosting cooperation with American national laboratories in various running projects.

### 1.3.2 MEMBER STATES

Information exchange with Member States and countries associated with FP7 were sustained and further developed in 2014, through the FCH JU States Representatives Group (SRG) (see Section 3.3).

In addition to formal cooperation channelled through the SRG, the relationship with Member States continued to develop through the National Contact Points (NCPs) for energy in all Member States. These NCPs have regularly been informed about FCH JU activities, invited to its events and been sent specific information material. The FCH JU also participated in NCP-organised events.

### 1.3.3 JOINT RESEARCH CENTRE (JRC)

The Commission's JRC undertakes high-quality research in the field of fuel cells and hydrogen that is of considerable relevance to the implementation of the FCH JU activities. During the FP7 period (ending in 2013), cooperation between the JRC and FCH JU was structured under a framework agreement covering support activities provided by the JRC in kind to the FCH JU, as well as possible funded JRC participation in FCH JU projects.

For the H2020 period, a new framework agreement between the FCH 2 JU and the JRC was initiated in 2014; it is being finalised and is subject to approval by the Governing Board in 2015.

This framework agreement will include activities at programme level to support strategy formulation, as well as research and innovation activities specifically related to standardisation and pre-normative research. These activities will be provided free of charge to the FCH 2 JU Programme Office and to FCH 2 JU-funded projects.

Other activities at programme and project level, including support for the implementation of the MAWP and the consecutive AWP, will be funded from the FCH 2 JU operational budget. These activities will be discussed and agreed annually between the JRC and the Programme Office, and will be included in a rolling collaboration plan, to be approved by the Governing Board of the FCH 2 JU. These activities will be subject to annual monitoring against agreed key performance indicators. The collaboration plan will list the activities, the expected outcomes/deliverables and the estimated necessary resources for each activity.

# 02

## SUPPORT ACTIVITIES

### 2.1 ADMINISTRATIVE FUNCTIONS

#### 2.1.1 LEGAL AND FINANCIAL FRAMEWORK

The main event in this regard was the adoption of Council Regulation No 559/2014 of 6 May 2014 establishing the Fuel Cells and Hydrogen 2 Joint Undertaking (FCH 2 JU) and delegating it the implementation of a part of H2020 budget for the period from 2014 to 2024.

In this context in 2014, beyond the usual work related to grant and procurement management activities, the focus was on preparing H2020 and FCH 2 JU.

A Sherpa group, comprising representatives of the Programme Office, of the NEW-IG and N.ERGHY and of the Commission services was set up to develop the legal framework applicable to the FCH JU: financial rules, delegation agreement, financing agreements with the NEW-IG and N.ERGHY. The FCH 2 JU regulation provides that the members of the NEW-IG and N.ERGHY contribute to the success of the programme through in kind contributions either within projects (IKOP) or in additional activities (IKAA). The FCH 2 JU (the Programme Office and the three JU members) developed a methodology for assessing both types of in kind contribution expected to be adopted by June 2015.

Following the recommendation of the internal audit manager, and taking into account the importance of the appropriate management and prevention of conflicts of interests as highlighted by the European Parliament during the discharge procedure<sup>14</sup>, the Programme Office also drafted a comprehensive policy on the prevention and management of conflicts of interests covering all levels of the organisation. It was presented for adoption by the Governing Board under Article 20 (2) of its statutes. However, its adoption was postponed: given the horizontal nature of this matter, the Commission considered it preferable to have a common template for all JUs. It is expected that a common template be finalised in 2015.

#### 2.1.2 HUMAN RESOURCES

Activities in the field of human resources included the following.

- Six **selection procedures** planned for 2014 were completed:
  - project manager — cross-cutting activity area/AD8 (took up duties on 1 May 2014)
  - financial assistant/AST6 (took up duties on 1 June 2014)
    - junior project managers/AD5-2 posts (took up duties on 1 November 2014)
    - financial officer/AD5 (took up duties on 16 November 2014)
    - junior legal officer/AD5 (took up duties on 1 January 2015)
    - communication officer/AST3 (took up duties on 16 January 2015).

By the end of 2014, the FCH JU Programme Office had been staffed with 22 temporary agents and 2 contract agents. Details on the staff establishment plan are shown in Annex 2.

<sup>14</sup> European Parliament resolution of 3 April 2014 with observations forming an integral part of its Decision on discharge in respect of the implementation of the budget of the Fuel Cells and Hydrogen Joint Undertaking for the financial year 2012 (C7-0340/2013 – 2013/2252(DEC)).

Regrets that the CVs of the members of the Management Board and the Executive Director are not publicly available; calls on the Joint Undertaking to remedy the situation as a matter of urgency; urges the Joint Undertaking to develop and adopt a comprehensive policy on the prevention and management of conflicts of interests; Believes that a high level of transparency is a key element in order to mitigate the risks of conflicts of interests; calls, therefore, on the Joint Undertaking to make its policy and/or arrangements on the prevention and management of conflicts of interests and its implementing rules, as well as the list of the members of the management boards and CVs available on its website.

In the year 2014, the FCH JU also recruited three trainees for the period of six months to support various activities, both in the Programme Unit and in the Finance and Administration Unit.

- Following the entry into force of the revised staff regulations on 1 January 2014, **new implementing rules** were adopted. Of the 25 implementing rules, 11 (application by analogy of EC rules) were adopted by the Governing Board on 14 April 2014, 7 were subject to a request for an opt-out (as not applicable to the JU; they concern officials or staff in EU delegations). Of the seven remaining, all apply by analogy, except for the implementing rule on teleworking for which adaptation was requested, and the implementing rule on the engagement of temporary staff for which discussions are ongoing in the permanent group between the Directorate-General for Human Resources and Security and the agencies.

In the context of the launch of the new H2020 Programme, staff members were encouraged to participate in **training sessions**. Furthermore, the vision, values and competences are also being reviewed. In this respect, a feedback development exercise was carried out with the support of a consultant and involving all staff. The outcome will be included in the learning and development plan of 2015.

### 2.1.3 OFFICES

The seat of the FCH 2 JU is located in the White Atrium in Brussels, Av. de la Toison d’Or 56-60. The building also hosts other JUs (Clean Sky (CS), Electronic Components and Systems for European Leadership (ECSEL) (formerly ARTEMIS and ENIAC) and the Innovative Medicines Initiative (IMI)).

In 2014, negotiations were carried out on the extension of the premises, so as to take into account the increased needs of the JUs, stemming from their new mandates under H2020 as well as the possible arrival of other Joint Undertakings (biobased industries (BBI) and Shift2Rail). The works were completed and accepted by the end of the summer. The arrival of BBI and Shift2Rail by mid 2015 was confirmed.

A new host agreement (required following the adoption of a new legal basis) was negotiated with the Belgian authorities and was signed in January 2015.

### 2.1.4 IT INFRASTRUCTURE

The FCH information and communications technology (ICT) strategic objective is to deliver ICT applications and infrastructure to support the implementation of the business objectives. The priority objectives for IT are to ensure a stable and secure IT system under FP7 and H2020, provide IT support to staff in the use of IT applications and equipment and to cooperate with the other JUs to ensure synergy and the efficient use of resources, with the goal of supporting and shaping the present and future of FCH.

In essence, the FCH IT architecture comprises three environments, as shown in the table below.

**TABLE 2.1.4 (A) | FCH IT ARCHITECTURE**

FCH CORE BUSINESS	
	ESS: submission of applications, call management
EC Framework Programme 7 IT tool family	NEF/CPM: negotiation, grant agreement Force/SESAM: submission form C, project reporting
EC Framework Programme H2020 IT tool family	SEP: submission of applications, call management COMPASS/SYGMA: grant agreement Force/SESAM: submission form C, project reporting
Expert management	EMI: expert management for evaluations
Results dissemination	CORDA: statistical database for calls and projects
ABAC	Accrual-based accounting system of the Commission
PUBLIC BUSINESS SUPPORT TOOLS	
Support to governance bodies (GB, SC, SRG, BCP)	Dedicated, secured and highly available IT platforms for governance bodies were set up on CIRCA BC
Events registration tool	New modular tool to manage events organised for communication team
TEMONAS tool	Technology monitoring and assessment platform delivered by one FCH project
FCH JU website	Public communication channel for the JTI

FCH INTERNAL SUPPORT	
JTI shared internal environment (New FWC)	<p>Hosted within the building's premises</p> <p>Supported by third-party contractors</p> <p>Common JTI IT governance chaired by FCH</p>
M-FILES (document repository application)	<p>Tool for electronic processing, storage and retrieval of documents</p> <p>Integrated one-page intranet to centralise helpdesk information and access to tools and applications</p>
ISA (Information System for Absences)	<p>Implementation on 1 January 2014 of the IMI tool, to manage the various types of absences as a JTI common integrated internal tool; study of possible further development (eMA: missions) ongoing and to be decided in 2015</p>

The year 2014 was driven by business continuity for the core business functions and internal support. It was marked by the parallel preparation of the new Framework Contract for IT services after 2014 and the assessments of the new FCH regulatory programme through the Sherpa group. In IT, focus was concentrated on the preparation and tests of the Commission IT applications for H2020 and the staff training. At the end of the year, priority was given to the transition to the FCH 2 JU new visual identity.

### Support to FCH core business

As in previous years, it was ensured that FCH staff has adequate access to the complete set of FP7 IT applications provided by the Commission, with an improved system of access rights, in line with Internal Audit Capability (IAC) or European Court of Auditors (ECA) recommendations. Electronic signature and e-submission processes were introduced in SESAM and Force; the expert management tool (EMI) is now completely operational for FCH, and use of CORDA increased for statistical reporting. The automated generation of cost claims in ABAC workflow was also activated, in agreement with DG Research and Innovation and DG Budget.

With the establishment of the FCH 2 JU under the H2020 Programme and the continuation of the management of FP7 projects, the Sherpa meetings identified a number of potential problems. Business IT tools differ, a fact which may increase the risk level of the processes. Under H2020, automated workflows are driven by Compass, and electronic documents will be recorded in the Hermes database for which the main tool Ares is unavailable to the JTIs. Particular attention was given to these issues as they directly impact the workload and planning activities of the staff. IT solutions and workarounds have been discussed and introduced by the system owners.

### Business support tools

The TEchnology MONitoring and ASessment platform (TEMONAS) was delivered in 2013 to the FCH as a result of a financed project under cross-cutting activities. The database and application portals are hosted in the FCH premises. It provides a functional and integrated technology monitoring and assessment (TMA) tool specifically tailored for the needs of research programme progress evaluation. Maintenance contracts as well as a development contract were signed in June 2014. Training for key users was conducted in July. Some corrections and additional developments occurred following the internal test phase. These will make the tool fully operational for the coordinator who enters the project's inputs and the knowledge management officer who uses the tool for the dissemination of project's research results.

Linked to new visual identity and the Programme Review Day in November, the website was redesigned completely. The FCH JU used the Framework Contract of DG Research and Innovation ISS/H2020 for the coding supported by the Agile methodology in the project plan, for the first time. The aim of this operation was to improve the external communication and visibility of the FCH programme.

### FCH internal support

Internal IT systems were set up on a server in the building White Atrium, and had been stabilised and enhanced throughout the years. The stabilisation, root-cause analysis of the problems, reporting and monitoring of IT issues and service level agreements (SLAs) in an efficient IT governance group have significantly reduced the IT risks in the organisation, as is proven by the IT risk assessment carried out by the IAS in 2013. In the updated procedure of this year, it was noted that the vulnerability of some IT processes has been reduced to some extent, but in the meantime the importance of IT has been increased due to the increasing IT applications being used (FP7 & H2020) and shared (IMI ISA platform).

The FCH document management system enables full electronic processing, storage and retrieval of all documents not directly stored in the EC applications. The homepage of the system integrates one intranet 'embryo' to provide FCH staff with a single interface from which to access information and connect with other systems. Due to the upcoming workflow management system in H2020 (Compass), it has been decided to put on hold for the moment significant development of automation in the Document Management System DMS, so we can better evaluate the needs and gaps in 2015.

The new telecommunication line (testa-NG) should have been replaced by the end of 2014. It is a key item for running the JU's business processes, and any interruption could be extremely damaging. The Directorate-General for Informatics has postponed the migration until May 2015, so as to allow the best deployment possible. The JUs had to ensure the prolongation in urgency of their data line with the existing provider until end of 2015 to allow the business continuity for all the JTIs.

A procurement procedure was carried out in 2014, and was concluded with the signature of the new Framework Contract for IT services from 2015 onwards. Some simplifications have been introduced in the tender, like reducing service providers to one single tenant by merging internal telecom services with end-support services in a global SLA. In the meantime, additional services, which had been absent in available Commission framework contracts to date, have been added (e.g. repairs, disposals and hosting).

## 2.2 COMMUNICATION ACTIVITIES

In 2014, all the activities initiated over the past years were further developed and strengthened. The FCH JU Programme Office organised, sponsored and attended a number of conferences/meetings. The aim was to increase awareness for EU and national-level policymakers of the market readiness and potential benefits of FCH technologies, and to raise the profile of the FCH JU Programme and its activities amongst stakeholders of the FCH community.

### 2.2.1 INSTITUTIONAL COMMUNICATION AND AWARENESS-RAISING

#### European Parliament

The Programme Office maintained regular contact with the Members of the European Parliament (MEPs) of the main political groups (e.g. EPP, S&D, ALDE and the Greens), particularly MEPs' representatives for the Industry, Research and Energy/Environment/Transport Committees. There were three main focal points in the messages: (1) information on the FCH JU Programme and its objectives, (2) dissemination of projects' results and achievements, and (3) clarification concerning the added value of a PPP and FCH 2 JU funding mechanism.

Communication with MEPs was strengthened during the course of the parliamentary discussions towards the adoption of the EU Research and Innovation programme Horizon 2020. Moreover, the Programme Office was very active in providing information/clarification and securing the necessary support for the FCH JU discharge, with members of the Budgetary Control Committee of the European Parliament.

The Programme Office was also in regular contact with the political advisers of the main European Parliament (EP) political groups and assistants to Members of the European Parliament (MEPs), who are key actors for the advancement of any legislative procedure at the EP.

The Programme Office has regularly accepted invitations to speak at high-level events at the EP and provide its views on financial mechanisms (i.e. PPPs) as a means of effective deployment of the EU Innovation strategy (lunch with the several MEPs and new Chinese Ambassador, Her Excellency Yang Yani on 18 March; work session with Commissioner G. Oettinger and Mr J. Buzek on 9 September 2014; workshop with several MEPs and Mr K. Vandenberghe, Director for Climate Action and Resource Efficiency, DG Research and Innovation on 18 November 2014, etc.).

#### Council

All the activities initiated in the past years have been further developed and strengthened. The FCH JU Programme Office maintained regular contact with councillors and scientific attachés of many national permanent representations to the EU, so as to provide updates on the achievements of the FCH JU. In view of the H2020 legislative process, the Programme Office had regular exchanges with the research delegate of the Greek Presidency of the EU Council. Regular contact was also made with the Italian Presidency, in particular to secure the participation of the FCH 2 JU at the SET Plan Conference which took place on 8 December 2014.

#### Member States

The FCH JU Programme Office has also been very active in communicating with Member States. The Executive Director and/or a Programme Office representative participated in several meetings, conferences and info days in Brussels and other Member State cities, ensuring visibility and garnering political support for the FCH JU Programme, and raising awareness of FCH JU activities (i.e. calls for proposals).

#### European Commission

The FCH JU Programme Office has maintained regular contact with the main DGs involved in the FCH JU Programme (i.e. DG Research and Innovation, DG Energy and DG Mobility and Transport). In the spirit of effective institutional collaboration, the Programme Office has been providing data and information with accuracy and transparency.

On 25 April 2014, the Programme Office took part in the JTI's lunchtime RTD debate 'FCH: Europe's clean solutions for energy and transport' as part of the DG Research and Innovation's internal communication initiatives. A series of special RTD debates was organised in view of the Joint Technology Initiatives/Joint Undertakings adoption in July, and the FCH JU Executive Director presented the FCH JU Programme, achievements and results as well as the added value of the PPP financial tool.

The Joint Communication Task Force comprising NEW-IG, RG, EC and the Programme Office was strengthened in order to ensure a more coordinated approach on communication and regular circulation of information on communication activities undertaken by the Programme Office. This is an aspect that should be further strengthened next year.

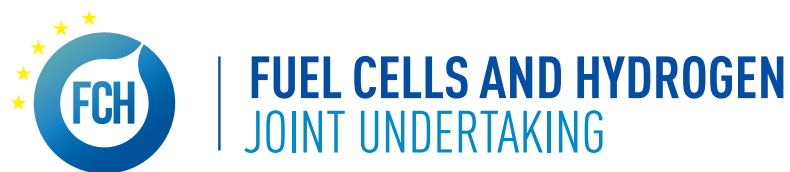
## 2.2.2 COMMUNICATION ACTIVITIES FOR THE PUBLIC

Due to the transition to the FCH 2 JU, the main priorities for 2014 were revitalising the visual identity and redeveloping the FCH JU website, as well as improving branding and visibility.

### Visual identity

The former logo did not do a good job of appropriately identifying the organisation; it did not relate to the name FCH JU. It was essential for the FCH JU to resurface under a new and refreshed visual identity.

In June and July 2014, a working group was created for this specific purpose: each member of the JU was represented. Under the coordination of the Programme Office, a new design was developed, and in mid-September 2014, a new official FCH JU logo and a brand new visual identity were adopted.



A slogan to illustrate the vision and mission has been also developed, as shown below.



### Organisation of the Programme Review Days and Stakeholders Forum

The FCH JU held its two main key events (the Programme Review Days and the Stakeholders Forum) under the new visual identity, taking this opportunity to present to all stakeholders the new logo and design.





**Website**

The FCH JU redesigned its website entirely. The purpose was to refresh the look and feel of its main communication tool, in line with the new visual identity, and also to improve its function as the main viewing point of the FCH JU identity and its activities.

New tools were developed:

- an interactive map was implemented on the homepage of the website, with the purpose of showcasing FCH JU-funded infrastructures throughout Europe;
- a blinking banner triggered interest on specific parts of the website, depending on the information being highlighted at a specific moment (opening of calls, news, etc.);
- an attractive button on the homepage allowed users to directly access a list of all the projects;
- one of the objectives of the new website was to allow more space for results, to make them more easily accessible (the first FCH JU website did not offer easy access to project deliverables);
- specific parts of the website were dedicated to project deliverables and publishable reports, and others to patents and publications as well as key figures (these are still under development, and will be implemented within the website when ready, with the purpose of presenting results and achievements in a dynamic way).

**2.2.3 PUBLIC RELATIONS AND DISSEMINATION OF PROJECTS**

The FCH JU was regularly invited to high-level events and took on the role of speaker and/or sponsor in many initiatives organised in Europe.

In 2014, the FCH JU participated in the following key events (the list is not exhaustive).

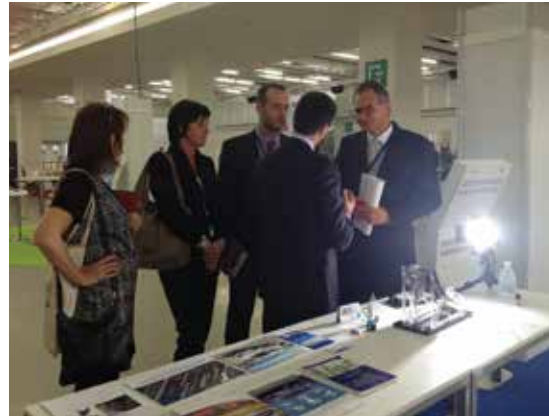
**01| Innovation Convention 2014 10–11 March 2014**

The Innovation Convention is an essential part of the Innovation Union flagship initiative (the EU strategy to create an innovation-friendly environment). The convention provides a platform to debate and to inform policies that will contribute towards the building of a research and innovation ecosystem in Europe that can support this objective.

The FCH JU participated as a 'showcase' in the area dedicated to 'Innovation Showcases'. The ix35 FCEV was displayed and the FCH team held an information point during the two days, from where they informed participants and raised awareness about FCH technologies.

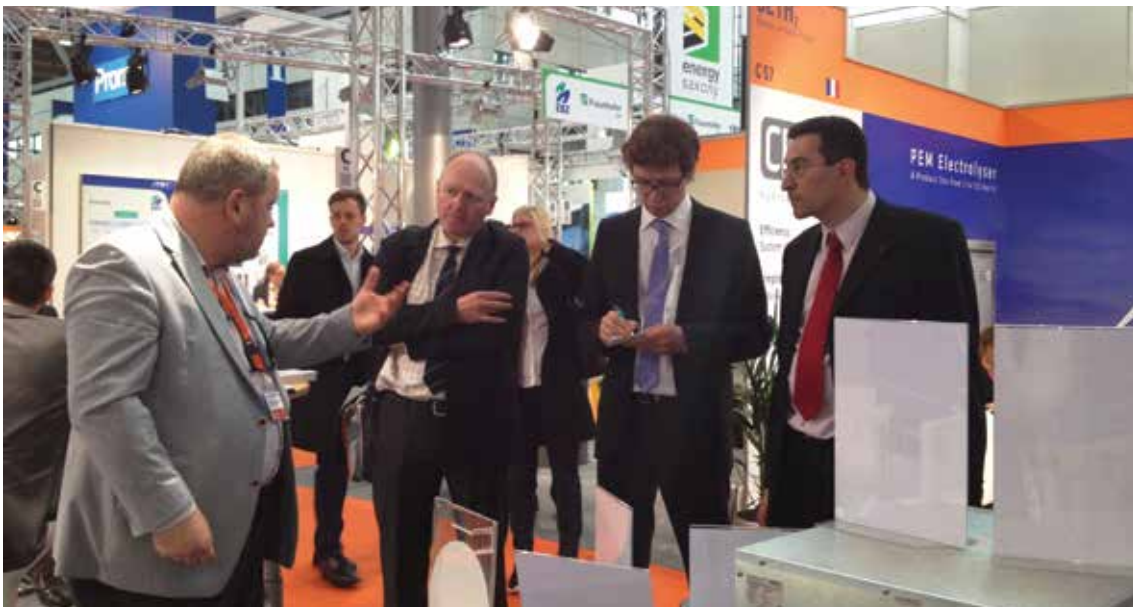






## 02 | Hannover Messe 7–11 April 2014

The FCH JU was present from a booth (30 m<sup>2</sup>) during the whole duration of the fair.



This year's stand also exhibited products related to projects supported by the FCH JU. These products stimulated lots of interest from the audience, and offered an insight into FCH JU activities as well as a practical understanding of development of projects supported by the FCH JU.

As part of the informative material distributed at the stand, the new *Programme Review Report 2013* and the study on electrolysis were widely distributed.



On Wednesday 9 April, Bert De Colvenaer and Bernard Frois participated in the public forum, leading a discussion on 'The ambitions of the FCH JU under H2020'.

On the same day, four of the projects supported by the FCH JU presented their material in the technical forum: ene.field, High V.LO-City, FITUP and HYDROSOL-PLANT.

For public and technical forum videos, please visit <http://www.h2fc-fair.com/hm14/exhibitors/fchju.html> online.



- Mr Bonifacio Garcia Porras, Head of Innovation Policy for Growth Unit in European Commission visited the stand (see <http://www.h2fc-fair.com/hm14/vips/vip09.html> online)
- Mr Antti Ilmari Peltomaki, Deputy Director-General responsible for Enterprise and Industry visited the stand (see <http://www.h2fc-fair.com/hm14/vips/vip12.html> online)



### 03| Programme Review Days and Stakeholders Forum

The fourth edition of the Programme Review Days was organised on 10 and 11 November at The Hotel in Brussels. The objective was to assess, over the years, progress and achievements of the FCH JU Programme, notably in relation to the targets of its MAWP and AWP, as well as in relation to international developments in the field.

As with last year, the review of FCH JU-funded projects was conducted in two phases: (1) remote assessment during the preparation of the Programme Review Days (based on the evaluation by experts of FCH JU progress against the MAIP and AIP targets and the international state of the art); and (2) the public event at which all projects presented their posters in dedicated poster sessions, while selected projects gave more detailed presentations in oral presentation sessions.

The posters were produced by the FCH JU Programme Office using information obtained from the projects; projects were required to provide information according to a predesigned template, developed by the Programme Office. A total of 114 posters were produced, designed in line with the newly launched (November 2014) FCH JU visual identity; these were displayed during the Programme Review Days and Stakeholders Forum of the FCH JU, held between 10 and 12 November 2014.



A total of 256 participants attended the Programme Review Days event.

The seventh edition of the Stakeholders Forum took place on 12 November at The Hotel in Brussels.

Leading speakers from political, industrial and customer groups, who demonstrated thoughtful insights into the development of the sector, met for the 2014 Stakeholder Forum of the Fuel Cells and Hydrogen 2 Joint Undertaking. The seventh edition of this high-level forum focused on the opportunity afforded to the FCH sector by the transition to the new H2020 Programme. In particular, the aim was to look back on lessons learned from the first phase, and more importantly, to shape the new EUR 1.33 billion FCH 2 JU Programme.

It was confirmed that fuel cells and hydrogen technologies are part of the core solution to address major challenges in energy security, climate change and economic growth. However, it was stressed that an even stronger commitment from public and private partners is needed in order to optimise EU, national and regional funds towards a concrete market penetration of FCH solutions.

The event was opened by a welcome speech of Mr Robert-Jan Smits, Director-General of DG Research and Innovation and Mr Dominique Ristori, Director-General of DG Energy.

A keynote speech was delivered by Olaf Scholz, First Mayor of Hamburg, and Kit Malthouse, Deputy Mayor of London, who presented a significant point of view from the customer's side, and a political perspective.

The plenary session was complemented by a poster session focused on projects funded by FCH JU; one FCEV and one FCH bus were displayed at the main entrance of the Stakeholder Forum venue.

More than 280 European and international stakeholders participated in the seventh Stakeholder Forum, and according to the evaluation form sent back by the participants, the 2014 event was a great success in term of organisation, contents and information provided.



04| Highlight: press event during the Stakeholder Forum Strategy H<sub>2</sub> bus



Following the development and finalisation of the new study on FCH buses, the Programme Office started to take the lead in consolidating interaction between the different bus projects (CHIC, Commercialisation Study leaders (Roland Berger), High V.LO City, HyTransit and 3Emotion). While projects continued their dissemination strategy in a more consistent and collaborative way (sharing results to technical targeted audience), the overarching objective to reach policymakers is now coordinated by the FCH JU Programme Office in collaboration with the teams in charge of dissemination of project's results.



On the occasion of the FCH JU Stakeholder Forum, the Programme Office has coordinated and organised a landmark ceremony to increase visibly of industry commitment and public authorities in the field of zero emission buses. Representatives of five major European bus manufacturers (Daimler Buses (EvoBus), MAN, Solaris, Van Hool and VDL Bus & Coach) have signed a joint Letter of Understanding. The letter underlines the commitment of bus manufacturers towards the commercialisation and market introduction of fuel cell electric buses in urban public transport. The presence of two mayors at the Stakeholder Forum was optimised and was integrated within the event to highlight the forefront position of two main authorities in promoting low emissions public transport systems. The letter was therefore handed over by the industry representatives to the first mayor of Hamburg, Mr Olaf Scholz and to the Deputy Mayor of London, Mr Kit Malthouse.



A press strategy has been implemented in coordination with all actors, in order to emphasise the 'joint' aspect of the event and several publications occurred in different main media such as *The Handelsblatt*, *Metro*, *L'Echo*, *Pan European Networks*, etc.

Events, conferences, workshops and other initiatives attended by the FCH JU during 2014

- 10–11 March: 2<sup>nd</sup> edition of the Innovation Convention (Brussels, Belgium)
- 12–14 March: EHEC 2014: European Hydrogen Energy Conference (Seville, Spain)
- 19 March: Knowledge4Innovation (K4I Forum High-Level Round Table) (Brussels, Belgium)
- 24 March: Hydrogen technology applications for industry – A Belgian perspective (Brussels, Belgium)
- 25–27 March: 14<sup>th</sup> edition of Birmingham International Conference (Birmingham, United Kingdom)
- 27 March: Transport Business Summit 2014 (Brussels, Belgium)
- 28 March: Master class 'Transition to Zero Emission Bus Transportation in Practice (Amersfoort, Netherlands)
- 28–29 March: Green mobility show (Venice, Italy)
- 2–4 April: Hydrogen Days 2014 (Prague, Czech Republic)

- 3 April: Joint NOW-FCH Water Electrolysis Day (Brussels, Belgium)
- 3–4 April: Grove Symposium (Amsterdam, Netherlands)
- 7–11 April: Hannover Messe 2014 (Hannover, Germany)
- 23–25 April: Energy Cities Annual Rendez-vous, 2014 (Riga, Latvia)
- 7 May: Belgian Platform on Alternative Transport Fuels 8 (Brussels, Belgium)
- 16 May: festival energy (Milan, Italy)
- 4–6 June: ees—electrical Energy Storage (Munich, Germany)
- 11 June: Life + ZeroHyTechPark project closing event (10<sup>th</sup> anniversary) (Aragon, Spain)
- 12–13 June: Conference Growth Enhancing EU financial instruments for RDI (Athens, Greece)
- 12–13 June: European Technology Congress (Wroclaw, Poland)
- 8–20 June: CIMTEC 2014 13<sup>th</sup> International Ceramics Congress & 6<sup>th</sup> Forum on New Materials (Florence, Italy)
- 15–20 June: W.H.E.C: World Hydrogen Energy Conference (Kwangju, Korea)
- 16–20 June: (DOE's) 2014 Annual Merit Review and Peer Evaluation Meetings (AMR) for the Hydrogen and Fuel Cells Programme and the Vehicle Technologies Office (Washington DC, United States)
- 23–24 June: European Technical School on Hydrogen and Fuel Cells 2014 (Crete, Greece)
- 24 June: EU Energy Week/policy event Scotland Europa (Brussels, Belgium)
- 23–27 June: Sustainable Energy Week 2014 (Brussels, Belgium)
- 27 June: Workshop on FC & H Urban Bus (Lisbon, Portugal)
- 1–4 July: 11<sup>th</sup> EUROPEAN SOFC & SOE FORUM (Lucerne, Switzerland)
- 9 July: JTIs launch event (Brussels, Belgium)
- 10 July: Info Days – FCH (Brussels, Belgium)
- 25 July: Info days – Florence (Florence, Italy)
- 3–4 September: Hy transfer (Aix en Provence, France)
- 11 September: Info-day Portugal (Porto, Portugal)
- 24 September: WIND ENERGY – H<sub>2</sub>Expo Forum – Infrastructure/Mobility (Hamburg, Germany)
- 29 September –1 October: Let's 2014 (leading Enabling for Societal Challenges) (Bologne, Italy)
- 30 September: 'Workshop 'Hydrogen fuel quality assurance for PEM fuel cells – needs & status' (Brussels, Belgium)
- 6–8 October: WES Conference The FC – 14<sup>th</sup> Forum for producers and users (Stuttgart, Germany)
- 20–21 October: Eco-Mobility 2014 (Vienna, Austria)
- 21 October: Workshop – 'Putting Science into Standards: Power-to-Hydrogen and HCNG' (Petten, Netherlands)

- 5 November: Energy Storage Track of European Utility Week 2014 (Amsterdam, Netherlands)
- 11–16 November: Challenge Bibendum (Chengdu, China)
- 10–12 November: Stakeholder Forum – Programme Review Days (Brussels, Belgium)
- 17–18 November: 4<sup>th</sup> International e-Bus Conference (Hamburg, Germany)
- 19–21 November: Energy Storage Global Conference (Paris, France)
- 26 November: Round table UK Study DG (London, United Kingdom)
- 1–3 December: Carisma 2014 (Cape Town, South Africa)
- 3 December: Hyundai (Frankfurt, Germany)
- 2 December: EU project day (Brussels, Belgium)
- 3–5 December : European Electric Vehicle Congress (EEVC) 2014 – Call for presentations (Brussels, Belgium)
- 3 December: IPHE (International Partnership for H<sub>2</sub>) (Rome, Italy)
- 8 December: HyTrEc – Hydrogen Transport Economy for the North Sea Region (Berlin, Germany)
- 9–12 December: EmHyTeC2014 (Taormina, Italy)
- 10–11 December: The 7<sup>th</sup> Conference of the European Strategic Energy Technology Plan (SET Plan) (Rome, Italy)
- 12 December: Round Table IT Study DG (Milan, Italy).

# 03

## MANAGEMENT AND INTERNAL CONTROL SYSTEMS

This section of the Annual Activity Report provides the reader with the overall picture of the implementation of sound management (not only financial) in FCH JU/FCH 2 JU. It provides key information on the nature and characteristics of the FCH JU's organisation, so as to understand the context in which the FCH JU operates (Chapter 3.1), its governance structure and accountability chain (Chapter 3.2), and the functioning of the FCH JU's internal control system (Chapter 3.3).

### 3.1 NATURE AND CHARACTERISTICS OF THE FCH JU/FCH 2 JU

As further detailed in Section 1, FCH JU is a public-private research partnership with three members (i.e. the European Commission, the 'NEW IG' and the 'N.ERGHY Research Grouping').

The FCH JU was set up in 2008 for a period up to 31 December 2017 and its total financing, consisting of contributions of all the members, is EUR 947 million for the whole period. On 6 May 2014, the Council adopted Regulation No 559/2014 establishing the Fuel Cells and Hydrogen 2 Joint Undertaking for the period from 2014 through 2024. The FCH 2 JU should provide continued support to the FCH research programme by implementing the remaining actions initiated under Regulation (EC) No 521/2008 and in accordance with that regulation. The transition from the FCH JU to the FCH 2 JU should be aligned and synchronised with the transition from the FP7 to H2020, to ensure optimal use of the funding available for research.

The Union's financial contribution to the FCH 2 JU, including European Free Trade Area (EFTA) appropriations to cover administrative and operational costs, is to be up to EUR 665 000 000.

Members of the FCH 2 JU other than the Union may make or arrange for their constituent entities or their affiliated entities to make a total contribution of at least EUR 380 000 000 over the above-mentioned period.

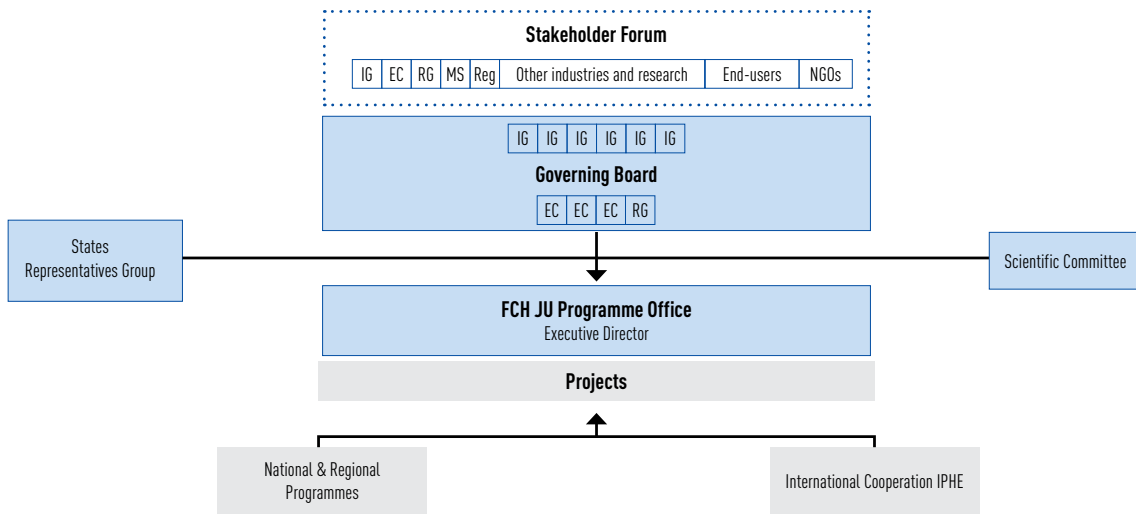
However, the contribution from participating legal entities should eventually match the financial contribution from the Union for the total amount of EUR 1.33 billion, through the implementation of additional activities outside the FCH 2 JU work plan which, however, contributes to achieving the objectives of the FCH 2 JU.

The FCH JU as a legal entity is responsible for the correct implementation of its budget. The FCH JU provides funds through grants to beneficiaries eligible to receive funds in order to support research activities selected following open and competitive calls for proposals. The general and specific legal, technical and financial terms for the grant procedures are stipulated in grant agreements signed with beneficiaries.

### 3.2 GOVERNANCE STRUCTURE

In line with Council Regulation No 559/2014, the governance structure of the FCH 2 JU is as follows: two executive bodies (i.e. the Governing Board and the Executive Director assisted by the staff in the Programme Office) and three advisory bodies (i.e. the SC, the SRG and the Stakeholder Forum). Changes in the governance structure can be represented as shown in Graph 3.2 below.

**FIGURE 3.2 | FCH 2 JU GOVERNANCE STRUCTURE**



### 3.2.1 EXECUTIVE BODIES

#### Governing Board

The Governing Board is the main decision-making body of the FCH JU. All three members of the FCH JU are represented on the Governing Board: the IG (see <http://www.new-ig.eu> online) has six seats, the Commission (see [http://ec.europa.eu/index\\_en.htm](http://ec.europa.eu/index_en.htm) online) has three seats (five in the FCH JU) and the RG (see <http://www.nerghy.eu/online>) has one seat. The Governing Board holds the overall responsibility for the operations of the Joint Undertaking, including the implementation of activities, the approval of the AIP, budget and annual accounts and the approval of the list of selected project proposals.

The Governing Board meets at least twice a year. Extraordinary meetings may be organised at the request of the Commission, the majority of the representatives of the Industry and Research Grouping, the Chairperson or at the Executive Director. Decisions of the Governing Board may also be taken by written procedure (this can be fast-tracked in matters of extreme urgency).

In 2014, the Governing Board met five times: on 30 January, 30 April, 30 June, 22 September and 11 November. Important decisions were taken at the meetings (or by written procedure) on many topics: the adoption of the new rules of procedure; the MAWP; the AWP 2014 of the FCH 2 JU; the Establishment Plan 2014 for the FCH 2 JU; the rules for submission, evaluation and selection of proposals (vade mecum); the 2013 final annual accounts; the Annual Activity Report 2013; the annual assessment of the level of in-kind contributions for the year 2013; the HR and organisation chart under H2020; the election of the Chair and Vice Chair of the Governing Board of the FCH 2 JU; the new FCH 2 JU visual identity and logo; the FCH 2 JU rules on the prevention and management of conflicts of interest; the methodology on IKOP; etc.

Moreover, some studies were presented to and discussed by the Governing Board (studies on the development of a European commercialisation strategy for fuel cell buses, on the development of a European commercialisation strategy for fuel cell stationary applications (distributed power generation), on the role of hydrogen in energy storage, etc.). The aim of the studies is to determine specific areas where further support is needed to facilitate the deployment of fuel cells and hydrogen technologies in the EU market.

#### Executive Director and Programme Office

The Executive Director is the legal representative of the FCH JU/FCH 2 JU, and is supported by the staff of the Programme Office. He is the chief executive responsible for the day-to-day management of the Joint Undertaking, commensurate with the decisions of the Governing Board. The Executive Director as authorising officer is responsible for the proper management of the Joint Undertaking’s budget, and has to report and give assurance concerning the use of the budget in line with sound financial management principles (see Annex 5).



The Programme Office, under the responsibility of the Executive Director, is in charge of the daily management of the Joint Undertaking, and executes all responsibilities of the FCH JU, including, among other tasks, launching of the calls for proposals, evaluation and selection of projects, the monitoring and update of the MAWP and AWP, coordination with other relevant programmes at national and regional levels, and communication and other support activities.

In 2014, the Executive Director and/or a Programme Office representative participated in several meetings, conferences and info days in Brussels and in several Member State cities, ensuring visibility and garnering political support for the overall FCH JU Programme and raising awareness of FCH JU activities (i.e. calls for proposals). The Programme Office was strongly committed to fostering the effective involvement of all players (e.g. SMEs and research organisations) in the FCH JU Programme, with a view to boosting deployment and implementation of FCH technologies at EU and national level.

For information on communication activities, please refer to Subsection 2.2.3.

## 3.2.2 ADVISORY BODIES

### Scientific Committee (SC)

The SC has nine members, appointed by the Governing Board based on their scientific competencies and expertise, to give their science-based recommendations on the priorities and the progress of the FCH JU. The members reflect a balanced representation of world-class expert opinion from academia, industry and regulatory bodies, and from different fields of expertise across fuel cells and hydrogen technologies.

In 2014, the SC met twice (on 24 February and on 24 April). Some teleconferences were also held, in particular, in view of the organisation of the Programme Review Days. The SC Chair also participated on behalf of the SC in few physical meetings with Programme Office staff.

During the SC meetings, relevant suggestions were provided by the SC members on the elaboration of the MAWP and AWP for improvements and optimisation of the FCH 2 JU.

### States Representatives Group (SRG)

The SRG consists of one representative of each Member State and of each country associated with H2020. The Chairperson of the SRG attends the meetings of the Governing Board as an observer.

The SRG has an advisory role in the FCH JU, and is to act as an interface between the Joint Undertaking and the relevant stakeholders within their respective countries. The SRG's key tasks are providing opinions on programme progress in the FCH JU, monitoring compliance and meeting of targets, and coordinating work with national programmes to avoid overlaps.

In 2014, the SRG met twice (on 5 March and on 13 November). Amongst many other activities focused on monitoring achievements and results of the FCH JU, particular emphasis was placed firstly on the smart specialisation strategy, and secondly on regular exchanges with the aim of facilitating an alignment between the industrial objectives and EU/national programmes.

During this year, SRG members stressed the need to find additional financial mechanisms at Member State level, in order to strengthen the leverage effects of the FCH JU.

### Stakeholder Forum

The Stakeholders Forum has an advisory role in the Joint Undertaking. It is open to all public and private stakeholders, and to international interest groups from Member States and Associated Countries as well as from third countries.

At the Stakeholder Forum, which is convened once a year, stakeholders are informed of the activities of the FCH JU and are invited to provide comments. The Stakeholder Forum is a fundamental communication channel to ensure transparency and openness in the FCH 2 JU's activities with its stakeholders.

For information on the activity of the Stakeholder Forum in 2014, please refer to Subsection 2.2.2.

### 3.3 THE FUNCTIONING OF THE ENTIRE INTERNAL CONTROL SYSTEM

The foundation of the FCH JU's Internal Control Framework is provided by a set of 16 **Internal Control Standards (ICS)** which were adopted by the Governing Board on 15 June 2010. These standards are inspired by the internationally recognised COSO framework<sup>15</sup> and are structured around six areas: 1. mission and values, 2. human resources, 3. planning and risk management processes, 4. operations and control activities, 5. information and financial reporting, and 6. evaluation and audit.

To permit effective implementation and allow measurement of the maturity of the JU's internal control systems, each standard is complemented by a list of **'Requirements'** i.e. the minimum features and specific practical actions (FCH JU ICS in Annex 6).

#### 3.3.1 EFFECTIVENESS OF CONTROL STANDARDS IMPLEMENTATION

FCH JU has drawn up an **Action Plan** for the effective implementation of the standards. This Action Plan describes the requirements for each standard, the status of their implementation, the action owner within the JU and the related outstanding actions and time plan. An analysis of their effective implementation identified weaknesses in the following areas, for which additional work and improvement is needed.

- *ICS 3 – Staff allocation and flexibility*

The increased workload linked to the increased number of ongoing projects remains a challenge for the FCH JU. Understaffing which was a 'high' risk in 2013, but has been downgraded to 'medium' in 2014. This was mainly thanks to staff recruitments as included in the staff establishment plan: two junior project managers, two financial officers, one junior legal manager and one communication officer joined the FCH 2 JU in response to the increased needs of the FCH 2 JU. An action plan including the update on recruitment policy will be implemented in 2015.

- *ICS 8 – Processes and procedures*

The main FCH JU processes and procedures are documented. However, the following points should be noted.

- In the context of H2020, the uncertainties on the readiness of new IT tools and of the related processes and the running in parallel of two programmes with different rules were assessed as a 'high' risk and were included in the AWP 2015 for close monitoring. To mitigate this risk, several measures were implemented: (1) a working group was set with a mandate to review the manual of procedures and identify procedures to be updated as necessary, taking into account H2020 workflows; (2) close contact is maintained with the Common Support Centre, in particular IT and business processes; (3) staff participate in H2020 trainings. Furthermore, information is provided to beneficiaries at dedicated sessions (such as info days on calls) and through documentation (online H2020 manual). In addition, a draft methodology on contributions in kind under H2020 was presented to the Governing Board in November 2014, and is expected to be adopted by June 2015.
- As noted elsewhere in this report, the action plan on the IAC audit 'Grant management: negotiation, contracting and pre-financing' is under revision: part of the measures are not relevant in the context of H2020 Programme, owing firstly to the 'no negotiation' approach and secondly to the FCH participation in the Participants' Guarantee Fund.
- The action plan on the IAS Limited Review on the use and dissemination of research results adopted in June 2014 also included the development of guidance to project managers on the assessment of dissemination activities, as well as the set-up of a system of follow-up of recommendations: these actions will be implemented in Q1, 2015.

- *ICS 11 – Document management*

A document management tool was implemented and is operational. Nevertheless, it may hold further potential if its functionalities as regards workflow and processes are developed further. However, an analysis still has to be carried out to assess the relevance of new developments in the context of the implementation of the new H2020 Programme, taking into account the tools of the programme and the services of the Common Support Centre. This will be undertaken in 2015.

<sup>15</sup> See <http://www.coso.org/online>.

- *ICS 12 – Information and communication*

The FCH JU has signed an SLA with DG Budget for the use of ABAC, and still has to perform an analysis of its level of compliance with the related requirements (security policy, roles and responsibilities, etc.). This was postponed for 2015 and will be carried out in Q1.

- *ICS 13 – Accounting and financial reporting*

The action plan to address the few weaknesses identified by the accountant in the context of the validation of the accounting systems was monitored, and the actions were implemented. In the context of handover of tasks to the EC Accounting Officer, the follow-up and/or validation of the accounting system is now under the remit of DG Budget.

### 3.3.2 CONCLUSIONS

The FCH JU annual review of its implementation of the Internal Control Standards (ICS-15) was based on a desk review by the JU's Internal Control Coordinator (ICC) and interviews with some staff members. This has led to an assessment of the FCH JU's internal control status at the end of the reporting year, as regards both ICS compliance with requirements and the effectiveness of the control arrangements in place. In addition, information on internal control issues obtained through the midyear management report of the Heads of Units has been taken into consideration. Additional information was extracted from the monitoring of action plans: (1) the effective implementation of the recommendations of the IAC related to the audit of 'ex ante controls', and (2) the state of play of the action plan on the IAS Limited Review on the use and dissemination of research results. It should be noted that the action plan on the IAC audit on 'Grant management: negotiation, contracting, pre-financing' is under review, in order to adapt it to the regulatory changes stemming from H2020 Programme. Finally, the information on results from other audits performed by the ECA as referred to in Subsection 4.1.2, have been considered as well. This analysis had enabled the ICC to report the state of internal control and her recommendations to the Executive Director.

The internal control system's functioning has also been monitored throughout the year by the systematic registration of exceptions (under ICS 8). The underlying causes behind these exceptions have been analysed, and corrective and alternative mitigating controls have been implemented where necessary.

Concerning the overall state of the internal control system, the FCH JU complies with the three assessment criteria for effectiveness: (1) staff having the required knowledge and skills, (2) systems and procedures being designed and implemented to manage key risks effectively, and (3) no instances of ineffective controls occurring that have exposed the FCH JU to its key risks.

However, further enhancing the effectiveness of the FCH JU's control arrangements is required: (1) by fully implementing the action plans on recommendations of both internal and external auditors, and (2) by improving the use of monitoring tools.

In conclusion, management has reasonable assurance that, overall:

- suitable controls are in place and are working as intended;
- risks are being mitigated and/or monitored;
- improvements and reinforcements are being implemented.

# 04

## BUILDING BLOCKS TOWARDS REASONABLE ASSURANCE

### 4.1 BUILDING BLOCKS TOWARDS REASONABLE ASSURANCE

Reasonable assurance is the personal judgement of the JU's Executive Director – as Authorising Officer of the JU at the date of signature of this Annual Activity Report – based on all information at his disposal. This information can be structured around three main pillars or 'building blocks': (1) the assessment by the JU's management, (2) results from audits during the reporting year, and (3) the assurance received from the Heads of Unit in their management reports.

#### 4.1.1 BUILDING BLOCK 1: ASSESSMENT BY JU MANAGEMENT

This building block describes the main elements underpinning the JU's control strategy and provides evidence, through indicators, of its solidness.

The JU's control strategy covers all activities of the JU. However, with grant management being the core business of the JU and representing more than 90 % of its operational budget, this chapter focuses on such processes. As indicated in Section 3.1, the FCH JU provides funds through grants to beneficiaries, following open and competitive calls for proposals. FCH JU projects are implemented through grant agreements signed with beneficiaries and co-financed by the JU. After signature of the grant agreement, pre-financing payments are made to make funds available and allow the project to start. During project implementation, grants are paid on the basis of the beneficiary's declaration of eligible costs (i.e. cost claims).

Under FP7, seven calls were launched (i.e. Calls 2008, 2009, 2010, 2011, 2012, 2013-1 and 2013-2). The key dates and data on payments for each call are shown in the following tables.

**TABLE 4.1.1 (A) | FCH JU FP 7 CALLS KEY DATES**

	CALL 2008	CALL 2009	CALL 2010	CALL 2011	CALL 2012	CALL 2013-1	CALL 2013-2
<b>PUBLICATION</b>	October 2008	July 2009	June 2010	May 2011	January 2012	January 2013	November 2013
<b>SIGNATURE OF GRANT AGREEMENTS</b>	December 2009	October–December 2010	October–December 2011	June–December 2012	April–December 2013	February–December 2014	December 2014 (2 projects)
<b>PAYMENT OF PRE-FINANCINGS</b>	December 2009, except EUR 27 220 in January 2010	December 2010, except EUR 519 508 in Q1 2011 at the request of the beneficiary	November–December 2011	July–December 2012	May 2013–January 2014	March 2014–December 2014	December 2014
<b>PAYMENTS OF EXPERTS</b>	Q1-2 2009 (app.)	Q2 2010 (app.)	Q1 2011 (app.)	Q4 2011	Q3 2012	Q3 2013	Q2 2014
<b>COST CLAIMS VALIDATED</b>	6 cost claims validated in 2011 (43 beneficiaries) 12 cost claims validated in 2012 (97 beneficiaries) 5 cost claims validated in 2013 (30 beneficiaries) 13 cost claims validated in 2014 (95 beneficiaries)	4 cost claims validated in 2011 (33 beneficiaries) 15 cost claims validated in 2012 (94 beneficiaries) 21 cost claims validated in 2013 (189 beneficiaries) 15 cost claims validated in 2014 (129 beneficiaries)	2 cost claims validated in 2012 (18 beneficiaries) 11 cost claims validated in 2013 (93 beneficiaries) 14 cost claims validated in 2014 (137 beneficiaries)	1 cost claim validated in 2013 (12 beneficiaries) 16 cost claims validated in 2014 (162 beneficiaries)	2 cost claims validated in 2014 (22 beneficiaries)	1 cost claim validated in 2014 (6 beneficiaries)	First cost claims are expected in 2015

Following the entry into force of Council Regulation 559/2014 setting up the FCH 2 JU, the first call under H2020 was launched on 9 July 2014 with a deadline for submission by 6 November 2014. The evaluation took place from 15 to 19 December 2014. Other key dates are shown in the table below.

**TABLE 4.1.1 (B) | FCH JU H 2020 CALL KEY DATES**

	CALL 2014
<b>PUBLICATION</b>	July 2014
<b>SIGNATURE OF GRANT AGREEMENTS</b>	Expected in Q2 2015
<b>PAYMENT OF PRE-FINANCING</b>	Expected in Q3 2015
<b>PAYMENTS OF EXPERTS</b>	Q1 2015

**TABLE 4.1.1 (C) | 2014 OPERATIONAL PAYMENTS UNDER FP7 AMOUNTS IN EUR**

YEAR	PRE-FINANCING	PAYMENTS AGAINST COST CLAIMS	CLEARING	OTHER OPERATIONAL PAYMENTS	TOTAL OPERATIONAL PAYMENTS
2014	35 618 540 (a)	30 304 163	26 023 078	2 881 882	68 804 585
2013	31 079 943 (b)	9 070 763	10 854 534	541 076	40 691 782
2012	44 980 842 (c)	5 246 904	12 094 499	1 215 150	51 442 896
2011	48 515 320 (d)	4 626 994	1 658 664	120 888	53 263 202
2010	39 894 107 (e)	-	-	-	39 894 107

(a) Of which 524 610 on Call 2012 and 35 093 930 on the two calls of 2013.

(b) Of which 2 928 664 on Call 2008–2011 and 28 151 279 on Call 2012.

(c) Of which 197 908 on Calls 2008–2010 and 44 782 934 on Call 2011.

(d) Of which 759 508 on Calls 2008–2009 and 47 755 812 on Call 2010.

(e) Of which 553 941 on Call 2008 and 39 340 166 on Call 2009.

The following main conclusions can be drawn from Tables 4.1.1 (a) and (b) above, with an impact on the 2014 Annual Activity Report:

- overall operational payments increased significantly, mainly as a result of payment of cost claims;
- the proportion of operational payments related to pre-financings decreased significantly, whereas that related to payment of cost claims increased considerably, reflecting the maturity of the programme;
- following the reporting requirements set out in the signed grant agreements, 61 cost claims involving 551 beneficiaries and related to FP7 projects were validated in 2014;
- no payment was made under H2020, as the first grant agreements will be signed in Q2 2015, and the pre-financing will be paid thereafter.

The main elements of **FCH JU control strategy** are a combination of *ex ante* and *ex post* controls. The table below clarifies the main features of these controls.

**TABLE 4.1.1 (D) | 'EX ANTE' VS 'EX POST' CONTROLS**

	'EX ANTE' CONTROLS	'EX POST' CONTROLS
WHEN?	<b>Before</b> the transaction is authorised	<b>After</b> the transaction is authorised
FREQUENCY?	Obligatory on <b>all</b> transactions	Made on a <b>sample</b> basis
HOW?	Mainly <b>desk review</b> of supporting documents (e.g. beneficiaries' proposals and reports), but might also take place 'on the spot' at the beneficiary's premises, if deemed necessary and cost-effective	Mainly <b>on-the-spot</b> checks at the beneficiary's premises
IMPACT?	Errors detected should be corrected <b>before</b> the transaction is approved	Errors detected (e.g. ineligible expenditure) should be corrected through <b>recovery orders</b> or offsetting with future payments
ASSURANCE?	<b>Primary</b> means of ensuring sound financial management and legality and regularity of transactions, but <b>less 'evidence'</b> (in particular for the eligibility of costs), as normally based on desk review	<b>Secondary</b> means of ensuring sound financial management and legality and regularity of transactions, but <b>more robust</b> as normally carried out 'on the spot'

Concerning the **project lifecycle**, the JU's control strategy is divided into four distinct stages. Control objectives, key controls, main outputs and indicators have been established for each stage as indicated in the table below. For more detailed information on the controls applied in each stage, reference is made to Annex 5.

**TABLE 4.1.1 (E) | STAGES IN THE PROJECT LIFECYCLE: OBJECTIVES, CONTROLS, OUTPUTS AND INDICATORS**

	<b>STAGE 1 EVALUATION</b>	<b>STAGE 2 FP7: NEGOTIATION AND SELECTION H2020: GRANT PREPARATION</b>	<b>STAGE 3 PROJECT AND CONTRACT MANAGEMENT</b>	<b>STAGE 4 EX POST CONTROLS: AUDITS AND RECOVERIES</b>
<b>OBJECTIVES</b>	Select projects to be financed according to their research credentials, to ensure that the JU's operational objectives are achieved.	<p><b>FP 7: NEGOTIATION PHASE</b></p> <p>For each proposal: clarify objectives and work to be carried out, substantiate costs and determine its duration and JU's contribution.</p> <p><b>H2020: GRANT PREPARATION</b></p> <p>'no negotiation' approach =&gt; grant agreement must not differ from the proposal, subject to some corrections;</p> <p>establish key points of the grant agreement (project start, reporting periods, amount of pre-financing, etc.).</p>	<p>Translation of each of the selected proposals into a legally binding instrument and making of pre-financing.</p> <p>Verification of the following:</p> <p>(1) interim and final beneficiaries' payment requests, and</p> <p>(2) achievement of key milestones.</p>	<p>Contribute to ensure the legality and regularity of the payments.</p> <p>Provide an indication of the effectiveness of previous <i>ex ante</i> controls.</p>
<b>CONTROLS</b>	<p>Screening of submitted proposals for eligibility.</p> <p>Choice of independent (i.e. no conflict of interest) expert evaluators.</p> <p>Evaluation by a minimum of three independent experts.</p> <p>Panel review for consistency, quality control and ranking of proposals.</p>	<p><b>FP 7 CALLS (2008–2013)</b></p> <p>Use of 'Evaluation Summary Report' as starting point for the negotiation.</p> <p>Requests for budget clarifications, if deemed necessary.</p> <p>Legal status verifications.</p> <p>Financial viability checks.</p> <p>Adoption of safeguarding measures (e.g. guarantees).</p> <p>When deemed necessary, 'on-the-spot' control visits.</p> <p><b>H2020 CALLS (FROM CALL 2014)</b></p> <p>Use of 'Evaluation Summary Report' and of the proposal to prepare the grant agreement</p> <p>description of action and estimated budget must match the proposal</p> <p>legal status verifications</p> <p>financial viability check (for non-public coordinators when FCH contribution for the action is equal or superior to EUR 500 000.</p>	<p><b>CONTRACTING AND PRE-FINANCING PAYMENT</b></p> <p>JU financial circuits in place, ensuring all operational and financial aspects are checked by two independent members of JU staff before (i.e. <i>ex ante</i>) authorisation.</p> <p><b>INTERIM AND FINAL PAYMENTS</b></p> <p>Analysis of beneficiaries' technical and financial reports (intermediate and final)</p> <p>CFS (i.e. cost claims) <sup>(a)</sup> by certifying auditor <sup>(b)</sup> and on the methodology used for the calculation of costs <sup>(c)</sup>.</p> <p>Midterm reviews by external experts, when applicable in the grant agreement.</p> <p>When deemed necessary, 'on-the-spot' control visits.</p> <p>JU financial circuits in place as for 'contracting and pre-financing payment' above.</p>	<p>Financial (representative and risk-based) and technical audits after (i.e. <i>ex post</i>) JU's authorisation of interim or final payments and up to 5 years after the end of the project (d).</p>

	STAGE 1 EVALUATION	STAGE 2 FP7: NEGOTIATION AND SELECTION H2020: GRANT PREPARATION	STAGE 3 PROJECT AND CONTRACT MANAGEMENT	STAGE 4 EX POST CONTROLS: AUDITS AND RECOVERIES
OUTPUTS	Evaluation Summary Report (ESR) for each proposal. Ranking list of proposals. Initial Information letter to applicants.	FP7 Final list of selected proposals.  H2020 Signed grant agreements.	FINANCIAL TRANSACTIONS Budgetary and legal commitment. Pre-financing, interim and final payments.	FINANCIAL TRANSACTIONS Recovery order (e.g. in case of ineligible expenditure identified after <i>ex post</i> audits) or offsetting with future payments.
INDICATOR	Redress procedure: number of applicants' complaints/total proposals.	Financial impact of the negotiation process: difference between the total value of the JU contribution <b>'requested'</b> in project proposals, (1); <b>'recommended'</b> in the negotiation mandates (2) and <b>'agreed'</b> in the signed grant agreements.(3).	Percentage of the number of payments made on time.  Time to grant (timespan between deadline for submission and signature of the grant agreement with breakdown of the various stages).	Representative error rate (i.e. average of individual error rates (in percentage) detected by representative <i>ex post</i> audits).  Residual error rate (i.e. error rate left in the population after correction of the following: (1) all detected errors, and (2) extrapolation of systematic errors on the non-audited amounts of audited beneficiaries).  Audit coverage: percentage (in value) of audited cost claims out of the total value of validated cost claims (i.e. population).

(a) Mandatory if above thresholds (Model Grant Agreement, Article II.4.4).

(b) Independent from the beneficiary and qualified to carry out statutory audits.

(c) Optional (Model Grant Agreement, Articles II.4.4 and II.14.1).

(d) Model Grant Agreement, Articles II.22 and II.23.

The indicators described above aim at providing an indication of the robustness of each stage, and as such, provide assurance on the sound financial management and the legality and regularity of the financial transactions (i.e. commitments and payments). Each indicator is analysed below.

### Stage 01 | Evaluation

A 'redress procedure' allows complaints to be filed by applicants in cases where they believe their proposals could have been handled better during the evaluation. A redress committee, working independently from the evaluation, analyses eligible complaints, and where suitable, may recommend the re-evaluation of the proposal. The final decision on follow-up actions is taken by the Executive Director.

The indicator on 'redress procedure' shown in the table below provides an indication of the quality of the evaluation process, which is a key element in the grant awarding process.

TABLE 4.1.1 (F) | REDRESS PROCEDURE

	CALL 2008	CALL 2009	CALL 2010	CALL 2011	CALL 2012	CALL 2013-1	CALL 2013-2
Number of proposals	32	50	71	82	72	70	9
Number of complaints received	0	4	6	4	6	5	0
% of complaints	0 %	8 %	8 %	5 %	8 %	7 %	0 %
Number of complaint cases which led to a re-evaluation	0	0	0	0	0	0	0
% of complaints which led to a re-evaluation	0 %	0 %	0 %	0 %	0 %	0 %	0 %

There is a low number of complaints in the different calls, none of which led to a re-evaluation: (1) this is an indication of the robustness of the evaluation and grant award process, and (2) this provides assurances concerning the legality and regularity of the commitments (i.e. signed grant agreements) in Stage 3 below.



## Stage 02 | Negotiation and selection (FP7 Programme)

Negotiation is the main process for ensuring efficient use of the JU's budget, as it dispenses with work which is not essential for the achievement of the scientific objectives of the project, and ensures that the budgeted costs are commensurate with the planned work.

The financial impact of the negotiation process, as shown in the indicator below, is defined as the reduction (expressed as a percentage) in JU contribution to the grant agreements, as a result of the negotiation process.

**TABLE 4.1.1 (G) | FINANCIAL IMPACT OF THE NEGOTIATION PROCESS THOUSAND EUR**

	CALL 2008	CALL 2009	CALL 2010	CALL 2011	CALL 2012	CALL 2013-1	CALL 2013-2
Number of grant agreements	16	28	26	33	27	23	2
JU contribution 'requested' in project proposals (1)	36 046	85 643	99 382	141 126	82 816	76 722	15 433
JU contribution 'recommended' in negotiation mandates (2)	29 076	75 202	84 907	119 733	70 256	67 283	15 433
JU contribution 'agreed' in the signed grant agreements (3)	27 222	72 527	83 676	117 522	68 135	66 843	15 433
Reduction in percentage from contribution 'requested' (1) – (3)	24 %	15 %	16 %	17 %	18 %	13 %	0 %
Reduction in percentage from contribution 'recommended' (2) – (3)	6 %	4 %	1.5 %	1.8 %	3 %	0.7 %	0 %

The total value of the JU contribution 'requested' in the project proposals (1), is reviewed by the JU due to several factors (e.g. comments on budget proposals by independent experts, budget clarification process, total JU budget available and matching requirements). This reviewed value is the value of the JU contribution 'recommended' in the 'negotiation mandates' (2) and represents the starting point of the negotiation process. As a result of the negotiation process, the value is/might be further reviewed. This third value represents the value of the JU contribution 'agreed' in the signed grant agreements (3).

Whereas the average reduction (1) - (3) is mainly the result of budget available and matching requirements, the reduction (2) - (3) is mainly due to changes during negotiations to comply with expert recommendations made during the evaluation stage.

**Under the H2020 Programme, no negotiation is expected.** Stage 2 consists in the grant preparation phase, and the grant agreement should not differ from the proposal.

In 2014, the JU carried out the negotiations of the last calls under FP7 (Calls 2013-1 and 2013-2). The grant preparation of Call 2014 (the first call under H2020) will take place in Q1-Q2 2015.

## Stage 03 | Project and contract management

The project and contract management stage starts with the signature of the grant agreement and ends with the final payment to the beneficiary.

As shown in Table 4.1.1 (a) and (b), the number of validated cost claims from beneficiaries of projects increased significantly, and in 2014, amounts paid under cost claims represent 44 % operational payments, whereas pre-financings account for 52 % (compared to 76 % in 2013). Other operational payments relate to procurement studies. The financial transactions involved are mainly the contract signature (commitment), the payments of either pre-financings or interim/final payments or other expenditure linked with the project lifecycle (payment of experts) and the clearing of pre-financing.

The main legality and regularity indicator for the commitment is the percentage of complaints as indicated in Stage 1 above. Concerning payments, an important indicator is the 'time to pay', which is defined as the percentage of payments made within the binding deadlines as shown in the table below.

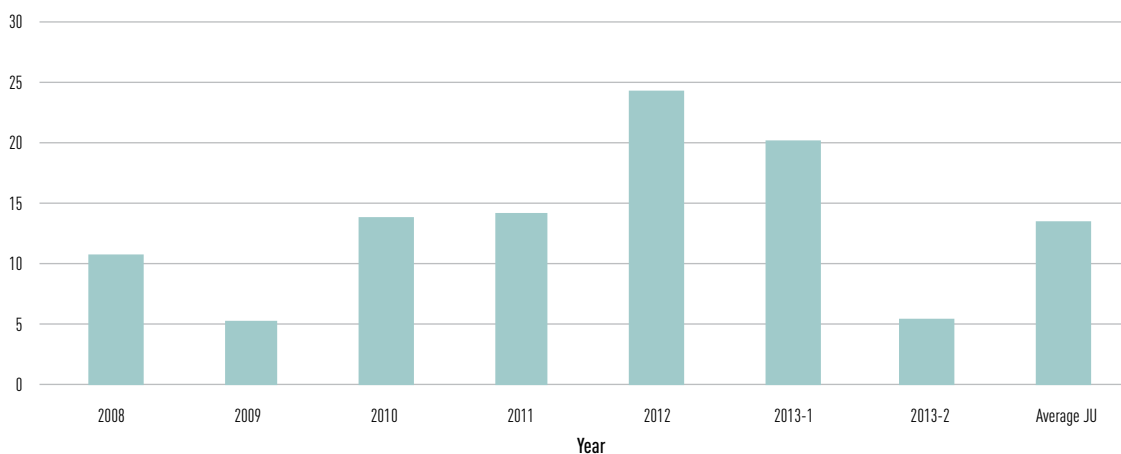
**TABLE 4.1.1 (H) | PERCENTAGE OF THE NUMBER OF PAYMENTS MADE ON TIME**

	YEAR 2008	YEAR 2009	YEAR 2010	YEAR 2011	YEAR 2012	YEAR 2013	YEAR 2014
Grants: payment of pre-financing	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Grants: payment cost claims	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Payments of experts (evaluators and midterm reviewers)	71 %	34 %	53 %	62 %	89 %	96 %	65 %

The data show that 100 % of grant payments, which represent more than 75 % of the total value of JU's payments, were made on time (within 30 days, with an average of 20 for Call 2013-1 and of 6 for Call 2013-2). Regarding interim/final payments, under cost claims all were made on time (within 90 days), with an average time to pay of 65 days.

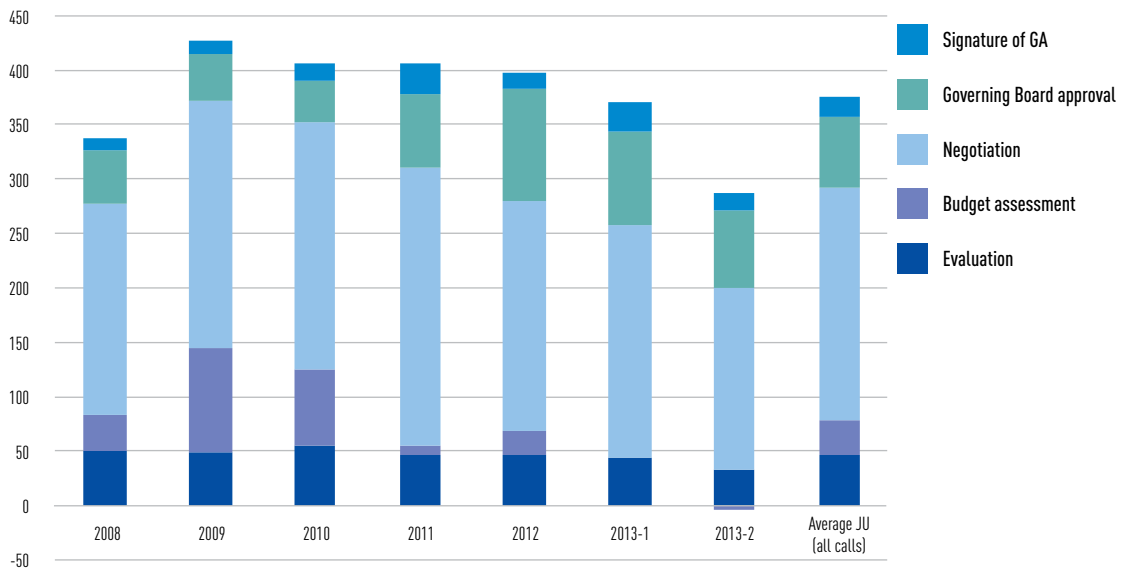
A total of 60 % of the payments to expert reviewers and 100 % to expert evaluators were made on time, with an average time to pay of 25 days (within a limit of 30 days). The delay in the payment of reviewers was mainly due to exceptional circumstances at the beginning of the year, linked to absences in the Programme Office and to missing documentation from the experts.

**TABLE 4.1.1 (I) | TIME TO PAY PRE-FINANCING DAYS**



TTG gives an indication of the efficiency of the FCH JU's operations in concluding grant agreements. The table below highlights the evolution of the TTG for the calls for proposals 2008 to 2013, and the evolution of the different processes contributing to this TTG.

**TABLE 4.1.1 (J) | TIME TO GRANT PROCESSES BY CALL**



It can be observed that the average TTG was significantly reduced in the last calls.

Under the H2020 Programme (call 2014 and following) the requirement is a TTG of maximum 8 months (240 days).

#### Stage 04 | Ex post controls

*Ex post* controls are the fourth and last **stage** of JU's control strategy in the project lifecycle, as is shown in Table 4.1.1 (e). This stage includes the *ex post* audits as well as the recovery/correction of any amounts found to have been paid in excess of the amount due.

*Ex post* audits have three main **objectives**: (1) to assess the legality and regularity of expenditure on a multi-annual basis; (2) to provide an indication on the effectiveness of the *ex ante* controls, and (3) to provide the basis for corrective and recovery mechanisms.

Because of its **multi-annual nature**, the effectiveness of the FCH JU's control strategy can only be fully measured and assessed in the final stages of the JU's program, once the *ex post* control strategy has been fully implemented, and systematic errors have been detected and corrected.

The main legality and regularity **indicator** in this stage is the '**error rate**' detected by *ex post* audits.

The following two aspects have to be considered when providing information on error rates and inferring conclusions from those errors:

- due to the multi-annual perspective of *ex post* audits, their effectiveness has to be measured by presenting '**cumulative**' information on the errors detected;
- two **types of ex post audits** have to be distinguished with **two different objectives**: 'representative' audits with a goal of producing a representative estimate of the error rate present in the population and 'corrective' audits (e.g. risk-based audits) with the objective of detecting and correcting as many errors as possible.

Having in mind the two aspects above, three **types of cumulative error rates** are calculated to provide a comprehensive overall view of the results of *ex post* audits (see Table 4.1.1 (m)). For each type of error, the rate is calculated at 'total cost' and at 'FCH JU contribution' level. This distinction is necessary, as not all errors detected at total cost have a financial impact on the FCH JU contribution<sup>16</sup>.

<sup>16</sup> For example, an error detected on indirect costs (at total cost level) for a beneficiary using 'actual' indirect cost method but with a maximum reimbursement rate of 20 % could have no impact in the FCH JU contribution if 'declared' and 'eligible' indirect costs are both above the 20 % reimbursed by the JU.

### Overall error rate

This is the error rate derived from **all** audits, comprising both 'representative' and 'risk-based' audits. It is calculated as a percentage of the value of the errors detected divided by the value of total costs accepted by the JU<sup>17</sup>. It provides information on the importance of errors detected, but it cannot be used as a reference for inferring conclusions on the expected error in the non-audited population, for the following reasons: (1) it is the result of 'representative' and 'risk-based' audits with two different objectives, and (2) as it is based on values, it is easily influenced by the error rates resulting from the individual audits of the cost claims of the highest values, which may not necessarily be the ones most representative for inferring conclusions.

### Representative error rate

This is the error rate resulting from the representative audits. It will give a reasonable estimate about the level of error in the population at the time of the audits, but it says nothing about the corrections and follow-up undertaken by the FCH JU, nor of the final financial impact in the JU contribution of any error. The formula for the calculation of the representative error rate, under the FCH JU *ex post* audit strategy approved by the Governing Board, is shown in Annex 4.

### Residual error rate

This is the level of error remaining in the population after corrections and recoveries made by the FCH JU. This includes extrapolation of audit results to non-audited contracts and the correction of errors. The formula for the calculation of the residual error rate, in line with the *ex post* strategy and shown in Annex 4, is based on the following assumptions: (1) all the errors detected will be corrected, and (2) the residual error rate for participations subject to extrapolation is estimated to be equal to the non-systematic error rate.

*Ex post* audit **resources**. The lean structure of the FCH JU does not allow for the set-up of an internal *ex post* audit section, and therefore *ex post* audits are outsourced to external audit firms.

Whereas the execution of the audit work is externalised, part of the JU's staff is responsible for the management of *ex post* audits, in particular of the following three processes:

1. planning (i.e. selection of 'representative' and 'risk-based' audits, coordination with Commission audits and preparation of audit input files);
2. monitoring (i.e. regular follow-up of audit status, interaction with audit firms on technical questions, and more importantly, quality checks of audit reports);
3. evaluation/implementation of audit results (i.e. inferring conclusions on the basis of identified error rates, extrapolation procedures and initiation of recovery orders/offsetting with future payments to correct errors detected).

The following table gives an overview on the resources devoted to *ex post* audits.

**TABLE 4.1.1 (K) | INPUT INDICATORS AMOUNTS IN EUR**

	2011	2012	2013	2014
INTERNAL RESOURCES <i>EX POST</i> AUDITS (a)	1 FTE	1.5 FTE	2 FTE	2 FTE
COST OF EXTERNALISED AUDITS (COMMITMENTS, IN EUR)	EUR 77 820	EUR 208 665	EUR 161 082	EUR 245 081

(a) Due to the lean structure of the FCH JU and cost-efficiency reasons, there is no single function in the JU fully dedicated to the management of *ex post* audits. The reported figure in 'FTE: Full Time Equivalent' is therefore an estimation of the time devoted by various members of JU staff to *ex post* audits in order to manage the three processes under the JU's responsibility (i.e. (1) planning, (2) monitoring/quality checks and (3) evaluation/implementation of audit results).

<sup>17</sup> When considering the value of errors detected, **three calculations** are provided: (1) with only the errors **in favour of the JU** (i.e. ineligible costs detected by the auditors; the JU has to recover the funds unduly paid, and these errors are expressed in negative values); (2) with only the errors **in favour of the beneficiary** (i.e. additional eligible costs identified by the auditors and not declared by the beneficiary, who can submit an additional cost claim, and additional payment by the JU is subject to certain conditions; these errors are expressed in positive values); and (3) with the total **net value** of errors (in favour of the JU and of the beneficiary).

The FCH JU *ex post* audit strategy was adopted by the Governing Board on 6 January 2011, and its implementation started in September 2011. The following table gives an overview of the number of *ex post* audits and their audit coverage.

**TABLE 4.1.1 (L) | INDICATORS OF COVERAGE: NUMBER OF AUDITS AND AUDIT COVERAGE CUMULATIVE**

BATCH	YEAR	TO BE LAUNCHED	ONGOING	FINALISED <sup>18</sup>	TOTAL	OF WHICH	
						REPRESENTATIVE	RISK-BASED
1 <sup>st</sup> batch	2011	0	0	5	5	5	0
2 <sup>nd</sup> batch	2011	0	0	7	7	6	1
3 <sup>rd</sup> batch	2012	0	0	9	9	7	2
4 <sup>th</sup> batch	2012	0	0	12	12	12	0
5 <sup>th</sup> batch	2013	0	0	15	15	11	4
6 <sup>th</sup> batch	2014	0	3	17	20	15	5
7 <sup>th</sup> batch	2014	0	2	0	2	0	2
<b>TOTAL (AUDITS)</b>		<b>0</b>	<b>5</b>	<b>65</b>	<b>70</b>	<b>56</b>	<b>14</b>
<b>TOTAL (COST CLAIMS)</b>					<b>210</b>		
Total costs accepted by FCH JU (cumulative) (in EUR) (A)					<b>214 359 710</b>		
Total costs of audits launched (cumulative) (in EUR) (B)					<b>56 063 682</b>		
Total costs of audits finalised (cumulative) (in EUR) (C)					<b>48 939 967</b>		
Audit coverage (value) of total audits (in %) (B/A)					<b>26 %</b>		
Audit coverage (value) of finalised audits (in %) (C/A)					<b>23 %</b>		
Total FCH JU beneficiaries (D)					<b>545</b>		
FCH JU beneficiaries audited (E)					<b>70</b>		
Audit coverage (number of benef.) of total audits (in %) (E/D)					<b>13 %</b>		

The first cost claims were received by the FCH JU in the spring of 2011 and the first *ex post* audits were launched immediately after the validation by the JU of the first claims. In the calendar year 2011, two batches were launched: the first batch (five audits) in September 2011, and the second batch (seven audits) in December 2011. During 2012, 2 additional batches were launched: the 3<sup>rd</sup> batch (9 audits) in February 2012, and the 4<sup>th</sup> batch (12 audits) in December 2012. In 2013, 1 batch was launched: the 5<sup>th</sup> batch (15 audits) in May 2013. In the calendar year 2014, two additional batches were launched: the 6<sup>th</sup> batch (20 audits) in May 2014, and the 7<sup>th</sup> batch (2 audits) in October 2014.

In conclusion, since the launching of *ex post* audits, 70 audits have been launched of which, 56 'representative' and 14 'risk-based'. Of the 70 audits (comprising 210 cost claims), 65 have been finalised and 5 are ongoing. The cumulative audit coverage represents 23 % (on finalised audits) and 26 % (on total audits) of the value of validated cost claims at the cut-off reporting date (i.e. 31/12/2014<sup>19</sup>). In terms of number of beneficiaries, the total number of FCH JU beneficiaries amounts to 545, of which 70 have been selected for audit, representing an audit coverage (in number) of 13 %.

The error rates resulting from the 65 finalised audits (of which 55 are representative and 10 are risk based) are as follows.

<sup>18</sup> An audit is considered 'finalised' when the audit adjustment and the related 'error rate' is final. This comprises either audits with 'Final Audit Reports' received or, if not received, with a 'Pre-final audit report' (after contradictory procedure with the beneficiary) approved by the JU and therefore with a definitive audit adjustment and error rate. In order to consider as many audits closed as possible for Annual Activity Report assurance purposes, we have considered all audits 'finalised' by 31/01/2015.

<sup>19</sup> The cut-off reporting date has been fixed at 31/12/2014, as this date coincides with the cut-off date for the preparation of the annual accounts.

**TABLE 4.1.1 (M) | INDICATORS OF ERROR**

	ACHIEVED CUMULATIVE PERIOD (AS OF 31 DECEMBER 2014)	
	TOTAL COST	FCH JU CONTRIBUTION
Costs accepted by FCH JU financial officers (FO) (in EUR) (A)	45 037 189	19 447 319
Overall errors (in EUR) in favour of the FCH JU (B)	-1 726 359	-744 496
'Overall error rate' (only in favour of the FCH JU) (B/A)	-3.83 %	-3.83 %
Overall errors (in EUR) in favour of the beneficiary (C)	1 965 136	339 692
'Overall error rate' (only in favour of the beneficiary) (C/A)	4.36 %	1.75 %
Total overall errors (in EUR) (in favour of the FCH JU and in favour of the beneficiary) (D)	238 777	-404 804
'Overall error rate' (netting off errors in favour of the JU and of the beneficiary) (D/A)	0.53 %	-2.08 %
'Representative error rate' (formula in Annex 4) (%)	-1.88 %	-2.10 %
'Residual error rate' (formula in Annex 4) (%)	-0.96 %	-1.14 %

The difference between the 'representative error rate' and the 'residual error rate' is the result of the following: (1) the correction of errors in an important part of the population due to the high audit coverage, and (2) the effect of extrapolation of audit results to non-audited cost claims of audited beneficiaries.

The analysis of the error rates and whether or not a reservation is necessary in the declaration of assurance concerning the accuracy of the cost claims is addressed in Section 4.2.

#### Implementation of audit results

As a result of errors identified during the FCH JU *ex post* audits, unduly paid JU funds need to be recovered. The FCH JU has implemented the necessary controls and monitoring mechanisms to ensure that all errors detected in favour of the JU are corrected in due course (either through a recovery order or as a set-off against a future payment).

The detailed situation on the implementation (at project level) of *ex post* audit results is as follows.

**TABLE 4.1.1 (N) | IMPLEMENTATION OF EX POST AUDIT RESULTS IN FAVOUR OF THE FCH JU EUR**

AUDIT LAUNCHING YEAR	AUDIT ADJUSTMENT (IN FAVOUR OF FCH JU)		ADJUSTMENTS PENDING IMPLEMENTATION		ADJUSTMENTS IMPLEMENTED	
	ON TOTAL COST	ON JU CONTRIBUTION	ON TOTAL COST	ON JU CONTRIBUTION	ON TOTAL COST	ON JU CONTRIBUTION
2011	824 960	214 492	-	-	824 960	214 492
2012	629 111	346 512	45 808	17 388	583 303	329 124
2013	138 734	66 592	24 398	14 137	114 336	52 455
2014	174 033	67 422	174 033	66 879	-	543
<b>TOTAL</b>	<b>1 766 838</b>	<b>695 018</b>	<b>244 239</b>	<b>98 404</b>	<b>1 522 599</b>	<b>596 614</b>

At the cut-off reporting date (i.e. 31 December 2014), the percentages of total adjustments effectively implemented are 86.2 % and 85.8 % at total cost and at FCH JU contribution level, respectively. These percentages prove the timely implementation of audit results, and consequently, the effective correction of detected errors by the FCH JU. Indeed, the vast majority of the adjustments with pending implementations are not due to JU delays, but are simply explained by the fact that the audits have been recently finalised and implementation will follow shortly. This is the case for most of the audits launched in 2014 for which the letters of conclusion have been sent very recently (December 2014 and January 2015).

So far, the FCH JU has focused its *ex post* audit effort on finalising a representative number of audits, in order to have sufficient information for the calculation of a 'representative error rate' in preparation of the 2014 Annual Activity Report. During the second quarter of 2015, the FCH JU will switch focus on the implementation of audit results, in order to effectively correct errors and provide the necessary information in the 2014 final accounts.

## Implementation of extrapolation

Extrapolation is the process by which 'systematic' errors detected on audited cost claims are 'extrapolated' to all other non-audited FCH JU claims of the same audited beneficiary. The timely implementation of 'extrapolation' relies on beneficiaries preparing and submitting revised cost claims from which the effect of any systematic error(s) detected in audits has been eradicated.

The overall situation on the implementation of extrapolation is shown in the following table.

**TABLE 4.1.1 (0) | IMPLEMENTATION OF EXTRAPOLATION OF EX POST AUDIT RESULTS**

	BENEFICIARIES	COST CLAIMS
Audits finalised	65	
Letters of conclusion sent as of reporting date	57	
Of which potentially concerned by extrapolation	22	
Extrapolation feedback not received from beneficiary	4	
Extrapolation feedback received from beneficiary	18	55
Of which projects not affected		15
Of which projects affected		40
Of which non-implemented		20
Of which implemented		20

At the cut-off reporting date (i.e. 31 December 2014), of the 65 finalised audits, 22 were potentially concerned by extrapolation. Feedback was not received from the beneficiary in four of those cases. For the 18 remaining audits, the beneficiary has provided the necessary information which covers 55 cost claims. Of the 55 cost claims, 40 are affected by extrapolation, and the FCH JU has implemented the extrapolation in 20 of these (50 %).

As explained above, in the section titled 'Implementation of audit results', in the second quarter of 2015 the FCH JU will closely monitor the pending extrapolation cases with the objective of closing as many cases as possible for the preparation of the 2014 final accounts.

## Liquidated damages

Liquidated damages are applied systematically by the FCH JU. In some cases, they do not result in a recovery order due to the application of the *de minimis* rule<sup>20</sup>. At the cut-off reporting date (i.e. 31 December 2014), of the 186 cost claims with finalised audits, 21 have been assessed as requiring liquidated damages for a total amount of EUR 56 114.94. Pre-information letters (i.e. letters of conclusion) have been sent to beneficiaries in all 21 of these cases, and recovery orders have already been issued and cashed for 13 cases, for a total value of EUR 24 204.90. This represents 62 % and 43 % of liquidated damages in value and number, respectively implemented. The pending cases will be followed up by the FCH JU for the closure of the 2014 final accounts.

## 4.1.2 BUILDING BLOCK 2: RESULTS FROM AUDITS DURING THE REPORTING YEAR AND FOLLOW-UP OF PREVIOUS AUDITS

### FCH JU Internal Audit Capability (IAC)

During 2014, the IAC of the Joint Undertaking carried out two **assurance engagements** (i.e. 'Annual assessment of the level of in-kind contributions' and 'Follow up - User access rights in FP7 IT tools') and provided **consulting services** on two main areas (i.e. 'Preparatory actions for the establishment of FCH 2 JU' and 'Annual Activity Report process'). In addition, in coordination with the Finance Unit, the IAC was responsible for the management of **ex post audits** (Section 3.3) and was involved in the '**Communication campaigns**' to FCH JU beneficiaries.

<sup>20</sup> Liquidated damages will only be applied where the unjustified contribution exceeds 2 % of the total contribution claimed for the given period.

Regarding the **assurance** engagements, the most relevant findings are as follows.

- **'Follow-up audit - User access rights in FP7 IT tools'**

The auditor concluded that, as of the cut-off date of the follow-up audit (i.e. 30 July 2014), all recommendations that resulted from the original engagement were implemented, except for two recommendations on the need to appoint back-ups in two FP7 IT systems, to ensure business continuity<sup>21</sup>.

*FCH JU actions:* both recommendations (or alternative measures to address the risk of business disruption) are implemented by FCH JU as of the date of this Annual Activity Report.

- **'Annual Assessment of the level of in-kind contributions'**<sup>22</sup>

The auditors concluded that the aggregated level of contributions in kind certified by the FCH JU's Executive Director (cut-off date 7 February 2014) for EUR 451.9 million, should be decreased by EUR 0.5 million (or - 0.11 %). The auditors also recommended the following: (1) to streamline the JU's internal procedure to update the relevant data in order to ensure that all events which have an impact on the amount of contributions in kind are identified in a timely manner, and (2) to ensure that all key (final and signed) documents are uploaded in the document management system.

*FCH JU action:* the proposed recommendations are implemented and corrections at the level of contributions in kind have been made. The auditor's assessment on the level of contributions in kind is to be carried out on a yearly basis. The next assessment will check the implementation of the recommendations and corrections, and the results will be presented by April 2015.

Concerning IAC **consulting** services, the following aspects have to be considered.

- On the **Annual Activity Report process**, advice was provided for the identification of the relevant aspects to consider when reporting under the sections 'Management and internal control system' and 'Building blocks towards the declaration of assurance'.
- On the **'Preparatory actions for the establishment of FCH 2 JU'**, the JU's risk management exercise identified as a 'critical point' the need to ensure adequate preparation of the JU for effective implementation of FCH 2 under H2020. In this context, the JU set up in 2014 an internal task force which meets regularly, and a Sherpa Working Group comprising representatives from the Commission, the IG, the RG and the Programme Office, with the IAC being one of its members.

Of particular relevance was the IAC contribution during 2014 to the following documents and discussions.

- The adoption of **Council Regulation (EU) N° 559/2014** of 6 May 2014 establishing FCH 2 JU, where key governance aspects were agreed in this legal document, particularly the need to maintain a separate discharge for the Joint Undertaking (independent from the Commission), and to confirm the ECA as the external auditor of the JU.
- The adoption of the **FCH 2 JU Financial Rules** by the Governing Board on 30 June 2014 based on the principles set out by the Council Regulation above.
- The interactions with the Commission's **Common Support Centre** on control, audit and assurance aspects.
- The establishment of a methodology/process for the management of **in-kind contributions under H2020**<sup>23</sup>.
- The signature of the **Delegation Agreement (DA)** between the FCH 2 JU and the European Commission, which defines the budget implementation tasks entrusted by the Commission to the JU as well as the terms and conditions for their implementation. Particularly relevant for assurance purposes and to contribute to the legality and regularity of the JU's transactions under H2020 is Article 10 of the DA on 'ex post audits'. Discussions are ongoing with the Commission to ensure that the effectiveness and level of assurance obtained from the FCH JU's ex post audit process under FP7 is maintained under the new H2020 in which the Common Support Centre will take over some parts of this process.

Regarding the **ex post audits** managed by the IAC (jointly with the Finance Unit), the ex post audit strategy has been implemented since September 2011. Some 70 audits have been launched so far, 65 of which have been finalised. See more details on the objectives of ex post audits and on the relevant indicators and results in Subsection 4.1.1 – Stage 4 (ex post controls).

<sup>21</sup> The two IT systems are the following: 'CaP' (IT system used by the call coordinator for the launching of a call) and 'CPM' (IT system used by financial officers and project managers for contract and project management).

<sup>22</sup> Assessment carried out jointly by the IAC of the FCH JU and the IAC of IMI JU.

<sup>23</sup> Two types of in-kind contributions are established under H2020, namely IKOP and in-kind contributions in additional activities (i.e. IKAA). The Governing Board decided in 2014 to set up a Task Force (TF) for the establishment of a process/methodology for IKOP and IKAA. The TF comprises representatives from the Commission, the IG, the RG and the Programme Office, the IAC being one member from the Programme Office. Both the methodologies and the underlying process are quite advanced and are expected to be finalised by June 2015.



For information on the **communication campaigns** to FCH JU beneficiaries to which the IAC contributed, see Section 4.2.

Finally, in terms of the FCH JU's **follow-up of action plans** addressing the audit recommendations resulting from IAC previous audits<sup>24</sup>, all the audit recommendations have been implemented with the following exceptions: (1) the guidance for technical review of projects will be formally adopted by Q1 2015, and (2) the action plan on IAC audit on 'Grant management: negotiation, contracting and pre-financing' is under revision in order to adapt it to the H2020 'no negotiation' approach and to the new H2020 processes.

### Commission's Internal Audit Service (IAS)

During 2014, the IAS finalised a Limited review on '**Use and dissemination of research results**' and carried out, jointly with the IAC, a **Risk Assessment** with a view to establishing its Strategic Audit Plan for 2015 to 2017.

As for the Limited review on '**Use and dissemination of research results**', the IAS identified as a good practice the organisation of 'Programme Review Days' to assess the progress of the programme funded by the JU, notably in relation to the targets of its MAWP and AWP, as well as in relation to international developments in the field. However, the auditors noted that the design and implementation of the processes related to the central collection and dissemination of research results and knowledge management were still under development. In particular, the auditors highlighted the need to reinforce the reporting and monitoring of beneficiaries' use and dissemination plans.

The IAS made the following recommendations:

- that the FCH JU, in cooperation with DG Research and Innovation, takes the necessary steps to ensure that the documents and tools provided under H2020 provide clear guidance to beneficiaries on project reporting, including the instruction to submit detailed information on the use and dissemination of research results, and evidence supporting the indicated dissemination activities;
- that the FCH JU provides clear guidance to project managers on how to assess midterm and final project reports, in particular by establishing the accepted level of information on the use and dissemination activities, and the extent to which beneficiaries are supposed to submit supporting evidence;
- that the FCH JU set up a follow-up system, both for implementing its midterm comments and recommendations, and as far as possible, for validating the indications provided by the beneficiaries in the final reports.

*FCH JU action:* the JU set out an action plan to address IAS recommendations and is working, in coordination with DG Research and Innovation (Common Support Centre) to implement the agreed actions by mid 2015.

Concerning the auditors' **Risk Assessment**, the management of the FCH JU confirmed the implementation of all actions to address the high-risk areas identified by the auditors in the previous risk assessment<sup>25</sup>. Concerning this year's risk assessment, final results will be presented shortly and reported by the JU in the relevant Annual Activity Report. However, the draft results communicated so far by the IAS to JU's management do not reveal any critical risk. Rather, they reveal mainly new processes (e.g. Coordination with the Commission's Common Support Centre), which require special attention and for which the JU has already established several mechanisms to maximise the advantages of common services (e.g. consistency), while at the same time minimising, to the extent possible and under the JU's control, the negative impact that those services might have on the effective functioning of the JU (e.g. timing issues and assurance implications).

Finally, concerning the FCH JU's **follow-up of action plans** addressing the audit recommendations resulting from previous IAS engagements (i.e. 'IT risk assessment on the common IT infrastructure of the Joint Undertakings'); all the recommendations have been implemented.

<sup>24</sup> Two assurance engagements carried out in 2011, (i.e. 'Assessment of FCH JU users' access rights granted in ABAC' and 'Assessment of FCH JU users' access rights granted in P7 IT systems'), one audit in 2012 (i.e. 'Ex ante controls for eligibility of declared costs and related payments') and one audit in 2013 (i.e. 'Grant management – Negotiation, contracting and pre-financing').

<sup>25</sup> The **high-risk areas** identified were monitoring of operational and administrative activities, data protection, IT development and management, document management, business continuity, matching assessment and *ex post* controls. The **actions** implemented by the JU include identification of key performance indicators and their monitoring through mid-year management reports by Heads of Units, data protection system, timely reporting and follow up of IT issues, assessment by the IAC of users' access rights granted in ABAC and FP7 IT systems, business continuity plan, methodology for and assessment of in-kind contributions and implementation of *ex post* audits.

## European Court of Auditors (ECA)

In its two last annual reports covering the financial years 2012 and 2013, the Court provided a 'clean opinion' on the following: (1) the reliability of FCH JU accounts, and (2) the legality and regularity of the underlying transactions.

The Court confirmed the key importance of *ex post* audits within the JU's internal control system and its effectiveness in identifying and correcting errors in a timely manner. This resulted in a residual error rate below 2 % which was a key factor for the clean opinions in both years.

Without calling into question the clean opinion indicated above, in its last report, the Court proceeded as follows.

- It highlighted some of the issues identified by IAC and IAS audits, with a particular focus on the monitoring and reporting of project research results (further details are provided in sections above).
- It acknowledged the measures put in place by the FCH JU to prevent conflicts of interests as regards its three key stakeholders (i.e. Governing Board members, experts and employees). A comprehensive policy on the management and handling of 'conflicts of interest' covering all levels of the organisation and processes has been developed by the JU, to be approved by the Governing Board<sup>26</sup>.
- It pointed out some of the recommendations resulting from the Commission's second interim evaluation of the FCH JU. These recommendations included the assignment of more resources to operations through the sharing of administrative functions with other JUs and/or returning them to the Commission's services, a sharper focus for the research strategy for the continuation of the JU in H2020 in fulfilment of the three main principles (alignment with EU policies, areas where Europe has or can achieve leadership and adaptation to the changing needs of the sector) and strengthening the capacity for change. An action plan to address those recommendations was adopted by the Governing Board on 11 November 2014.

### 4.1.3 BUILDING BLOCK 3: ASSURANCE FROM HEADS OF UNIT

The FCH JU Internal Control Framework provides for mid-year management reports from the Heads of Unit to the Executive Director, including a declaration of assurance. For the second half of the year, the Heads of Unit review is encompassed in their input for the Annual Activity Report and on the review by the ICC of the state of the internal control system.

Based on their review, the Heads of Unit consider that given the scope of the Statement of Assurance and taking into account the controls and monitoring system in place, the weaknesses they identified do not call into question the reasonable assurance as to the use of resources for their intended purpose, in accordance with the principles of sound financial management, and the fact that the implemented control procedures give the necessary guarantees on the legality and regularity of the underlying transactions.

### 4.1.4 COMPLETENESS AND RELIABILITY OF THE INFORMATION REPORTED IN THE BUILDING BLOCKS

The information reported in Sections 4.1.1 to 4.1.3 stems from the results of management monitoring and auditors' work. This approach provides sufficient guarantees of the completeness and reliability of the information reported, and results in complete coverage of the FCH JU budget.

## 4.2 RESERVATIONS

The **representative error rate** resulting from the 55 representative audits finalised is – **1.88 %** at total cost level and – **2.10 %** at FCH JU contribution level.

The **residual error rate** (i.e. error remaining in the population after corrections and recoveries) calculated at this point is – **0.96 %** at total cost level and – **1.14 %** at FCH JU contribution level. This rate should develop as more audits are closed, and more corrections and recoveries undertaken. In fact, at this stage of FCH JU strategy, the 'cleaning effect' of implementation and extrapolation of audit results does not yet have a significant effect in lowering the detected error rate.

<sup>26</sup> A draft policy was submitted to the Governing Board (GB) in November 2014. The Governing Board members from the Commission (EC) confirmed the good quality of the draft policy but decided to postpone its adoption considering the horizontal nature of these rules and therefore the need for the EC to ensure consistency amongst JUs.

Taking into consideration:

- the **residual error rates** below 2 % at this point in time;
- the adequate **audit coverage**, comprising a representative number of finalised audits;
- the **experience** gained by the JU's staff in the **ex ante** validation of costs claims;
- the continuous **reinforcement** of JU's **ex ante** controls;
- the **improved quality** of beneficiaries' cost claims as a result of the communication campaigns carried out by the FCH JU in 2012, 2013 and 2014;

**no** reservation is necessary. In the opinion of the Executive Director, considering the aspects above and with the information available at this stage, it is possible to state with a reasonable assurance that by the end of the programme, the residual error rate will be below the materiality threshold (i.e. 2 %) established in Annex 4 ('Materiality Criteria').

#### FCH JU actions towards an acceptable level of 'Residual error rate'

The declaration of assurance of last year (i.e. 2013) did not include a reservation, as is the case this year (2014). This is the result of a firm commitment of the FCH JU to maintain a robust internal control system where *ex post* audits play a significant role. The 'residual error rate' is a key indicator of the legality and regularity of the JU's transactions. In this context, the FCH JU laid down in 2012 an action plan with the objective of achieving an acceptable level of 'residual error rate', which should provide sufficient assurance to the Executive Director, while at the same time respecting cost-benefit principles (i.e. the cost of controls have to be measured against the benefits that those additional controls can bring to the organisation. Auditing 100 % of the cost claims is not cost-efficient).

The FCH JU action plan includes a combination of **preventive, detective and corrective measures** and is closely monitored. The measures/actions can be grouped around three main axes and are ongoing.

- Organisation of **communication campaigns** to prevent financial errors in cost reporting by improving awareness within the beneficiaries of the regulatory framework. In total, six campaigns have been organised by FCH JU so far (three in 2012; two in 2013 and one in 2014). The set-up of the campaigns was reviewed in 2013 to maximise its impact, with the possibility to participate 'on-site' and 'online', a focused audience (including auditors responsible for the preparation of the CFS and *ex post* auditors) and a focused scope on the most recurrent issues. The 2014 campaign continued with the approach of 'on-site' and 'online' participation, and particular emphasis was placed this year on eligibility aspects in 'Demonstration' projects. A total of 141 beneficiaries involved in 129 projects have attended the communication campaigns. This represents approximately 26 % and 83 % of FCH JU beneficiaries and projects, respectively. The communication campaigns were highly appreciated by the participants and their positive impact is visible since 2013, through an improved quality in beneficiaries' cost reporting.
- Reinforcement of FCH JU **ex ante controls** in order to allow for higher detection and correction of errors before validation of cost claims (e.g. JU's scrutiny of the CFS has been strengthened, JU's *ex ante* checklists were updated, and other aspects have been reinforced following the IAC audit recommendations on '*ex ante* controls').
- Continuation of FCH JU **ex post audit effort**. During 2013, the *ex post* audit effort was critical and allowed the closure of an important number of ongoing audits (i.e. the number of audits finalised increased from 19 by the end of 2012 to 45 by the end of 2013). In 2014, the JU confirmed the paramount importance of *ex post* audits within its control strategy, but also the need to ensure that controls are cost-effective. In this sense, a significant *ex post* audit effort has continued this year with the launching of 22 new audits, but to ensure that controls are cost-effective, the target audit coverage (in value) has been reduced as a result of the positive trend observed in terms of low error rates. The combination of appropriate audit coverage and relatively low detected error rate has resulted in a residual error rate below 2 %.

Likewise, the **positive feedback loop** generated by the combination of the three actions above is of particular importance. For example, the (preventive) communication campaigns are also a very useful platform to share experiences between beneficiaries and with JU actors. Also, *ex post* audits have a multiplying effect: lessons learned from the results of *ex post* audits provide very valuable information not only to the audited beneficiary, but also to the JU's *ex ante* controllers for future cost claims and to other beneficiaries of the same project.

The FCH JU has a clear control strategy of a **multi-annual** nature which is a combination of **ex ante** and **ex post** controls, and takes into consideration **cost-efficiency** aspects. This strategy has proved its effectiveness from an assurance point of view. Therefore, the FCH JU is fully committed to continuing its work along the same control principles.

## 4.3 OVERALL CONCLUSION

The purpose of this section is to provide an overall conclusion on the declaration of assurance as a whole (Chapter 5).

It is important to note that only material weaknesses/risks lead to a reservation to the assurance in Chapter 5. The concept of **'materiality'** provides the Executive Director with a basis for assessing the importance of the weaknesses/risks identified. Deciding whether something is material involves making a judgement in both qualitative and quantitative terms (see details on the 'Materiality criteria' in Annex 4).

Based on the information provided in sections above, the following conclusions can be drawn.

- Concerning the FCH JU's policy activities, no qualification is to be made. There is also no reservation in the procedures relating to the selection of contractors and beneficiaries for FCH JU projects and its underlying financial operations (legal and financial commitments). This is also the case for JU's payments relating to administrative expenditure and procurement, as well as for pre-financing payments in the case of grants.
- The amounts that have a higher risk of being affected by errors are the expenditure incurred against cost statements. Based on the analysis of error rates and the effectiveness of the preventive, detective and corrective actions presented in Section 4.2, no reservation is necessary in this area either.

In conclusion, the management of the JU has reasonable assurance that, overall, suitable controls are in place and working as intended, risks are being properly monitored and mitigated, and necessary improvements noted by the auditors (i.e. the JU's IAC, Commission's IAS and the ECA) are being implemented. Therefore, the Executive Director, in his capacity as Authorising Officer, has signed the declaration of assurance presented in Chapter 5.

# 05

## DECLARATION OF ASSURANCE

I, the undersigned, Mr Bert De Colvenaer, Executive Director of FCH JU in my capacity as authorising officer:

Declare that the information contained in this report gives a true and fair view<sup>27</sup>.

State that I have reasonable assurance that the resources assigned to the activities described in this report have been used for their intended purpose and in accordance with the principles of sound financial management, and the control procedures put in place, give the necessary guarantees concerning the legality and regularity of the underlying transactions.

This reasonable assurance is based on my own judgement and on the information at my disposal, mainly the results of the management self-assessment, the results from internal and external audits during the reporting year and the assurance provided by the Heads of Unit in their management reports.

Confirm that I am not aware of anything not reported here which could harm the interests of the Joint Undertaking.

**Brussels, 27 February 2015**



**Bert DE COLVENAER**  
Executive Director  
Fuel Cells and Hydrogen Joint Undertaking

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<sup>27</sup> True and fair in this context means a reliable, complete and correct view on the state of affairs in the JU.



# ANNEX 01

## STATEMENT OF THE INTERNAL CONTROL COORDINATOR

*I declare that in accordance with the Commission's communication on clarification of the responsibilities of the key actors in the domain of internal audit and internal control in the Commission<sup>28</sup> which is used as a reference by the FCH JU, I have reported my advice and recommendations to the Executive Director on the overall state of internal control in the FCH JU.*

*I hereby certify that the information provided in Parts 3 and 4 of the present Annual Activity Report and in its annexes 2 to 6 is, to the best of my knowledge, accurate and exhaustive.*

**Brussels, 27 February 2015**



**Elisabeth ROBINO**  
Internal Control Coordinator

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<sup>28</sup> See SEC(2003)59 of 21.01.2003. online.

# ANNEX 02

## HUMAN RESOURCES

TABLE | ESTABLISHMENT PLAN POSTS

CATEGORY AND GRADE	ESTABLISHMENT PLAN 2014		POSTS ACTUALLY FILLED AT 31 DECEMBER 2013		POSTS FILLED IN BY EXTERNAL PUBLICATION IN 2014		PROMOTION/ RECLASSIFICATION IN 2014		DEPARTURES 2014		POSTS ACTUALLY FILLED AT 31 DECEMBER 2014	
	perm	temp	perm	temp	perm	temp <sup>29</sup>	perm	temp	perm	temp	perm	temp
AD 16												
AD 15												
AD 14		1		1								1
AD 13												
AD 12												
AD 11		3		3								3
AD 10												
AD 9		1		0								0
AD 8		4		4		1				1 (**)		4
AD 7		2		2								2
AD 6												
AD 5		4		-		4 (*)						4
<b>Total AD</b>		<b>15</b>		<b>10</b>		<b>5</b>				<b>1</b>		<b>14</b>
AST 11												
AST 10												
AST 9												
AST 8		1		0								0
AST 7		3		3								3
AST 6						1						1
AST 5												
AST 4		1		1		1				1		1
AST 3		4		2		2 (*)						4
AST 2												
AST 1												
<b>Total AST</b>		<b>9</b>		<b>6</b>		<b>4</b>				<b>1</b>		<b>9</b>
<b>TOTAL</b>		<b>24</b>		<b>16</b>		<b>9</b>				<b>2</b>		<b>23</b>

(\*) One took up duty in January 2015

(\*\*) Resignation with effect 31 December 2014 will be filled in February 2015 by use of the reserve list.

In addition, the FCH JU employs two contract agents of FG III and FG IV.

<sup>29</sup> All new contracts, including the inter-agency job market.



# ANNEX 03

## FINANCIAL INFORMATION

In accordance with Article 20 of the FCH Financial Rules, the Annual Activity Report includes information on the accounts and on budgetary and financial management.

Below is an **extract** of the report on budgetary and financial management and of the provisional accounts.

### BUDGETARY INFORMATION<sup>30</sup>

In accordance with Council Regulation 559/2014 setting up the Fuel Cells and Hydrogen 2 Joint Undertaking (Article 13 of its statutes), the FCH 2 JU is financed through contributions from its members, including cash contributions from the Union and the Industry and Research Groupings for its running costs, and a cash contribution from the Union for its operational activities. Private members also contribute in kind in operational activities.

#### BUDGET STRUCTURE

The budget of the FCH JU is divided into three titles as follows:

- TITLE 1 Staff expenses
- TITLE 2 Administrative expenses
- TITLE 3 Operational expenses.

Fund sources include funds from the current year (C1), funds carried over from the previous year (C8), reactivated unused appropriations from previous years (C2), internal assigned revenue (C4) and assigned revenues carried over from 2011 (C5).

#### BUDGET REVENUE

The funding of the FCH 2 JU budget 2014 is set out below (in EUR).

HEADING	CA	PA	CASHED IN 2014
Union contribution* for operational expenditure	96 154 620	67 364 463	67 364 463
Union Contribution* for administrative expenditure	2 014 780	2 014 780	2 014 780
Industry Grouping	2 315 244	2 315 244	2 025 881
Research Grouping	384 870	384 870	336 643
Other revenues	50 000	50 000	849 363
Re-activation of appropriations	11 145 476	23 822 819	
<b>TOTAL</b>	<b>112 064 990</b>	<b>95 952 176</b>	<b>72 591 129</b>

\* Includes EFTA contribution (3 % in 2014)

<sup>30</sup> The report on budgetary and financial management is available separately and sent to the European Parliament, the Council, the Court of Auditors and the Commission by 31 March.

It is noted that according to the new Financial Rules adopted on 30 June 2014, there is no distinction between non-dissociated and dissociated appropriations: commitments and payment appropriations can be of different amounts, as the commitments can be paid over different years (n+3 for Title 1 and 2 appropriations) in line with contractual obligations

## BUDGET EXPENDITURE

Budget execution by year end for all fund sources reached 98.48 % as regards commitment appropriations and 74.52 % in terms of payment execution.

Below is an overview of the budget implementation (execution on commitments and payments) by fund source.

(amounts in EUR)

	COMMITMENT APPROPRIATIONS	COMMITTED	% COMMITTED	PAYMENT APPROPRIATIONS	PAID	% PAID
<b>C1</b>						
Title 1	2 930 734.00	2 539 232.60	86.64 %	2 930 734.00	2 442 043.04	83.33 %
Title 2	1 834 160.00	1 668 834.05	90.99 %	1 834 160.00	904 027.18	49.29 %
Subtotal	4 764 894.00	4 208 066.65	88.31 %	4 764 894.00	3 346 070.22	70.22 %
Title 3 (FP7)			-	67 364 463.00	44 449 638.37	65.98 %
Title 3 (H2020)	96 154 619.50	96 154 619.50	100 %			-
<b>TOTAL C1</b>	<b>100 919 513.50</b>	<b>100 362 686.15</b>	<b>99.45 %</b>	<b>72 129 357.00</b>	<b>47 795 708.59</b>	<b>66.26 %</b>
<b>C2</b>						
Title 3 (FP7)	<b>11 145 475.50</b>	<b>8 016 614.00</b>	<b>71.93 %</b>	<b>23 822 818.60</b>	<b>23 822 818.60</b>	<b>100 %</b>
<b>C4</b>						
Title 1	2 368.50	0	0 %	2 368.50	0	0 %
Title 2	134.21	0	0 %	134.21	0	0 %
Subtotal	2 502.71	0	0 %	2 502.71	0	0 %
Title 3 (FP7)	773 474.07	4 346.44	0.56 %	773 474.07	360 128.28	46.56 %
<b>TOTAL C4</b>	<b>775 976.78</b>	<b>4 346.44</b>	<b>0.56 %</b>	<b>775 976.78</b>	<b>360 128.28</b>	<b>46.41 %</b>
<b>C5</b>						
Title 1	104.53	0	0 %	104.53	0	0 %
Title 2	0	0	0 %	0	0	0 %
Subtotal	104.53	0	0 %	104.53	0	0 %
Title 3 (FP7)	77 677.12	0	0 %	171 999.96	171 999.96	100 %
<b>TOTAL C5</b>	<b>77 781.65</b>	<b>0</b>	<b>0 %</b>	<b>172 104.49</b>	<b>171 999.96</b>	<b>99.94 %</b>
<b>C8</b>						
Title 1	78 147.21	62 968.35	80.58 %	78 147.21	62 968.35	80.58 %
Title 2	540 465.37	460 483.89	85.20 %	540 465.37	460 483.89	85.20 %
Subtotal	618 612.58	523 452.24	84.62 %	618 612.58	523 452.24	84.62 %
Title 3 (FP7)	244 897 122.46	244 085 388.03	99.67 %	0	0	0 %
<b>TOTAL C8</b>	<b>245 515 735.04</b>	<b>244 608 840.27</b>	<b>99.63 %</b>	<b>618 612.58</b>	<b>523 452.24</b>	<b>84.62 %</b>
<b>C9</b>						
Title 2	<b>2 427.20</b>	<b>0</b>	<b>0 %</b>	<b>0</b>	<b>0</b>	<b>0 %</b>
<b>TOTAL</b>	<b>358 436 909.67</b>	<b>352 992 486.86</b>	<b>98.48 %</b>	<b>97 518 869.45</b>	<b>72 674 107.67</b>	<b>74.52 %</b>

For C1 funds, commitment appropriations for administrative costs corresponding to obligations duly contracted at the close of the financial year are carried over automatically to the following year (C8).

These automatic carry-overs amount to EUR 861 996.43 and mainly relate to expert contracts and meetings (EUR 265 595.43), *ex post* audits of beneficiaries (EUR 242 331.11), communication costs (EUR 130 814) non-statutory staff and trainees (EUR 44 370.11) and training (EUR 28 500).

Unused payment appropriations from operations 2014 amounting to EUR 23 328 170.42 — taking into account C1 and C4 balances — stem from the lower amount paid under cost claims, due notably to clarification reports in connection with *ex ante* controls still pending. They will be reactivated in the FCH JU 2015 budget through a budget amendment for adoption by the Governing Board and used for payment of operations (title 3).

According to the FCH 2 JU Financial Rules and the interpretative note from DG Budget, there is no distinction between non-dissociated and dissociated appropriations. These outstanding payments amounted to EUR 861 996.43 (see appropriations automatic carry-over above) and will be re-introduced (as C2) in the budget 2015 through amendment to cover obligations under outstanding commitments for administrative costs. It is noted that in the previous years these unused payment appropriations were automatically carried forward to the year N+1.

According to Article 6.5 of the FCH 2 Financial Rules, non-used commitment appropriations from administrative expenditure (titles 1 and 2) from 2014 may be entered in the budget for up to the following three financial years. These appropriations amount to EUR 556 827.35.

The amounts from C2 funds correspond to reactivation of unused appropriations cancelled in 2013 and entered in 2014 budget by amendment.

The funds from C4 relate to recovery of amounts due by third parties.

The funds from C5 correspond to assigned revenues of 2013 carried over in 2014.

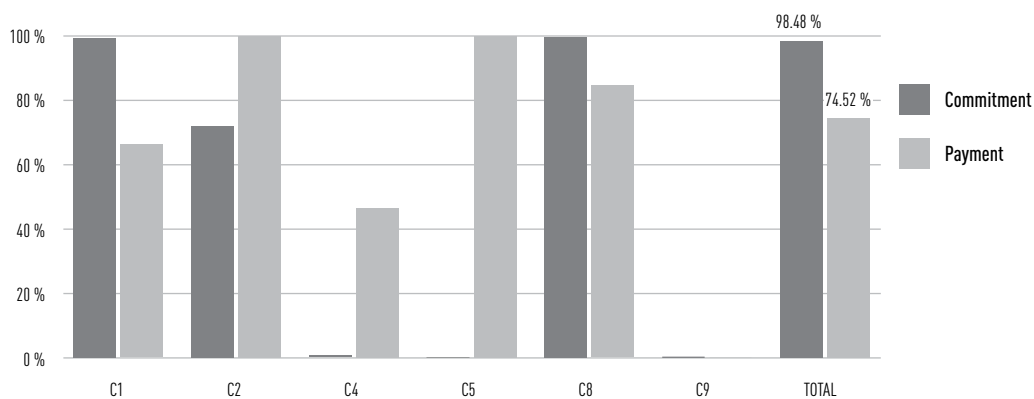
Regarding C8, the unused commitment appropriations from operations (EUR 811 734.43) include:

1. an amount of EUR 296 442 related to studies 2013 that was not used and de-committed in 2014;
2. an amount of EUR 89 038.23 related to de-commitments following amendments in 2 projects from call 2011;
3. an amount of 132 703 referring to de-commitment following an amendment in a project of call 2012;
4. an amount of EUR 293 551.20 following a termination of a project from call 2009.

The total payments made in 2014 (all fund sources) amount to EUR 72 674 107.67 (47 795 708.59 + 23 822 818.60 + 360 128.28 + 171 999.96 + 523 452.24).

The chart below provides an overview for the budget execution rates per fund source.

**FIGURE I** BUDGET IMPLEMENTATION PER FUND SOURCE (IN %)



## OVERVIEW OF FP7 BUDGET IMPLEMENTATION

Below is a summary statement of the overall programme budget implementation and the schedule of payments due in subsequent financial years.

The following table details the aggregate amount of commitments and payments made each year from 2008 until 2014, as well as the forecast of payments to meet these commitments. All commitments and payments refer to FP7 funds, as until the end of 2014 no individual commitments were validated under H2020 funds.

TABLE (amount in EUR)

YEAR	UNTIL 31 DECEMBER 2014	2015	2016	SUBSEQUENT YEARS	TOTAL
Commitments (operational)	454 534 854	0	0	0	454 534 854
Commitments (administrative)	18 281 704	4 363 609	4 411 078	4 256 932	31 313 323
Subtotal	472 816 558	4 363 609	4 411 078	4 256 932	485 848 177
Payments (operational)	271 095 784	57 793 690	53 122 356	55 241 987	437 253 817
Payments (administrative)	18 281 704	4 363 609	4 411 078	4 256 932	31 313 323
Subtotal	289 377 488	62 157 299	57 533 434	59 498 919	468 567 140
Cumulative budget implementation	61.20 %	73.67 %	84.94 %	96.44 %	96.44 %

According to the table above, the overall budget execution until the end of 2014 reaches up to 61.2 % of the budget. The forecast is that 96.44 % of the FP7 budget will be executed.

## FINANCIAL STATEMENTS (FCH 2014 PROVISIONAL ACCOUNTS)<sup>31</sup>

TABLE

BALANCE SHEET	NOTE	31.12.2014	31.12.2013
<i>EUR '000</i>			
<b>NON-CURRENT ASSETS</b>			
<i>Intangible assets</i>	1	1	6
<i>Property, plant and equipment</i>	48	48	52
<i>Pre-financing</i>		34 680	34 865
		<b>34 729</b>	<b>34 923</b>
<b>CURRENT ASSETS</b>			
<i>Pre-financing</i>		6 970	13 447
<i>Exchange receivables and non-exchange recoverables</i>		27 360	1 158
<i>Cash and cash equivalents</i>		–	26 614
		<b>34 330</b>	<b>41 219</b>
<b>TOTAL ASSETS</b>		<b>69 060</b>	<b>76 141</b>
<b>CURRENT LIABILITIES</b>			
<i>Provisions</i>		–	(1 864)
<i>Payables</i>		(162 475)	(131 374)
<i>Accrued charges and deferred income</i>		(17 167)	(471)
		<b>(179 641)</b>	<b>(133 710)</b>
<b>TOTAL LIABILITIES</b>		<b>(179 641)</b>	<b>(133 710)</b>

<sup>31</sup> Provisional accounts are sent to the Commission and the Court of Auditors by 1 March. Only the balance sheet and statement of financial performance are shown in this section. Final accounts will be reported by 1 July and published.

	NOTE	31.12.2014	31.12.2013
<b>NET ASSETS</b>			
<i>Contribution from Members</i>		425 019	312 160
<i>Accumulated deficit</i>		(369 729)	(218 654)
<i>Economic result of the year</i>		(165 871)	(151 075)
<b>NET ASSETS</b>		<b>(110 581)</b>	<b>(57 568)</b>

## TABLE

STATEMENT OF FINANCIAL PERFORMANCE		EUR '000	
	NOTE	2014	2013
<b>REVENUE</b>			
<b>Revenue from non-exchange transactions</b>			
<i>Recovery of expenses</i>		985	931
<i>Other</i>		–	37
<b>Total</b>		<b>985</b>	<b>968</b>
<i>Revenue from exchange transactions</i>			
<i>Financial income</i>		33	99
<i>Other exchange revenue</i>		14	4
<b>Total</b>		<b>47</b>	<b>103</b>
		<b>1 032</b>	<b>1 072</b>
<b>EXPENSES</b>			
<i>Operating costs</i>		(162 985)	(147 846)
<i>Staff costs</i>		(2 160)	(2 050)
<i>Finance costs</i>		249	(0)
<i>Other expenses</i>		(2 006)	(2 250)
		<b>(166 903)</b>	<b>(152 147)</b>
<b>ECONOMIC RESULT OF THE YEAR</b>		<b>(165 871)</b>	<b>(151 075)</b>

# ANNEX 04

## MATERIALITY CRITERIA

The ‘**materiality**’ concept provides the Executive Director with a basis for assessing the importance of the weaknesses/risks identified and thus whether those weaknesses should be subject to a formal reservation to his declaration.

When deciding whether something is material, **qualitative and quantitative** terms have been considered.

In **qualitative** terms, when assessing the significance of any weakness, the following factors have been taken into account:

- the nature and scope of the weakness;
- the duration of the weakness;
- the existence of compensatory measures (mitigating controls which reduce the impact of the weakness);
- the existence of effective corrective actions to correct the weaknesses (action plans and financial corrections) which have had a measurable impact.

In **quantitative** terms, in order to make a judgement on the significance of a weakness, the potential maximum (financial) impact is quantified.

Whereas the FCH JU control strategy is of a **multi-annual nature** (i.e. the effectiveness of the JU’s control strategy can only be assessed at the end of the programme, when the strategy has been fully implemented and errors detected have been corrected), the Executive Director is required to sign a declaration of assurance for each financial year. In order to determine whether to qualify his declaration of assurance with a reservation, the effectiveness of the JU’s control system has to be assessed, not only for the year of reference, but more importantly, with a multi-annual outlook.

The **control objective** for FCH JU is to ensure that the ‘**residual error rate**’, i.e. the level of errors which remain undetected and uncorrected, **does not exceed 2 % by the end of the JU’s programme**. Progress towards this objective is to be (re)assessed annually, in view of the results of the implementation of the *ex post* audit strategy.

As long as the residual error rate is not (yet) below 2 % at the end of a reporting year within the programme lifecycle, a reservation would (still) be made. Nevertheless, apart from the residual error rate, the Executive Director may also take into account other management information at his disposal to identify the overall impact of a weakness and determine if it leads to a reservation.

If an adequate calculation of the residual error rate is not possible, for reasons not involving control deficiencies<sup>32</sup>, the consequences are to be assessed quantitatively by estimating the likely exposure for the reporting year. The relative impact on the declaration of assurance would be then considered by analysing the available information on qualitative grounds and considering evidence from other sources and areas (e.g. information available on error rates in more experienced organisations with similar risk-profiles).

Considering the crucial role of *ex post* audits within the JU’s control system, its effectiveness needs to check whether the scope and results of the *ex post* audits carried out are sufficient and adequate to meet the control objectives.

<sup>32</sup> For example, in the early stages of implementation of audits, when the number of audit results is limited.

## EFFECTIVENESS OF CONTROLS

The **starting point** to determine the effectiveness of the controls in place is the '**representative error rate**' expressed as a percentage of errors in favour of the FCH JU detected by *ex post* audits measured with respect to the amounts accepted after *ex ante* controls.

According to the FCH JU *ex post* audit strategy approved by the Governing Board, the 'representative error rate' will be based on the simple average error rate (AER) for a stratified population, from which a **judgemental sample** has been drawn according to the following formula:

$$\text{AER\%} = \frac{\sum (\text{err})}{n} = \text{RepER\%}$$

Where:

$\sum (\text{err})$  = sum of all individual error rates of the sample (in %). Only the errors in favour of the JU will be taken into consideration.

**n** = sample size

**Second step:** calculation of **residual error rate**.

To take into account the impact of the *ex post* controls, this error level is to be adjusted by subtracting:

- errors detected and corrected as a result of the implementation of audit conclusions;
- errors corrected as a result of the extrapolation of audit results to non-audited contracts with the same beneficiary.

This results in a residual error rate, which is calculated by using the following formula:

$$\text{ResER\%} = \frac{(\text{RepER\%} * (P-A) - (\text{RepERsys\%} * E))}{P}$$

Where:

**ResER%** = residual error rate, expressed as a percentage.

**RepER%** = representative error rate, or error rate detected in the representative sample, in the form of the Average Error Rate, expressed as a percentage and calculated as described above (AER%).

**RepERsys%** = systematic portion of the RepER% (the RepER% is composed of complementary portions reflecting the proportion of 'systematic' and 'non-systematic' errors detected) expressed as a percentage.

**P** = total amount in EUR of the auditable population.

**A** = total of all audited amounts, expressed in EUR.

**E** = total non-audited amounts of all audited beneficiaries. This will consist of the total amount, expressed in EUR, of all non-audited validated cost statements for all audited beneficiaries, excluding those beneficiaries for which an extrapolation is ongoing.

This calculation will be performed on a point-in-time basis, i.e. all the figures will be provided as of a certain date.

## ADEQUACY OF THE AUDIT SCOPE

The quantity and adequacy of the audit effort carried out is to be measured by comparing the actual audits to the target audit coverage.

# ANNEX 05

## FCH JU INTERNAL CONTROL STRATEGY

The table below provides a narrative description of the control environment and of key controls in each stage of the project lifecycle, including two horizontal processes: Planning & Programming, and Communication & Information.

### THE CONTROL ENVIRONMENT

#### SUMMARY | FCH JU PROJECTS CO-FINANCED THROUGH THE REIMBURSEMENT OF ELIGIBLE COSTS

The control environment characterised by a large number of beneficiaries, each operating their own control system.

#### KEY INHERENT CONTROL RISKS IN THIS ENVIRONMENT

- A complex legal framework is required to implement a system based on the reimbursement of 'actual eligible costs'.
- Beneficiaries must allocate personnel cost and overheads via productive hours and time recording and deduct a range of ineligible items (VAT, duties) from direct costs and overheads via management accounting in accordance with the complex contractual and regulatory provisions.
- Budgets allocated at the award stage are indicative only — amounts paid are always provisional and subject to recovery if not in line with actual costs.
- Given the large number of criteria for compliance, and the relatively limited financial management expertise of the beneficiaries, errors are expected in costs declared.

#### ACCOUNTABILITY STRUCTURES

The Executive Director reports to the Governing Board annually through the Annual Activity Report which includes his declaration of assurance. He is also requested to inform the Governing Board, at any time deemed appropriate, of any potentially significant issues related to internal control, audit and OLAF investigations as well as material budgetary and financial issues which might have an impact on the sound management of appropriations or which could hamper the attainment of the objectives set. Furthermore, he reports annually to the EP, the Council and the Commission on internal audits (Article 73(5) of the FCH JU Financial Rules).

The main bases for assurance are the mid-year reports from the Heads of Unit, which are required to sign a statement of assurance.

The reliability of the information is supported by the monitoring of action plans and supervision of activities.

The ICC prepares the annual assessment of the FCH JU internal control system and issues recommendations to the Executive Director. Furthermore, he or she certifies the accuracy and exhaustiveness of the information on management and internal controls as well as the information contained in the annexes to the Annual Activity Report.

The IAC provides the Executive Director with expert advice on internal control and on risk management. Furthermore the IAC and the IAS of the Commission provide the Executive Director with independent, objective assurance services as to the effectiveness and efficiency of risk management, control and internal governance processes in the FCH JU.

The FCH JU also relies on the certificates issued by independent, professional auditors (i.e. the CFS on the compliance with the contractual and regulatory requirements and on the accuracy of the cost statements submitted in order to detect and correct errors **before** the payments are made. Concerning control measures **after** payment, *ex post* audits are one of the main elements for the provision of assurance (stage 4 below).



## MANAGEMENT AND CONTROL SYSTEMS: STAGES AND MAIN ACTORS

Grants are awarded directly to the beneficiary consortia. The coordinator of each consortium manages the distribution of funds, except in a few projects for which payments are made directly to beneficiaries.

<b>GRANT PERIOD: BETWEEN X AND Y MONTHS (average x months)</b>	<b>12 - 81 (37.3)</b>
<b>Average value (in EUR)</b>	<b>2 907 476</b>
Median value (in EUR)	2 055 747
Range of grants (in thousand EUR)	257 – 25 907
Percentage of grants under EUR 1 million	9.68 %
Number of coordinators/beneficiaries	155/1286

## STAGES AND ACTORS AND MAIN ISSUES ADDRESSED AT EACH STAGE

**HORIZONTAL PROCESS**  
**Planning & Programming** Council regulation 559/2014 setting up FCH 2 JU is the primary element from which the objectives of the JU derive for the preparation of the MAWP and AWP.

The AWP is developed on the basis of an internal dialogue in order to ensure it is understood and owned, and after having taken into consideration stakeholders' feedback to ensure alignment with their priorities.

**PROJECT LIFECYCLE**  
**Stage 01 | Evaluation** Proposals are evaluated and selected according to their research credentials (i.e. best value for public money).

Key controls include the screening of submitted proposals for eligibility; the choice of independent expert evaluators, the evaluation by a minimum of three experts; and a panel review for quality control and ranking of proposals.

**PROJECT LIFECYCLE**  
**Stage 02 | Grant preparation** Based on the ranking list, the JU draws up the final list of proposals selected for adoption by the Governing Board. Thereafter, it proceeds to the preparation of the grant agreements with the successful applicants.

The purpose of the preparation is the following:

- gather legal, administrative and financial information from the prospective beneficiaries (project participants) and any third parties linked to them;
- make sure the Description of the Action (DoA, Annex 1 to the grant agreement) and the Estimated budget for the action (Annex 2) match the proposal, any relevant information in the invitation to prepare the grant agreement, and, if applicable, the ethics review report, and the security scrutiny report;
- establish the key points of the grant agreement (when the project starts, reporting periods, amount of pre-financing, need for consortium agreement, and, if applicable, ethical issues, third parties linked to the beneficiaries, in-kind contributions provided by third parties, subcontracting);
- verify the financial capacity (principally, this concerns certain types of coordinators only, other participants will be checked in exceptional cases)<sup>33</sup>.

Based on the 'no negotiation' approach, the grant agreement must not differ from the proposal, without prejudice to corrections that may be needed: (1) as a result of an ethical review or security scrutiny, (2) to ensure the project conforms to the applicable rules, e.g. legal and financial rules, (3) to remove clerical errors or clear inconsistencies, and (4) when, under exceptional circumstances, a participant is removed from a consortium during grant preparation.

<sup>33</sup> Under the H2020 Programme, FCH is part of the Participant Guarantee Fund, considered a sufficient guarantee in most cases; when the requested FCH funding for the action is equal or superior to EUR 500 000, the non-public project coordinators are subject to financial viability checks.

<p><b>PROJECT LIFECYCLE</b> <b>Stage 03   Project &amp; contract management</b></p>	<p><b>CONTRACTING AND PRE-FINANCING</b></p> <p>The grant preparation ends with the signature of the grant agreements based on the model grant agreement. The process is automated and includes the authorisation of a budgetary commitment before the electronic signature of the grant agreement by the authorising officer. Signature must take place within three months of the start of the preparation.</p> <p>After signature, the pre-financing is paid within 30 days of the entry into force of the grant agreement. Financial circuits are in place, ensuring that all relevant operational and financial aspects are verified by at least two independent members of staff.</p>
	<p><b>INTERIM AND FINAL PAYMENTS</b></p> <p>For beneficiaries' payment requests (i.e. cost claims), the JU relies on two main sources:</p> <ul style="list-style-type: none"> <li>• beneficiaries' technical and financial progress reports (intermediate and final);</li> <li>• audit certificates<sup>34</sup> by a certifying auditor who must be independent from the beneficiary and qualified to carry out statutory audits of accounting documents.</li> </ul> <p>In particular:</p> <ul style="list-style-type: none"> <li>• 'Certificates on the beneficiaries' financial statements' issued by independent, professional auditors on the compliance with the contractual and regulatory requirements and on the accuracy of the cost statements submitted in order to detect and correct errors before the payments are made;</li> <li>• 'Certificate on the methodology': the beneficiary may submit a 'Certificate on the methodology' for the calculation of costs which it uses to prepare its claims for both personnel and indirect costs.</li> </ul> <p>The approval of interim and final payments to beneficiaries is subject to the <i>ex ante</i> financial circuit indicated above. Indeed, before a payment is authorised, all relevant operational and financial aspects are verified by at least two independent members of staff. Project managers verify that the work carried out by the beneficiary complies in all respects with the grant agreement by evaluating the project reports and deliverables. To do so, they may seek the advice of independent experts. Financial assistants carry out financial and arithmetical checks to ensure financial statements and auditor's certificates have been submitted as per the grant agreement. The authorising officer ascertains that these checks on the supporting documents have been carried out and validates the expenditure.</p> <p>When deemed necessary, <i>ex ante</i> 'on-the-spot' control visits and/or <i>ex ante</i> 'in-depth' desk checks may be carried out during project implementation. They include the verification of individual cost items against other sources of information (reconciliations, authorisation) based on third-party invoices or payslips provided by the beneficiary. Basic deficiencies in beneficiaries' understanding of the contract provisions can be detected and improved this way, with a resulting corrective effect on future claims.</p>
<p><b>PROJECT LIFECYCLE</b> <b>Stage 04   Ex post controls: audits and recoveries</b></p>	<p><i>Ex post</i> audits are one of the main elements for the provision of assurance, because many errors can only be detected by <i>ex post</i> audits 'on the spot'. This control is intended to achieve the following: (1) contribute towards ensuring the legality and regularity of the financial transactions, (2) provide an indication of the effectiveness of <i>ex ante</i> controls, and (3) to provide the basis for corrective and recovery mechanisms.</p> <p>The JU has developed an <i>ex post</i> audit strategy which is harmonised with the Commission's strategy, as requested by the General Financing Agreement signed between the Commission and the JU for FP7.</p> <p>Audit results are implemented by the Executive Director as authorising officer by issuing recovery orders or deducing amounts wrongly paid from future payments to the same beneficiary.</p>

34 Under H2020, the requirement for CFS is limited to the final reporting period and a FCH contribution > EUR 325 000.

Under H2020, the Common Audit Service (CAS) is in charge of developing a common *ex post* audit strategy for the Research family and to carry out H2020 audits. Under Article 10 of the DA between the Commission and the FCH 2 JU, 'the FCH 2 JU may ask the CAS to complement, at the expense of the FCH 2 JU, the audit activities of the CAS by performing additional *ex post* audits on its beneficiaries, in compliance with the principles of the Common Audit Strategy and in a cost-effective way'. The JU will participate in the discussions on the design of the strategy as well as in the setting up of the working arrangements to ensure that its needs in terms of assurance are satisfied.

**HORIZONTAL PROCESS**  
**Communication & Information**

Communication and information channels with beneficiaries and auditors provide preventive and directive measures to improve the quality of beneficiaries' financial management and of their data. This aims at ensuring that both beneficiaries and the certifying auditors fully understand the contract requirements and provisions, in order to reduce the number of errors and omissions in the cost claims submitted.

In this respect, the FCH JU has developed some guidance notes which are available through the 'Participant's Portal' and the FCH JU webpage. This includes a guide to financial issues for FCH JU beneficiaries. The FCH JU has also developed a communication campaign to ensure that both beneficiaries and certifying auditors understand the contract requirements.

The FCH JU also participates in meetings with units responsible for *ex post* audits in the Commission, in order to share their best practices across JU's beneficiaries and auditors and ensure a common understanding of similar critical issues and harmonised methodology.

**HORIZONTAL PROCESS**  
**Anti-fraud measures**

Anti-fraud measures and actions are embedded in various *ex ante* and *ex post* controls for prevention and detection purposes.

The FCH JU cooperates with the Commission services, particularly in sharing information in the context of reviews of selected fraud-related risks and risk schemes (such as detection of plagiarism or double funding). Its staff has participated in fraud-related training sessions arranged by the Commission (DG Research and Innovation) aimed at raising fraud risk awareness.

The CAS is in charge of the set-up of a common fraud detection strategy for H2020 and of the management of relations with OLAF on irregularities and fraud cases. The FCH was consulted on the draft strategy and action plan that will be adopted in Q 1 2015. The FCH 2 JU will follow this common fraud detection strategy and action plan.

## SUPERVISION AND MONITORING OF THE INTERNAL CONTROL SYSTEMS AND AUDIT FOLLOW-UP

The FCH JU complies with all ICS, including:

- recording of exceptions;
- recording and correction of internal control weaknesses;
- principles of the 'surveillance' system;
- systematic monitoring of the implementation of audit recommendations;
- structured and documented reviews of the effectiveness of the internal controls;
- structured and documented risk management exercises;
- direct observation and analysis of information.

In addition, the FCH JU is also subject to an independent monitoring and review and receives regular feedback on adequacy of the system in place from:

- the IAC
- the IAS
- the ECA (annual audit with a clean opinion).

There is systematic monitoring of the implementation of audit recommendations. It aims to ensure that the internal control weaknesses

# ANNEX 06

## FCH JU INTERNAL CONTROL STANDARDS<sup>35</sup>

and risks identified by both external (the ECA) and internal auditors (currently mainly the IAC) are reported and adequately addressed; defining appropriate action to remedy systemic weaknesses and monitoring the implementation of action plans.

### MISSION AND VALUES

#### ICS 1 | MISSION

The FCH JU's 'raison d'être' is clearly defined in up-to-date and concise mission statements developed from the perspective of its customers.

#### REQUIREMENTS

The JU have up-to-date mission statements which are linked across all hierarchical levels.

These mission statements have been explained to staff and are readily accessible.

#### ICS 2 | ETHICAL AND ORGANISATIONAL VALUES

Management and staff are aware of and share appropriate ethical and organisational values, and uphold these through their own behaviour and decision-making.

#### REQUIREMENTS

The JU has procedures in place to ensure that all staff is aware of relevant ethical and organisational values, in particular ethical conduct, avoidance of conflicts of interest, fraud prevention and reporting of irregularities.

### HUMAN RESOURCES

#### ICS 3 | STAFF ALLOCATION AND FLEXIBILITY

The allocation and recruitment of staff is based on the FCH JU's objectives and priorities. Flexibility is promoted to strike the right balance between ownership and continuity.

#### REQUIREMENTS

Whenever necessary - at least once a year - management aligns the organisational structures and staff allocations with priorities and workload.

Staff job descriptions are consistent with relevant mission statements

According to its scope and size, the JU has a policy to promote flexibility in order to ensure that the right person is in the right job at the right time and, where feasible, can provide multilevel support.

Necessary support is defined and delivered to new staff to facilitate their integration in the team.

<sup>35</sup> The Internal Control Standards (ICS) were adopted by the Governing Board on 15.06.2010 under the previous Council Regulation 521/2008 and Financial Rules and consequently with the former terminology. Therefore AIP, MAIP, references to articles should be read as AWP, MAWP and updated references. A review of the ICS will be carried out in 2015 to update as necessary.

## ICS 4 | STAFF EVALUATION AND DEVELOPMENT

Staff performance is evaluated against individual annual objectives, which fit with the FCH JU's overall objectives. Adequate measures are taken to develop the skills necessary to achieve the objectives.

### REQUIREMENTS

In the context of the evaluation process, discussions are held individually with all staff to establish their annual objectives, which fit with the JU's objectives.

Staff performance is evaluated according to standards set by the JU.

Appropriate measures to develop the necessary skills (e.g. training, coaching...) are defined and management ensure their implementation.

## PLANNING AND RISK MANAGEMENT PROCESSES

### ICS 5 | OBJECTIVES AND PERFORMANCE INDICATORS

The FCH JU's objectives are clearly defined and updated when necessary. These are formulated in a way that makes it possible to monitor their achievement. Key performance indicators are established to help management evaluate and report on progress made in relation to their objectives.

### REQUIREMENTS

The JU's AIP is developed in accordance with applicable guidance and on the basis of (1) an internal dialogue in order to ensure it is understood and owned and (2) stakeholders' feedback to ensure alignment with their priorities.

The AIP clearly sets out how the planned activities will contribute to the achievement of objectives set, taking into account the allocated resources and the risk identified.

To the extent possible, the AIP objectives are established in line with the SMART criteria, i.e. they are Specific, Measurable or verifiable, discussed and Accepted, realistic and Timed.

Whenever necessary, the objectives are updated to take account of significant changes in activities and priorities.

Where appropriate, the JU establishes road-maps of on-going multi-annual activities (i.e. MAWP), setting out critical milestones for the actions that need to be taken before the budget appropriations can be implemented for the whole period of the activity.

In the AIP, there is at least one performance indicator per objective to monitor and report on achievements. To the extent possible, the performance indicators are established according to the RACER criteria, i.e. they are Relevant, discussed and Accepted, Credible, Easy and Robust.

Measures are defined to alert management when indicators show that the achievement of the objectives is at risk.

### ICS 6 | RISK MANAGEMENT PROCESS

A risk management process that is in line with applicable provisions and guidelines is integrated into the AIP.

### REQUIREMENTS

A risk management exercise (i.e. risk identification, risk assessment and action plan) at JU level is conducted at least once a year as part of the AIP process and whenever management considers it necessary (typically in the event of major modifications to the JU's activities occurring during the year). Risk management is performed in line with applicable provisions and guidelines.

Risks considered 'critical' from an overall JU perspective are indicated in the JU's AIP and followed up in the Annual Activity Report.

## OPERATIONS AND CONTROL ACTIVITIES

### ICS 7 | OPERATIONAL STRUCTURE

The FCH JU's operational structure supports effective decision-making by suitable delegation of powers. Risks associated with the FCH JU's sensitive functions are managed through mitigating controls. Adequate IT governance structures are in place.

#### REQUIREMENTS

Delegation of authority is clearly defined, assigned and communicated in writing, conforms to legislative requirements and is appropriate to the importance of decisions to be taken and risks involved.

All delegated and sub-delegated authorising officers have received and acknowledged the Charters and specific delegation instruments.

As regards financial transactions, delegation of powers (including both 'passed for payment' and 'certified correct') is defined, assigned and communicated in writing.

The JU's sensitive functions are identified and relevant mitigating controls are established e.g. robust financial circuits, management of exceptions, use of independent experts when necessary and other control procedures (ref. ICS 8).

Governance of the IT structure is established to enable the efficient and secure functioning of the IT services.

### ICS 8 | PROCESSES AND PROCEDURES

The FCH JU's processes and procedures used for the implementation and control of its activities are effective and efficient, adequately documented and compliant with applicable provisions. They include arrangements to ensure segregation of duties, and to track and give prior approval to control overrides or deviations from policies and procedures.

#### REQUIREMENTS

The JU's main operational and financial processes and procedures and IT systems are adequately documented.

The JU's processes and procedures ensure appropriate segregation of duties (including for non-financial activities).

The JU's processes and procedures comply with applicable provisions, in particular the Financial Rules (e.g. *ex ante* and *ex post* verifications).

A method is in place to ensure that all instances of overriding of controls or deviations from established processes and procedures are documented in exception reports, justified, duly approved before action is taken and logged centrally in the JU.

### ICS 9 | MANAGEMENT SUPERVISION

Management supervision is performed to ensure that the implementation of activities is running efficiently and effectively while complying with applicable provisions.

#### REQUIREMENTS

Management supervises the activities they are responsible for and keep track of main issues identified. Management supervision covers both legality and regularity aspects and operational performance (i.e. achievement of AIP objectives).

The supervision of activities involving potentially critical risks is adequately documented<sup>36</sup>.

Management monitors the implementation of accepted audit recommendations and related action plans.

<sup>36</sup> Depending on the nature of the work performed, the documentation of supervision can, for example, be constituted of minutes of meetings, notes explaining key decisions, signature of authorising officer in IT systems, or documents explaining the scope, methods, results and conclusions of the supervisory activities.

At least annually in the Annual Activity Report as stipulated in Article 6 of the JU's Statutes and Article 10 of the General Financing agreement, and at any time deemed appropriate, the Executive Director informs the Governing Board of any potentially significant issues related to internal control, audit and OLAF investigations as well as material budgetary and financial issues which might have an impact on the sound management of appropriations or which could hamper the attainment of the objectives set.

## **ICS 10 | BUSINESS CONTINUITY**

Adequate measures are in place to ensure the continuity of service in case of 'business-as-usual' interruption. Business continuity plans are in place to ensure that the FCH JU is able to continue operating to the extent possible, whatever the nature of a major disruption.

### **REQUIREMENTS**

Adequate measures - including handover files and deputising arrangements for relevant operational activities and financial transactions - are in place to ensure the continuity of all service during 'business-as-usual' interruptions (such as sick leave, staff mobility, migration to new IT systems, incidents, etc.).

Business continuity plans cover the crisis response and recovery arrangements with respect to major disruptions (such as pandemic diseases, terrorist attacks, natural disasters, etc.). They identify the functions, services and infrastructure which need to be restored within certain time-limits and the resources necessary for this purpose (key staff, buildings, IT, documents and other).

## **ICS 11 | DOCUMENT MANAGEMENT**

Appropriate processes and procedures are in place to ensure that the FCH JU's document management is secure, efficient (in particular as regards retrieving appropriate information) and complies with applicable legislation.

### **REQUIREMENTS**

Document management systems comply with relevant security measures, provisions on document management and rules on protection of personal data.

A document management system is established for registration, filing, classification and archiving of documents.

# **INFORMATION AND FINANCIAL REPORTING**

## **ICS 12 | INFORMATION AND COMMUNICATION**

Internal communication enables management and staff to fulfil their responsibilities effectively and efficiently, including in the domain of internal control. The FCH JU has an external communication strategy to ensure that its external communication is effective, coherent and in line with the JU's key political messages. IT systems used and/or managed by the JU (where the JU is the system owner) are adequately protected against threats to their confidentiality and integrity.

### **REQUIREMENTS**

Internal and external communications comply with relevant copyright provisions.

Appropriate Internal Communication is in place to ensure that management and staff are appropriately informed of decisions, projects or initiatives that concern their work assignments and environment.

All personnel are encouraged to communicate potential internal control weaknesses, if judged significant or systemic, to the appropriate management level.

A documented general strategy for external communication, including clearly defined target audiences, messages and action plans is in place. The communication strategy is devised from the beginning of policy formulation and is discussed with the relevant stakeholders.

The IT systems support adequate data management, including database administration and data quality assurance. Data management systems and related procedures comply with relevant information systems policy, compulsory security measures and rules on protection of personal data.

### ICS 13 | ACCOUNTING AND FINANCIAL REPORTING

Adequate procedures and controls are in place to ensure that accounting data and related information used for preparing the organisation's annual accounts and financial reports are accurate, complete and timely.

#### REQUIREMENTS

The Authorising Officer (i.e. Executive Director) has responsibility for ensuring the reliability and completeness of the accounting information under his/her control necessary to the Accounting Officer for the production of accounts which give a true image of the JU' assets and of budgetary implementation.

The JU's accounting procedures and controls are adequately documented.

Financial and management information produced by the FCH JU, including financial information provided in the Annual Activity Report, is in conformity with applicable accounting rules and instructions.

## EVALUATION AND AUDIT

### ICS 14 | EVALUATION OF ACTIVITIES

Evaluations of expenditure programs and other non-spending activities are performed to assess the results, impacts and needs that these activities aim to achieve and satisfy.

#### REQUIREMENTS

N/A: The evaluation of the program is up to the Commission.

### ICS 15 | ASSESSMENT OF INTERNAL CONTROL SYSTEMS

Management assess the effectiveness of the FCH JU's key internal control systems, including the processes carried out with external assistance and/or outsourced, at least once a year.

#### REQUIREMENTS

Management assess the effectiveness of the FCH JU's key internal control systems, including the processes carried out with external assistance and/or outsourced at least annually. Such self-assessments can, for example, be based on staff surveys or interviews combined with management reviews of supervisory reports, results of evaluation and *ex ante/ex post* verifications, audit recommendations and other sources that provide relevant information about the JU's internal control effectiveness.

On an annual basis – as part of the Annual Activity Report – the Internal Control Coordinator signs a statement, to the best of his/her knowledge, on the accuracy and exhaustiveness of the information on management and internal control systems provided in the Annual Activity Report.

### ICS 16 | INTERNAL AUDIT CAPABILITY:

The FCH JU has an Internal Audit Capability (IAC), which provides independent, objective assurance and consulting services designed to add value and improve the operations of the JU.

#### REQUIREMENTS

The role and responsibilities of the FCH JU's Internal Audit Capability (IAC) are formally defined in an audit charter.

The annual audit work plan is risk based, and is approved by the Executive Director and the Governing Board.

The Executive Director ensures that the IAC is independent of the activities they audit.

The Executive Director ensures that the IAC has sufficient and adequate resources to perform the audit work plan.





# ANNEX A

## PUBLICATIONS RESULTING FROM FCH JU-FUNDED PROJECTS

PROJECT ACRONYM	NO	PUBLICATION TITLE	MAIN AUTHOR
ADEL	1	Model-based behaviour of a high temperature electrolyser system operated at various loads	Floriane Petipas, Annabelle Brisse, Chakib Bouallou
ADEL	2	Transient operation of a solid oxide electrolysis cell	Floriane Petipas, Qingxi Fu, Annabelle Brisse, Chakib Bouallou
ADEL	3	Coupling Heat and Electricity Sources to Intermediate Temperature Steam Electrolysis	Martin Roeb, Nathalie Monnerie, Anis Houajjia, Christian Sattler, Javier Sanz-Bermejo, Manuel Romero, Ignacio Canadas, Anabella Drisaldi Castro
ADEL	4	Development and Manufacturing of SOFC-Based Products at SOFCpower SpA	O. Bucheli, M. Bertoldi, S. Modena, A. Ravagni
ADEL	5	High Temperature Steam Electrolysis Stack with Enhanced Performance and Durability	Julie Mougín, A. Chatroux, K. Couturier, M. Petitjean, M. Reytier, G. Gousseau, F. Lefebvre-Joud
ADEL	6	Electrolysis and Co-Electrolysis Performance of SOE Short Stacks	S. Diethelm, J. Van herle, D. Montinaro, O. Bucheli
ADEL	7	Comparative System Performance Analysis of Direct Steam Generation Central Receiver Solar Thermal Power Plants in Megawatt Range	Javier Sanz-Bermejo, Victor Gallardo-Natividad, José Gonzalez-Aguilar, Manuel Romero
ASSENT	1	Effect of anode off-gas recycling on reforming of natural gas for solid oxide fuel cell systems	Halinen, Matias
ASSENT	2	Analysis of solid oxide fuel cell system concepts with anode recycling	Roland Peters, F. Z. J.
CATION	1	LCA-LCC analysis of a 230 kW SOFC system for distributed generation applications	C. Strazza
D-CODE	1	A review on non-model based diagnosis methodologies for PEM fuel cell stacks and systems	Z. Zheng, R. Petrone, M.C. Péra, D. Hissel, M. Becherif, C. Pianese, N. Yousfi Steiner, M. Sorrentino
D-CODE	2	A review on model-based diagnosis methodologies for PEMFCs	R. Petrone, Z. Zheng, D. Hissel, M.C. Péra, C. Pianese, M. Sorrentino, M. Becherif, N. Yousfi-Steiner
D-CODE	3	A double-fuzzy diagnostic methodology dedicated to on-line fault diagnosis of PEMFC stack	Zhixue Zheng, Marie-Cécile Péra, Daniel Hissel, Mohamed Becherif, Kréhi-Serge Agbli, Yongdong Li
DELIVERHY	1	Safety approach for composite pressure vessels for road transport of hydrogen. Part 1: Acceptable probability of failure and hydrogen mass	Kaspar Lasn, Andreas Echtermeyer
DELIVERHY	2	Safety approach for composite pressure vessels for road transport of hydrogen. Part 2: Safety factors and Test Requirements	Kaspar Lasn, Andreas Echtermeyer
DEMMEA	1	Covalent cross linking in phosphoric acid of pyridine based aromatic polyethers bearing side double bonds for use in high temperature polymer electrolyte membrane fuel cells	Konstantinia D. Papadimitriou, Maria Geormezi, Stylianos G. Neophytides, Joannis K. Kallitsis
DEMMEA	2	Cross linked high temperature polymer electrolytes through oxadiazole bond formation and their applications in HT PEM fuel cells	Christina I. Morfopoulou, Aikaterini K. Andreopoulou, Maria K. Daletou, Stylianos G. Neophytides and Joannis K. Kallitsis
DEMMEA	3	Design of a reference electrode for high temperature PEM fuel cells	Sebastian Kaserer, Christoph Rakousky, Julia Melke, Christina Roth
DEMMEA	4	Cooperative behaviour of Pt microelectrodes during CO bulk electrooxidation	Alfonso Crespo-Yapur, Antoine Bonnefont, Rolf Schuster, Katharina Krischer, Elena R. Savinova
DEMMEA	5	Thermal crosslinking of aromatic polyethers bearing pyridine groups for use as high temperature polymer electrolytes	Ioannis Kalamaras, Maria K. Daletou, Stylianos G. Neophytides, Joannis K. Kallitsis
DEMMEA	6	Polymer blends based on copolymers bearing both side and main chain pyridine units as proton exchange membranes for high temperature fuel cells	M. Geormezi, V. Deimede, J.K. Kallitsisa, S. Neophytides
DEMMEA	7	Analyzing the Influence of H <sub>2</sub> PO <sub>4</sub> as Catalyst Poison in High Temperature PEM Fuel Cells Using in-operando X-ray Absorption Spectroscopy	Sebastian Kaserer, Keegan M. Caldwell, David E. Ramaker and Christina Roth
DEMMEA	8	3D ordered layers of vertically aligned carbon nanofilaments as a model approach to study electrocatalysis on nanomaterials	P. S. Ruvinskiy, A. Bonnefont, E. R. Savinova
DEMMEA	9	Using Ordered Carbon Nanomaterials for Shedding Light on the Mechanism of the Cathodic Oxygen Reduction Reaction	Pavel S. Ruvinskiy, Antoine Bonnefont, Cuong Pham-Huu, Elena R. Savinova

PERIODICAL TITLE	PUBLICATION FREQUENCY	PUBLISHER	PUBLICATION PLACE	PUBLICATION DATE	RELEVANT PAGES	PERMANENT IDENTIFIERS	OPEN ACCESS
Journal of Power Sources	Vol. 239	Elsevier	Netherlands	01-Oct-2013	584–595		Yes
International Journal of Hydrogen Energy	Vol. 38/Issue 7	Elsevier Limited	United Kingdom	01-Mar-2013	2957–2964		Yes
Journal of Energy and Power Engineering	Vol. 7	David Publishing Company		30-Nov-2013	2068–2077		No
ECS Transactions	Vol. 57/Issue 1	The Electrochemical Society	United States	06-Oct-2013	81–88		Yes
Energy Procedia	Vol. 29	Elsevier BV	Netherlands	01-Jan-2012	445–454		Yes
Fuel Cells	Vol. 13/Issue 4	John Wiley and Sons Ltd	United Kingdom	01-Aug-2013	631–637		Yes
Journal of Solar Energy Engineering, Transactions of the ASME	Vol. 136/Issue 1	American Society of Mechanical Engineers (ASME)	United States	01-Feb-2014	011028		No
Fuel Cells	Vol. 12 (2012) No. 5	John Wiley and Sons Ltd		08-Aug-2012	754–760		No
International Journal of Hydrogen Energy	in press	Elsevier Limited		19-Apr-2013	in press		No
Applied Energy	N/A	Elsevier BV		31-Dec-2014	n/a		Yes
International Journal of Hydrogen Energy	Vol. 38/Issue 21	Elsevier Limited	United Kingdom	01-Jul-2013	8914–8926		
International Journal of Hydrogen Energy	Vol. 38/Issue 17	Elsevier Limited	United Kingdom	01-Jun-2013	7077–7091		
Journal of Power Sources	in press	Elsevier		31-Dec-2014	1–10		No
International Journal of Hydrogen Energy		Elsevier Limited		01-Sep-2014			
International Journal of Hydrogen Energy		Elsevier Limited		01-Sep-2014			
Journal of Membranes Science	433	Elsevier		25-Jan-2013	1–9		No
Journal of Materials Chemistry	1	Royal Society of Chemistry		07-Dec-2012	1613–1622		No
Journal of Applied Electrochemistry	-	Springer Netherlands		28-Apr-2013			No
ChemPhysChem	14	Wiley-VCH Verlag		01-Mar-2013	1117–1121		No
Journal of Membranes Science	415–416	Elsevier		22-May-2012	42–50		No
Journal of Membranes Science	396	Elsevier		02-Jan-2012	57–66		No
Journal of Physical Chemistry C	117	American Chemical Society		01-Mar-2013	6210–6217		No
Electrochimica Acta	84	Elsevier Limited		03-Apr-2012	174–186		No
Langmuir	27	American Chemical Society		14-Jun-2011	9018–9027		No

PROJECT ACRONYM	NO	PUBLICATION TITLE	MAIN AUTHOR
DEMMEA	10	Sulfonated aromatic polyethers containing pyridine units as electrolytes for high temperature fuel cells	I. Kalamaras, M. K. Daletou, V. G. Gregoriou, J. K. Kallitsis
DEMMEA	11	Preparation and characterization of Pt on modified multi-wall carbon nanotubes to be used as electrocatalysts for high temperature fuel cell applications	A. Orfanidi, M.K. Daletou, S. G. Neophytides
DEMMEA	12	The Effect of Structural Variations on Aromatic Polyethers for High-Temperature PEM Fuel Cells	Christina Morfopoulou, Aikaterini K. Andreopoulou, Joannis K. Kallitsis
DEMMEA	13	Mass transport effects in CO bulk electrooxidation on Pt nanoparticles supported on vertically aligned carbon nanofilaments	Pavel S. Ruvinskiy, Antoine Bonnefont, Maryam Bayati, Elena R. Savinova
DEMMEA	14	Preparation, testing and modeling of three-dimensionally ordered catalytic layers for electrocatalysis of fuel cell reactions	P. S. Ruvinskiy, A. Bonnefont, M. Houllé, C. Pham-Huu, E. R. Savinova
DEMMEA	15	Further insight into the oxygen reduction reaction on Pt nanoparticles supported on spatially structured catalytic layers	Pavel S. Ruvinskiy, Antoine Bonnefont, Elena R. Savinova
DEMMEA	16	Cross linking of side chain unsaturated aromatic polyethers for high temperature polymer electrolyte membrane fuel cell applications	Konstantinia D. Papadimitriou, Fotis Paloukis, Stylianos G. Neophytides, Joannis K. Kallitsis
GENIUS	1	'Implementation of a model-based methodology aimed at detecting degradation and faulty operation in SOFC systems'	Marra, D.
GENIUS	2	Application of Fault Tree Analysis to Fuel cell diagnosis	Yousfi Steiner, N.
GENIUS	3	A Neural Network Estimator Of SOFC Performance For On-Field Diagnostics And Prognostics Applications	Marra, D.
GENIUS	4	A Review on Solid Oxide Fuel Cell Models	Wang, K.
H2FC-LCA	1	HOW CAN LIFE CYCLE ASSESSMENT FOSTER ENVIRONMENTALLY SOUND FUEL CELL PRODUCTION AND USE?	Amalia Zucaro
H2SENSE	1	Developments in gas sensor technology for hydrogen safety	Hübert, T., Boon-Brett, L. Palmisano, V., Bader, M. A.
H2SENSE	2	Assessment of commercial micro-machined hydrogen sensors performance metrics for safety sensing applications	H. El Matbouly, F. Domingue, V. Palmisano, L. Boon-Brett, M. B. Post, C. Rivkin, R. Burgess, W. J. Buttner
H2SENSE	3	Evaluation of selectivity of commercial hydrogen sensors	V. Palmisano, L. Boon-Brett, C. Bonato, F. Harkamp, W. J. Buttner, M. B. Post, R. Burgess, C. Rivkin
H2SENSE	4	An assessment on the quantification of hydrogen releases through oxygen displacement using oxygen sensors	W. J. Buttner, R. Burgess, C. Rivkin, M. B. Post, L. Boon-Brett, V. Palmisano, P. Moretto
HY2SEPS-2	1	H <sub>2</sub> purification by pressure swing adsorption using CuBTC	Bruna Silva, Ioan Solomon, Ana M. Ribeiro, U-Hwang Lee, Young Kyu Hwang, Jong-San Chang, José M. Loureiro, Alirio E. Rodrigues
HYDROSOL-3D	1	Hydrogen production via solar-aided water splitting thermochemical cycles with nickel ferrite: Experiments and modeling	Agrafiotis, C., Zygogianni, A., Pagkoura, C., Kostoglou, M., Konstandopoulos, A. G.
HYDROSOL-3D	2	Hydrogen production via solar-aided water splitting thermochemical cycles: Combustion synthesis and preliminary evaluation of spinel redox-pair materials	Christos C. Agrafiotis, Chrysoula Pagkoura, Alexandra Zygogianni, George Karagiannakis, Margaritis Kostoglou, Athanasios G. Konstandopoulos
HYDROSOL-3D	3	Development of a system model for a hydrogen production process on a solar tower	J.-P. Säck, M. Roeb, Sattler, R. Pitz-Paal, A. Heinzl
HYUNDER	1	Hydrogen underground storage in Romania, potential directions of development, stakeholders and general aspects	Ioan Iordache, Dorin Schitea, Adrian V. Gheorghe, Mihaela Iordache
IRAFC	1	Cross-Linking of Side Chain Unsaturated Aromatic Polyethers for High Temperature Polymer Electrolyte Membrane Fuel Cell Applications	Konstantinia D. Papadimitriou, Fotis Paloukis, Stylianos G. Neophytides, Joannis K. Kallitsis
IRAFC	2	Nontrivial Redox Behavior of Nanosized Cobalt: New Insights from Ambient Pressure X-ray Photoelectron and Absorption Spectroscopies	Vasiliki Papaefthimiou, Thierry Dintzer, Véronique Dupuis, Alexandre Tamion, Florent Tournus, Arnaud Hillion, Detre Teschner, Michael Hävecker, Axel Knop-Gericke, Robert Schlögl, Spyridon Zafeiratos
IRAFC	3	When a Metastable Oxide Stabilizes at the Nanoscale: Wurtzite CoO Formation upon Dealloying of PtCo Nanoparticles	Vasiliki Papaefthimiou, Thierry Dintzer, Véronique Dupuis, Alexandre Tamion, Florent Tournus, Detre Teschner, Michael Hävecker, Axel Knop-Gericke, Robert Schlögl, Spiros Zafeiratos
IRAFC	4	Development of an Internal Reforming Methanol Fuel Cell: Concept, Challenges and Opportunities	G. Avgouropoulos, T. Ioannides, J. K. kallitsis, S. Neophytides
IRAFC	5	The effect of structural variations on aromatic polyethers for high temperature PEM fuel cells	Christina Morfopoulou, Aikaterini K. Andreopoulou, Joannis K. Kallitsis
IRAFC	6	CuMnOx catalysts for internal reforming methanol fuel cells: Application aspects	Joan Papavasiliou, George Avgouropoulos, Theophilos Ioannides
IRAFC	7	Performance of internal reforming methanol fuel cell under various methanol/water concentrations	G. Avgouropoulos, S. G. Neophytides
IRAFC	8	Thermal crosslinking of aromatic polyethers bearing pyridine groups for use as high temperature polymer electrolytes	Ioannis Kalamaras, Maria K. Daletou, Stylianos G. Neophytides, Joannis K. Kallitsis

PERIODICAL TITLE	PUBLICATION FREQUENCY	PUBLISHER	PUBLICATION PLACE	PUBLICATION DATE	RELEVANT PAGES	PERMANENT IDENTIFIERS	OPEN ACCESS
Fuel Cells	11	John Wiley and Sons Ltd		17-Nov-2011	921931		No
Applied Catalysis B: Environmental	106	Elsevier		22-Jun-2011	379–389		No
Polymer Chemistry	49	Royal Society of Chemistry		09-Aug-2011	4325–4334		No
Physical Chemistry Chemical Physics	12	Royal Society of Chemistry		08-Sep-2010	15207–15216		No
Electrochimica Acta	55	Elsevier Limited		18-Jan-2010	3245–3256		No
Electrocatalysis	2	Springer Publishing Company		13-Apr-2011	123–133		No
Macromolecules	44	American Chemical Society		18-May-2011	4942–4951		No
Proceedings of the ASME Design Engineering Technical Conference	2011-54686			07-Aug-2011	449–455		Yes
Fuel Cells	2	John Wiley and Sons Ltd		27-Mar-2012	302–309		Yes
Journal of Power Sources	30/04/2013	Elsevier		30-Apr-2013	in press		Yes
International Journal of Hydrogen Energy	12	Elsevier Limited		01-Jun-2011	7212–7228		Yes
International Journal of Hydrogen Energy	accepted	Elsevier		19-Oct-2012	58–69	HE-D-12-00885R1	Yes
International Journal of Hydrogen Energy	2014	Elsevier Limited		14-Jun-2014	online		No
International Journal of Hydrogen Energy	39/9	Elsevier Limited		18-Mar-2014	4664–4673		No
International Journal of Hydrogen Energy	2014	Elsevier Limited		05-Jul-2014	online		
International Journal of Hydrogen Energy	2014	Elsevier Limited		03-May-2014	online		
Separation and Purification Technology	118	Elsevier		24-Aug-2013	744–756		
AIChE Journal	Volume 59, Issue 4	American Institute of Chemical Engineers		28-Aug-2012	1213–1225		No
International Journal of Hydrogen Energy	Volume 37, Issue 11	Elsevier Limited		06-Apr-2012	8964–8980		No
Solar Energy	86	Elsevier Limited		12-Oct-2011	99–111		No
International Journal of Hydrogen Energy	Vol. 39/Issue 21	Elsevier Limited	United Kingdom	01-Jul-2014	11071–11081		
Macromolecules	41	American Chemical Society		18-May-2011	4942–4951		No
ACS Nano	5	American Chemical Society		10-Feb-2011	2182–2190		No
Journal of Physical Chemistry Letters	2	American Chemical Society		04-Apr-2011	900–904		No
Chemical Engineering Journal	177	Elsevier		23-May-2011	95–101		No
Journal of Polymer Science, Part A: Polymer Chemistry	49	John Wiley and Sons Inc.		15-Oct-2011	4325–4334		No
International Journal of Hydrogen Energy	37	Elsevier Limited		01-Nov-2012	16739–16747		No
Journal of Applied Electrochemistry	42	Springer Netherlands		01-Sep-2012	719–726		No
Journal of Membranes Science	415–416	Elsevier		01-Oct-2012	42–50		No

PROJECT ACRONYM	NO	PUBLICATION TITLE	MAIN AUTHOR
IRAFC	9	Alloys in catalysis: phase separation and surface segregation phenomena in response to the reactive environment	Spiros Zafeiratos, Simone Piccinin, Detre Teschner
IRAFC	10	Bimetallic Nickel-Cobalt Nanosized Layers Supported on Polar ZnO Surfaces: Metal-Support Interaction and Alloy Effects Studied by Synchrotron Radiation X-ray Photoelectron Spectroscopy	Y. T. Law, T. Skála, I. Piš, V. Nehasil, M. Vondráček, S. Zafeiratos
IRAFC	11	Probing Metal-Support Interaction in Reactive Environments: An in Situ Study of PtCo Bimetallic Nanoparticles Supported on TiO <sub>2</sub>	V. Papaefthimiou, T. Dintzer, M. Lebedeva, D. Teschner, M. Hävecker, A. Knop-Gericke, R. Schlögl, V. Pierron-Bohnes, E. Savinova, S. Zafeiratos
IRAFC	12	Side chain crosslinking of aromatic polyethers for high temperature polymer electrolyte membrane fuel cell applications	Andrea Vöge, Valadoula A. Deimede, Joannis K. Kallitsis
IRAFC	13	Methanol Steam Reforming over Indium-Promoted Pt/Al <sub>2</sub> O <sub>3</sub> Catalyst: Nature of the Active Surface	Roland L. Barbosa, Vasiliki Papaefthimiou, Yeuk T. Law, Detre Teschner, Michael Hävecker, Axel Knop-Gericke, Ralf Zapf, Gunther Kolb, Robert Schlögl
IRAFC	14	Cross linked high temperature polymer electrolytes through oxadiazole bond formation and their applications in HT PEM fuel cells	Christina I. Morfopoulou, Aikaterini K. Andreopoulou, Maria K. Daletou, Stylianos G. Neophytides, Joannis K. Kallitsis
IRAFC	15	Covalent crosslinking in phosphoric acid of pyridine based aromatic polyethers bearing side double bonds for use in high temperature polymer electrolyte membrane fuel cells	Konstantinia D. Papadimitriou, Maria Geormezi, Stylianos G. Neophytides, Joannis K. Kallitsis
IRAFC	16	Microchannel Fuel Processors as Hydrogen Source for Fuel Cells in Distributed Energy Supply Systems	G. Kolb, S. Keller, M. O'Connell, S. Pecov, J. Schuerer, B. Spasova, D. Tiemann, A. Ziogas
LOLIPEM	1	Durability of Sulfonated Aromatic Polymers for Proton-Exchange-Membrane Fuel Cells	H. Hou, M. L. Di Vona, P. Knauth
LOLIPEM	2	Thermogravimetric analysis of SPEEK membranes: Thermal stability, degree of sulfonation and cross-linking reaction	P. Knauth, H. Hou, E. Bloch, E. Sgreccia, M. L. Di Vona
LOLIPEM	3	Water activity coefficient and proton mobility in hydrate acidic polymers	P. Knauth, E. Sgreccia, A. Donnadio, M. Casciola, M. L. Di Vona
LOLIPEM	4	Building Bridges: Crosslinking of Sulfonated Aromatic Polymers – a Review	H. Hou, M. L. Di Vona, P. Knauth
LOLIPEM	5	Sulfonated aromatic ionomers: Analysis of proton conductivity and proton mobility	P. Knauth; M. L. Di Vona
LOLIPEM	6	High Performance Sulfonated Aromatic Ionomers by Solvothermal Macromolecular Synthesis	M. L. Di Vona, G. Alberti, E. Sgreccia, M. Casciola, P. Knauth
LOLIPEM	7	New Results on the Visco-Elastic Behaviour of Ionomer Membranes and Relations Between T-RH Plots and Proton Conductivity Decay of Nafion 117 in the Range 50-140°C	G. Alberti, M. L. Di Vona, R. Narducci
LOLIPEM	8	Influence of the preparation conditions on the properties of polymeric and hybrid cation exchange membranes	Fontananova, E., Cucunato, V., Curcio, E., Trotta, F., Biasizzo, M., Drioli, E., Barbieri, G.
LOLIPEM	9	New approach for the evaluation of membranes transport properties for polymer electrolyte membrane fuel cells	Brunetti A., Fontananova E., Donnadio A., Casciola M., Di Vona M.L., Sgreccia E., Drioli E., Barbieri G.
LOLIPEM	10	Conductivity and hydration of sulfonated polyethersulfone in the range 70-120°C: effect of temperature and relative humidity cycling	A. Donnadio, M. Casciola, M.L. Di Vona, M. Tamilvanan
LOLIPEM	11	Permeability and Diffusivity Measurements on Polymer Electrolyte Membranes	F. Arena, J. Mitzel, R. Hempelmann
LOLIPEM	12	Electrodeposition Of PEM Fuel Cell Catalysts By The Use Of A Hydrogen Depolarized Anode	J. Mitzel, F. Arena, H. Natter, T. Walter, M. Batzer, M. Stefener, R. Hempelmann
LOLIPEM	13	Stabilization of Sulfonated Aromatic Polymer (SAP) Membranes Based on SPEEK-WC for PEMFCs	E. Fontananova, A. Brunetti, F. Trotta, M. Biasizzo, E. Drioli, G. Barbieri
LOLIPEM	14	Annealing of Nafion 1100 in the Presence of an Annealing Agent: A Powerful Method for Increasing Ionomer Working Temperature in PEMFCs	Alberti, G.; Narducci, R.; Di Vona, M. L.; Giancola, S.
LOLIPEM	15	Proton Mobility in Sulfonated PolyEtherEtherKetone (SPEEK): Influence of Thermal Crosslinking and Annealing	Knauth, P.; Pasquini, L.; Maranesi, B.; Pelzer, K.; Polini, R.; Di Vona, M. L.
LOLIPEM	16	Crosslinked SPEEK membranes: Mechanical, thermal and hydrothermal properties	H. Hou, B. Maranesi, J. F. Chaitan, M. Khadhraoui, R. Polini, M. L. Di Vona, P. Knauth
LOLIPEM	17	Proton-Conducting Cross-Linked Sulfonated Aromatic Polymers for Fuel Cells Application	B. Maranesi, L. Pasquini, M. Khadhraoui, P. Knauth, M. L. Di Vona
LOLIPEM	18	Cross-linking of sulfonated poly ether ketone by thermal treatment: how does the reaction occur?	B. Maranesi, H. Hou, R. Polini, E. Sgreccia, G. Alberti, R. Narducci, P. Knauth, L. Di Vona
LOLIPEM	19	More on NAFION conductivity decay at temperatures higher than 80°C: preparation and first characterization of in-plane oriented layered morphologies	Alberti, G.; Narducci, R.; Di Vona, M. L.; Giancola, S.
LOLIPEM	20	Electrocatalyst-Membrane Interface and Fuel Cell Performance with Sulfonated PolyEtherEtherKetone as Ionomer	F. Arena, J. Mitzel, R. Hempelmann
LOTUS	1	System design and process layout for a SOFC micro-CHP unit with reduced operating temperatures	T. Pfeifer

PERIODICAL TITLE	PUBLICATION FREQUENCY	PUBLISHER	PUBLICATION PLACE	PUBLICATION DATE	RELEVANT PAGES	PERMANENT IDENTIFIERS	OPEN ACCESS
Catalysis Science and Technology	2	Royal Society of Chemistry		26-Jan-2012	1787-1801		No
Journal of Physical Chemistry C	116	American Chemical Society		12-Apr-2012	10048-10056		No
Journal of Physical Chemistry C	116	American Chemical Society		11-Jun-2012	14342-14349		No
Journal of Polymer Science, Part A: Polymer Chemistry	50	John Wiley and Sons Inc.		04-Oct-2011	207-216		No
Journal of Physical Chemistry C	113	American Chemical Society		07-Mar-2013	6143-6150		No
Journal of Materials Chemistry	1	Royal Society of Chemistry		07-Dec-2012	1613-1622		No
Journal of Membranes Science	433	Elsevier		15-Apr-2013	1-9		No
Energy and Fuels	27	American Chemical Society		13-Feb-2013	4395-4402		No
ChemSusChem	4	Wiley-VCH Verlag		18-Nov-2011	1-12		No
Journal of Analytical and Applied Pyrolysis	92	Elsevier		29-Jul-2011	361-365		No
Journal of the Electrochemical Society	158 (2)	Electrochemical Society, Inc.		07-Dec-2010	159-165		No
Journal of Membranes Science	423-424	Elsevier		17-Aug-2012	113-127		No
Solid State Ionics	225	Elsevier		25-Feb-2012	255-259		No
International Journal of Hydrogen Energy	37	Elsevier Limited		24-Mar-2012	8672-8680		No
International Journal of Hydrogen Energy	37	Elsevier Limited		15-Sep-2011	6302-6307		No
Electrochimica Acta	66	Elsevier Limited		30-Jan-2012	164-172		No
Journal of Power Sources	205	Elsevier		24-Jan-2012	222-230		No
Journal of Power Sources	205	Elsevier		11-Jan-2012	145-150		No
Fuel Cells	13(1)	John Wiley and Sons Ltd		19-Dec-2012	56-64		No
International Journal of Hydrogen Energy	37	Elsevier Limited		11-Oct-2011	6261-6267		No
Fuel Cells	13(1)	John Wiley and Sons Ltd		08-Nov-2012	86-97		No
Fuel Cells	13(1)	John Wiley and Sons Ltd		08-Nov-2012	42-47		No
Fuel Cells	13(1)	John Wiley and Sons Ltd		16-Mar-2013	79-95		No
Journal of Materials Research	27	Materials Research Society		14-Aug-2012	1950-1957		No
Materials Research Society Symposium - Proceedings	1384	Materials Research Society		01-Mar-2012	60-65		No
Fuel Cells	13(2)	John Wiley and Sons Ltd		18-Feb-2013	107-117		No
Industrial and Engineering Chemistry Research		American Chemical Society		14-Mar-2013			No
Zeitschrift für Physikalische Chemie		Oldenbourg Wissenschaftsverlag GmbH		11-Feb-2013			No
International Journal of Hydrogen Energy	38	Elsevier Limited		11-Jan-2013	431-439		No

PROJECT ACRONYM	NO	PUBLICATION TITLE	MAIN AUTHOR
MAESTRO	1	Effect of side-chain length on the electrospinning of perfluorosulfonic acid ionomers	Surya Subianto, Sara Cavaliere, Deborah J. Jones, Jacques Rozière
MAESTRO	2	Physical and chemical modification routes leading to improved mechanical properties of perfluorosulfonic acid membranes for PEM fuel cells	Surya Subianto, Monica Pica, Mario Casciola, Paula Cojocar, Luca Merlo, Graham Hards, Deborah J. Jones
MAESTRO	3	Short side chain perfluorosulfonic acid membranes and their composites with nanosized zirconium phosphate: hydration, mechanical properties and proton conductivity	Monica Pica, Anna Donnadio, Mario Casciola, Paula Cojocar, Luca Merlo
MAESTRO	4	Layered zirconium alkylphosphates: suitable materials for novel PFSA composite membranes with improved proton conductivity and mechanical stability	Anna Donnadio, Monica Pica, Donatella Capitani, Valentina Bianchi, Mario Casciola
MCFC-CONTEX	1	Experimental analysis of SO <sub>2</sub> effects on Molten Carbonate Fuel Cells	N. Di Giulio, B. Bosio, J. Han, S. J. McPhail
MCFC-CONTEX	2	Effects of sulfur contaminants on MCFC performance	I. Rexed, C. Lagergren, G. Lindbergh
MCFC-CONTEX	3	Membranes and molten carbonate fuel cells to capture CO <sub>2</sub> and increment energy production in natural gas power plants	Paolo Greppi, Barbara Bosio, Elisabetta Arato
MCFC-CONTEX	4	Electrochemical Impedance Study of the Poisoning Behaviour of Ni-based Anodes at Low Concentrations of H <sub>2</sub> S in a MCFC	H. Devianto, E. Simonetti, S. J. McPhail, F. Zaza, V. Cigolotti, C. Paoletti, A. Moreno, A. La Barbera, I. Luisetto
MCFC-CONTEX	5	Experimental and theoretical analysis of H <sub>2</sub> S effects on MCFCs	N. Di Giulio, B. Bosio, V. Cigolotti, S. W. Nam
MCFC-CONTEX	6	MCFC fed with biogas: Experimental investigation of sulphur poisoning using impedance spectroscopy	Viviana Cigolotti, Stephen McPhail, Angelo Moreno, Sung Pil Yoon, Jong Hee Han, Suk Woo Nam, Tae-Hoon Lim
MCFC-CONTEX	7	Strategies and new developments in the field of molten carbonates and high-temperature fuel cells in the carbon cycle	M. Cassir, S. J. McPhail, A. Moreno
NEXPEL	1	A Microblock Ionomer in Proton Exchange Membrane Electrolysis for the Production of High Purity Hydrogen	Daniel W. Smith
PREMIUM ACT	1	Experimental investigation of methanol crossover evolution during direct methanol fuel cell degradation tests	A. Casalegno, F. Bresciani, M. Zago, R. Marchesi
PREMIUM ACT	2	A physical model of Direct Methanol Fuel Cell anode impedance	M. Zago, A. Casalegno
PREMIUM ACT	3	A comparison of operating strategies to reduce DMFC degradation	F. Bresciani, A. Casalegno, J. L. Bonde, M. Odgaard, R. Marchesi
PREMIUM ACT	4	A Parametric Analysis on DMFC Anode Degradation	F. Bresciani, A. Casalegno, M. Zago, R. Marchesi
PREMIUM ACT	5	Water transport into PEFC gas diffusion layer: experimental characterization of diffusion and permeation	F. Bresciani, A. Casalegno, G. Varisco, R. Marchesi
PREMIUM ACT	6	Water transport and flooding in DMFC: Experimental and modeling analyses	M. Zago, A. Casalegno, C. Santoro, R. Marchesi
PREMIUM ACT	7	Effect of anode MPL on water and methanol transport in DMFC: experimental and modeling analyses	M. Zago, A. Casalegno, F. Bresciani, R. Marchesi
PREMIUM ACT	8	Surface Analytical Methods for the Development of Electrochemical Components of Polymer Electrolyte Fuel Cells	Pawel Gazdzicki
PREMIUM ACT	9	Surface Analytical Methods for the Development of Electrochemical Components of Polymer Electrolyte Fuel Cells	Indro Biswas
PREMIUM ACT	10	A Flexible Framework for Modeling Multiple Solid, Liquid and Gaseous Phases in Batteries and Fuel Cells	J. P. Neidhardt
ROBANODE	1	Mathematical modeling of Ni/GDC and Au-Ni/GDC SOFC anodes performance under internal methane steam reforming conditions	S. Souentie, M. Athanasiou, D. K. Niakolas, A. Katsaounis, S. G. Neophytides, C. G. Vayenas
ROBANODE	2	Study of the synergistic interaction between nickel, gold and molybdenum in novel modified NiO/GDC cermets, possible anode materials for CH <sub>4</sub> fueled SOFCs	D. K. Niakolasa, M. Athanasiou, V. Dracopoulou, I. Tsiaoussis, S. Bebelisa, S. G. Neophytides
ROBANODE	3	On the active surface state of nickel-ceria solid oxide fuel cell anodes during methane electrooxidation	Vasiliki Papaefthimiou, Maxim Shishkin, Dimitris K. Niakolas, Michalis Athanasiou, Yeuk Ting Law, Rosa Arrigo, Detre Teschner, Michael Hävecker
ROBANODE	4	Fundamental Studies of Sonoelectrochemical Nanomaterials Preparation	P. Sakkas, O. Schneider, S. Martens, P. Thanou, G. Sourkouni, and Chr. Argiris
ROBANODE	5	Design of experiment approach applied to reducing and oxidizing tolerance of anode supported solid oxide fuel cell. Part II: Electrical, electrochemical and microstructural characterization of tape-cast cells	Faes, A., Wuillemin, Z., Tanasini, P., Accardo, N., Modena, S., Schindler, H. J., Cantoni, M., Lübke, H., Diethelm, S., Hessler-Wyser, A., Van herle
ROBANODE	6	Redox stable Ni-YSZ anode support in solid oxide fuel cell stack configuration	Faes, A., Wuillemin, Z., Tanasini, P., Accardo, N., Van Herle, J.
SCOTAS-SOFC	1	Full Ceramic Fuel Cells Based on Strontium Titanate Anodes, an Approach towards More Robust SOFCs	P. Holtappels, J. T. S. Irvine, B. Iwanschitz, L. T. Kuhn, L. Lu, Q. Ma, J. Malzbender, A. Mai, T. Ramos, J. Rass-Hansen, B. R. Sudiredy



PERIODICAL TITLE	PUBLICATION FREQUENCY	PUBLISHER	PUBLICATION PLACE	PUBLICATION DATE	RELEVANT PAGES	PERMANENT IDENTIFIERS	OPEN ACCESS
Journal of Polymer Science, Part A: Polymer Chemistry	Vol. 51/Issue 1	John Wiley and Sons Inc.	United States	01-Jan-2013	118–128		
Journal of Power Sources	Vol. 233	Elsevier	Netherlands	01-Jul-2013	216–230		
Journal of Materials Chemistry	Vol. 22/Issue 47	Royal Society of Chemistry	United Kingdom	01-Jan-2012	24902		
Journal of Membranes Science	in press	Elsevier	Netherlands	01-Mar-2014	in press		
International Journal of Hydrogen Energy	Vol. 39, Issue 23	Elsevier Limited		01-Aug-2014	12300–12308		
International Journal of Hydrogen Energy	Vol. 39, Issue 23	Elsevier Limited		04-Aug-2014	12242–12250		No
Journal of the American Chemical Society	Ind. Eng. Chem. Res. Vol. 52 (26),	American Chemical Society		20-Mar-2013	8755–8764		No
International Journal of Hydrogen Energy	Volume 37, Issue 24	Elsevier Limited		01-Dec-2012	19312–19318		No
International Journal of Hydrogen Energy	Volume 37, Issue 24	Elsevier Limited		01-Dec-2012	19329–19336		No
International Journal of Hydrogen Energy	Vol. 36, Issue 16	Elsevier Limited		01-Aug-2011	10311–10318		No
International Journal of Hydrogen Energy	Vol. 37 (24)	Elsevier Limited		02-Dec-2012	19345–19350		No
Macromolecules	4 / 46	American Chemical Society		26-Feb-2013	1504–1511	10.1021/ma3026145	No
Journal of Power Sources	Vol. 249	Elsevier	Netherlands	01-Mar-2014	103–109		No
Journal of Power Sources	Vol. 248	Elsevier	Netherlands	01-Feb-2014	1181–1190		No
International Journal of Energy Research	Vol. 38/Issue 1	John Wiley and Sons Ltd	United Kingdom	01-Jan-2014	117–124		No
Fuel Cells	00	John Wiley and Sons Ltd	United Kingdom	05-Nov-2013	00		No
International Journal of Energy Research	Vol. 38/Issue 5	John Wiley and Sons Ltd	United Kingdom	01-Apr-2014	602–613		No
Journal of Power Sources	Vol. 217	Elsevier	Netherlands	01-Nov-2012	381–391		No
International Journal of Hydrogen Energy	Volume 39, Issue 36	Elsevier Limited		25-Mar-2014	21620–21630		No
Surface and Interface Analysis	-	John Wiley and Sons Ltd		24-Apr-2014	-		
ECS Transactions	-	The Electrochemical Society		01-Dec-2013	-		
Journal of the Electrochemical Society	-	Electrochemical Society, Inc.		14-Aug-2012	-		
Journal of Catalysis	306	Academic Press Inc.		01-Oct-2013	116–128		No
Applied Catalysis A: General	223	Elsevier		05-Mar-2013	223–232		No
Advanced Materials	3	Wiley-VCH Verlag		31-Jan-2013	762–769		No
Journal of Applied Electrochemistry	49	Springer Netherlands		01-Sep-2012	763–777		No
Journal of Power Sources	196	Elsevier		01-Nov-2011	8909–8917		No
Journal of Power Sources	196	Elsevier		01-Apr-2011	3553–3558		No
ECS Transactions	Vol. 57/Issue 1	The Electrochemical Society	United States	06-Oct-2013	1175–1184		No

PROJECT ACRONYM	NO	PUBLICATION TITLE	MAIN AUTHOR
SCOTAS-SOFC	2	Thermomechanical properties of Y-substituted SrTiO <sub>3</sub> used as re-oxidation stable anode substrate material	Viacheslav Vasechko, Bingxin Huang, Qianli Ma, Frank Tietz, Jürgen Malzbender
SCOTAS-SOFC	3	Influence of phase transformations on mechanical properties of novel ceramics for solid oxide fuel cell anode applications	Viacheslav Vasechko, Mirko Ziegner, Jürgen Malzbender
SCOTAS-SOFC	4	Impedance and Stability of M/CGO (M: Ni, Pd, Ru) Co-infiltrated Nb-doped SrTiO <sub>3</sub> SOFC Anodes	T. Ramos, S. Veltze, B. R. Sudireddy, P. Holtappels
SCOTAS-SOFC	5	Effect of Ru/CGO versus Ni/CGO Co-infiltration on the Performance and Stability of STN-based SOFCs	T. Ramos, S. Veltze, B. R. Sudireddy, P. S. Jørgensen, L. T. Kuhn, P. Holtappels
SCOTAS-SOFC	6	Electrochemical performance and stability of electrolyte-supported solid oxide fuel cells based on Y-substituted SrTiO <sub>3</sub> ceramic anodes	Q. Ma, B. Iwanschitz, E. Dashjav, A. Mai, F. Tietz, H.-P. Buchkremer
SCOTAS-SOFC	7	Instability and growth of nanoscale Ce <sub>0.8</sub> Gd <sub>0.2</sub> O <sub>1.9</sub> /NiO infiltrate in Sr <sub>0.94</sub> Ti <sub>0.9</sub> Nb <sub>0.1</sub> O <sub>3-δ</sub> -Zr <sub>0.84</sub> Y <sub>0.16</sub> O <sub>1.92</sub> anodes for solid oxide fuel cells	Wei Zhang, Luise Theil Kuhn, Peter Stanley Jørgensen, Bhaskar Reddy Sudireddy, Janet Jonna Bentzen, Carlos Bernuy-Lopez, Sune Veltze, Tânia Ramos
SCOTAS-SOFC	8	Performance of Electrolyte Supported Solid Oxide Fuel Cells with STN Anodes	S. Veltze, B. R. Sudireddy, P. S. Jørgensen, W. Zhang, L. T. Kuhn, P. Holtappels, T. Ramos
SCOTAS-SOFC	9	Transmission Electron Microscopy Specimen Preparation Method for Multiphase Porous Functional Ceramics	W. Zhang, L. Theil Kuhn, P. S. Jørgensen, K. Thydén, J. J. Bentzen, E. Abdellahi, B. R. Sudireddy, M. Chen, J. R. Bowen
SCOTAS-SOFC	10	A solid oxide fuel cell with lanthanum and calcium co-doped strontium titanate as support	Lanying Lu, Maarten C. Verbraeken, Mark Cassidy John T. S. Irvine
SCOTAS-SOFC	11	Thermo-mechanical properties of (Sr, Y) TiO <sub>3</sub> as anode material for solid oxide fuel cells	B. X. Huang, V. Vasechko, Q. L. Ma, J. Malzbender
SCOTAS-SOFC	12	Evaluation of Ca Doped La <sub>0.2</sub> Sr <sub>0.7</sub> TiO <sub>3</sub> as an Alternative Material for Use in SOFC Anodes	M. C. Verbraeken, B. Iwanschitz, A. Mai, J. T. S. Irvine
SCOTAS-SOFC	13	Performance-Microstructure Relations in Ni/CGO Infiltrated Nb-doped SrTiO <sub>3</sub> SOFC Anodes	T. Ramos, C. Bernuy-Lopez, B. R. Sudireddy, J. J. Bentzen, W. Zhang, P. S. Jørgensen, L. Theil Kuhn
SCOTAS-SOFC	14	Comparison of Y and La-substituted SrTiO <sub>3</sub> as the anode materials for SOFCs	Qianli Ma, Frank Tietz

PERIODICAL TITLE	PUBLICATION FREQUENCY	PUBLISHER	PUBLICATION PLACE	PUBLICATION DATE	RELEVANT PAGES	PERMANENT IDENTIFIERS	OPEN ACCESS
Journal of the European Ceramic Society	submitted	Elsevier BV		28-May-2014	online corrected proof		No
Ceramics International	40	Elsevier Limited		30-Sep-2014	137179-13189		No
Electrochemical and Solid-State Letters	Vol. 3/Issue 2	Electrochemical Society, Inc.		01-Jan-2014	F5-F6		No
Fuel Cells	accepted	John Wiley and Sons Ltd		31-Dec-2014	n/a		No
Solid State Ionics	in press	Elsevier		31-Dec-2014	n/a		No
Journal of Power Sources	Vol. 258	Elsevier	Netherlands	01-Jul-2014	297-304		No
ECS Transactions	Vol. 57/Issue 1	The Electrochemical Society	United States	06-Oct-2013	743-752		No
Microscopy and Microanalysis	Vol. 19/Issue 02	Cambridge University Press	United Kingdom	01-Apr-2013	501-505		No
ECS Transactions	57	The Electrochemical Society		06-Oct-2013	1415-1422		No
Journal of Power Sources	206	Elsevier		01-Aug-2012	204-209		No
Journal of the Electrochemical Society	Vol. 159/Issue 11	Electrochemical Society, Inc.	United States	01-Jan-2012	F757-F762		No
ECS Transactions	54	The Electrochemical Society		31-Dec-2012	389-402		No
Solid State Ionics	225	Elsevier		31-Dec-2012	108-112		No

**NOTE |** Items in red represent publications which appear twice in the list, as entered by two different projects (DEMMEA and IRAFC). Excluding double entries, and counting all types of publication (open, restricted and blank), there are a total of 119 publications.

# ANNEX B

## PATENT APPLICATIONS REALISED THROUGH FCH JU-FUNDED PROJECTS

PROPOSAL CALL IDENTIFIER	PROJECT ID	PROJECT ACRONYM	TYPE OF IP RIGHTS	SUBJECT TITLE
FCH-JU-2008-1	244821	ASSENT	Patents	Festoxid-Brennstoffzellen-System sowie Verfahren zum Betreiben eines solchen – Solid Oxide Fuel Cell System and Method for Operating the Same
FCH-JU-2008-1	244821	ASSENT	Patents	Control arrangement and method in fuel cell system
FCH-JU-2008-1	244821	ASSENT	Patents	Method and control arrangement for a fuel cell device
FCH-JU-2008-1	244821	ASSENT	Patents	Method and arrangement for controlling water content of cell anode gas
FCH-JU-2008-1	244821	ASSENT	Patents	Method and arrangement for utilizing recirculation for high temperature fuel cell system
FCH-JU-2008-1	244821	ASSENT	Patents	Method and arrangement for determining enthalpy balance of a fuel cell system
FCH-JU-2008-1	244821	ASSENT	Patents	Method and arrangement for determining enthalpy change of a fuel cell system
FCH-JU-2009-1	256627	CATION	Patents	Combined heat exchanging and fluid mixing apparatus
FCH-JU-2009-1	256627	CATION	Patents	A heating method and arrangement for enhanced heating of a high temperature fuel cell device
FCH-JU-2009-1	256673	D-CODE	Patents	Identification of fuel cell impedance for on-board diagnosis applications
FCH-JU-2008-1	24156	DEMMEA	Patents	CROSS-LINKED OR NON-CROSS-LINKED AROMATIC COPOLYMERIC PROTON-CONDUCTING ELECTROLYTES FOR POLYMERIC MEMBRANE FUEL CELLS
FCH-JU-2008-1	245156	DEMMEA	Patents	CROSSLINKED OR NON-CROSSLINKED AROMATIC (CO) POLYMERS AS PROTON CONDUCTORS FOR USE IN HIGH TEMPERATURE PEM FUEL CELLS
FCH-JU-2008-1	245224	HYDROSOL-3D	Patents	GAS/SOLID PHASE REACTION
FCH-JU-2008-1	245202	IRAFC	Patents	CROSS-LINKED OR NON-CROSS-LINKED AROMATIC COPOLYMERIC PROTON-CONDUCTING ELECTROLYTES FOR POLYMERIC MEMBRANE FUEL CELLS
FCH-JU-2008-1	245202	IRAFC	Patents	CROSSLINKED OR NON-CROSSLINKED AROMATIC (CO) POLYMERS AS PROTON CONDUCTORS FOR USE IN HIGH TEMPERATURE PEM FUEL CELLS
FCH-JU-2009-1	256730	SCOTAS-SOFC	Patents	Structurally reinforced ceramic supports

CONFIDENTIAL APPLICATION	APPLICATION REFERENCE	APPLICANTS
Yes	EP11006485.4-2119	R. Deja, R. Peters, L. Blum, Forschungszentrum Jülich GmbH
Yes	FI 20105697	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
Yes	FI 20106241	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
Yes	FI 20116281	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
Yes	FI 20125147	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
Yes	PCT/FI2012/050405	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
Yes	PCT/FI2012/050407	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
No	EP2719447A1	Yves De Vos; Freddy Wollants; Jean-Paul Hubert Janssens
No	FI20115307	Wärtsilä Finland Oy
Yes	Patent under submission	University of Salerno - Inventors: R. Petrone, C. Pianese, P. Polverino, M. Sorrentino
Yes	GR 20110100058 A	ADVENT S.A., University of Patras, FORTH/ICE-HT
Yes	US2012202129	Advent Technologies (GR)
No	US 2011/0135566 A1	Martin ROEB, Christian SATTler, Peter-Michael RIETBROCK, Ruth KÜSTER, Athanasios G. KONSTANDOPOULOS, Christos AGRAFIOTIS, Lamark DE OLIVEIRA, Mark SCHMITZ
No	GR20110100058 A	ADVENT S.A., UNIVERSITY OF PATRAS, FORTH/ICE-HT
No	US2012/0202,129	ADVENT SA, FORTH/ICE-HT, UNIVERSITY OF PATRAS
Yes	EP No. 14158353.4 - 1360	T. Ramos, B. R. Sudireddy, K. Agersted, P. Holtappels

**NOTE** | Items in red represent patents referenced by two different projects: DEMMEA and IRAFC.



# GLOSSARY

<b>AA</b>	Activity Area
<b>ABAC</b>	Accrual-based Accounting
<b>AD</b>	Administrator
<b>AER</b>	Average Error Rate
<b>AIP</b>	Annual Implementation Plan
<b>ALDE</b>	Group of the Alliance of the Liberals and Democrats for Europe in the European Parliament
<b>APU</b>	Auxiliary Power Unit
<b>ARTEMIS</b>	Advanced Research and Technology for Embedded Intelligence and Systems
<b>ASME</b>	American Society of Mechanical Engineers
<b>AST</b>	Assistant
<b>AWP</b>	Annual Work Plan
<b>BBI</b>	Bio-Based Industries
<b>BCP</b>	Business Continuity Plan
<b>BoP</b>	Balance of Plant
<b>BTH</b>	Biomass to Hydrogen
<b>CA</b>	Commitment Appropriation
<b>CA</b>	Contractual Agent
<b>CAS</b>	Common Audit Service
<b>CFD</b>	Computational Fluid Dynamics
<b>CFS</b>	Certificate of Financial Statements
<b>CHP</b>	Combined Heat and Power
<b>CIRCA</b>	Communication and Information Resource Centre for Administrations
<b>CORDA</b>	Common Research Data Warehouse
<b>COSO</b>	Committee of Sponsoring Organizations of the Tradeway Commission
<b>CPM</b>	Contract and Project Management
<b>CPT</b>	Clean Power for Transport
<b>CS</b>	Clean Sky
<b>DA</b>	Delegation Agreement
<b>DEMMEA</b>	Understanding the Degradation Mechanisms of Membrane-Electrode-Assembly for High Temperature Pemfcs and Optimization of the Individual Components
<b>DG</b>	Directorate-General
<b>DG Budget</b>	Directorate-General for the Budget
<b>DG Energy</b>	Directorate-General for Energy
<b>DG Environment</b>	Directorate-General for the Environment
<b>DG Human Resources and Security</b>	Directorate-General for Human Resources and Security

<b>DG Mobility and Transport</b>	Directorate-General for Mobility and Transport
<b>DG Research and Innovation</b>	Directorate-General for Research and Innovation
<b>DoA</b>	Description of the Action
<b>DoE</b>	Department of Energy
<b>ECA</b>	European Court of Auditors
<b>ECSEL</b>	Electronic Components and Systems For European Leadership
<b>EFTA</b>	European Free Trade Area
<b>EMI</b>	Experts Management Tool
<b>ENIAC</b>	European Nanoelectronics Initiative Advisory Council
<b>EP</b>	European Parliament
<b>EPP</b>	Group of the European People's Party in the European Parliament
<b>ESR</b>	Evaluation Summary Report
<b>ESS</b>	Electronic Submission System
<b>EU</b>	European Union
<b>FCEV</b>	Fuel Cell Electric Vehicle
<b>FCH JU</b>	Fuel Cells and Hydrogen Joint Undertaking
<b>FGIII</b>	Function Group III
<b>FGIV</b>	Function Group IV
<b>FO</b>	Financial Officer
<b>FORCE</b>	Form C Editor
<b>FP7</b>	Seventh Framework Programme
<b>FTE</b>	Full-Time Equivalent
<b>GA</b>	Grant Agreement
<b>GB</b>	Governing Board
<b>GDP</b>	Gross Domestic Product
<b>H2020</b>	Horizon 2020
<b>HFC</b>	Hydrogen and Fuel Cells
<b>HR</b>	Human Resources
<b>HRS</b>	Hydrogen Refuelling Station
<b>IAC</b>	Internal Audit Capability
<b>IAS</b>	Internal Audit Service
<b>ICC</b>	Internal Control Coordinator
<b>ICE</b>	Internal Combustion Engine
<b>ICS</b>	Internal Codes and Standards
<b>ICT</b>	Information and Communications Technology
<b>IEA</b>	International Energy Agency
<b>IG</b>	Industry Grouping
<b>IKAA</b>	Contributions in Kind in Additional Activities
<b>IKOP</b>	Contributions in Kind in Operational Activities
<b>IMI</b>	Innovative Medicines Initiative
<b>IPHE</b>	International Partnership for the Hydrogen Economy
<b>IRAFC</b>	Development of an Internal Reforming Alcohol High Temperature Pem Fuel Cell Stack
<b>ISA</b>	Information System for Absences
<b>IT</b>	Information Technology



<b>ITRE</b>	European Parliament Committee on Industry, Research and Energy
<b>JRC</b>	Joint Research Centre
<b>JTI</b>	Joint Technology Initiative
<b>KPI</b>	Key Performance Indicator
<b>M</b>	Million
<b>MAIP</b>	Multi-Annual Implementation Plan
<b>MAWP</b>	Multi-Annual Work Programme
<b>MCFC-CONTEX</b>	MCFC Catalyst and Stack Component Degradation and Lifetime: Fuel Gas Contaminant Effects and Extraction Strategies
<b>MEA</b>	Membrane Electrode Assembly
<b>MEP</b>	Member of the European Parliament
<b>MHV</b>	Materials Handling Vehicle
<b>N.ERGHY</b>	New European Research Grouping on Fuel Cells and Hydrogen
<b>NEF</b>	Negotiation Form Facility
<b>NEW-IG</b>	New Energy World Industry Grouping for Sustainability
<b>OEM</b>	Original Equipment Manufacturer
<b>OLAF</b>	European Anti-Fraud Office
<b>PA</b>	Payment Appropriation
<b>PEM</b>	Polymer Electrolyte Membrane
<b>PEM</b>	Proton Exchange Membrane
<b>PNR</b>	Pre-Normative Research
<b>PPP</b>	Public-Private Partnership
<b>RACER</b>	Relevant Accepted Credible Easy and Robust
<b>RCS</b>	Regulation Code and Standards
<b>RE</b>	Renewable Energy
<b>RG</b>	Research Grouping
<b>RTD</b>	Research Technology Development
<b>S&amp;D</b>	Group of the Progressive Alliance of Socialists and Democrats in the European Parliament
<b>SAP</b>	Sulfonated Aromatic Polymer
<b>SC</b>	Scientific Committee of the Fuel Cells & Hydrogen Joint Undertaking
<b>SESAM</b>	European Commission Online Reporting Tool for Research and Technological Projects
<b>SET Plan</b>	Strategic Energy Technology Plan
<b>SLA</b>	Service-Level Agreement
<b>SMART</b>	Specific, Measurable or Verifiable, Discussed and Accepted, Realistic and Timed
<b>SME</b>	Small and Medium-Sized Enterprise
<b>SOFC</b>	Solid Oxide Fuel Cell
<b>SRG</b>	States Representatives Group
<b>STTP</b>	Strategic Transport Technology Plan
<b>TEMONAS</b>	Technology Monitoring and Assessment Platform
<b>TMA</b>	Technology Monitoring and Assessment
<b>TTG</b>	Time to Grant
<b>UK</b>	United Kingdom
<b>US</b>	United States
<b>VAT</b>	Value Added Tax
<b>WHEC</b>	World Hydrogen Energy Conference







Contact us

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