

Fuel Cells and Hydrogen Joint Undertaking



Annual Activity Report **2013**

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Fuel Cells and Hydrogen Joint Undertaking (FCH JU)
Annual Activity Report 2013



Table of content

Foreword.....	5
Executive summary.....	7
1. Operations	9
1.1 Overview.....	9
1.2 Results of Calls and Operational Achievements	10
1.3 Cooperation.....	30
2. Support activities.....	33
2.1 Administrative functions	33
2.1.1 Legal and Financial Framework.....	33
2.1.2 Human Resources	34
2.1.3 Offices.....	34
2.1.4 IT Infrastructure	34
2.2 Communication activities.....	36
2.2.1 Advocacy and awareness-raising.....	37
2.2.2 Public relations & dissemination of projects.....	39
2.2.3 Media relations	43
3. Management and internal control systems	45
3.1 Nature and characteristics of the FCH JU.....	45
3.2 Governance structure.....	45
3.2.1 Executive bodies	46
3.2.2 Advisory bodies.....	47
3.3 The functioning of the entire internal control system.....	49
3.3.1 Effectiveness of implementation of the control standards.....	49
3.3.2 Conclusion	50
4. Building blocks towards reasonable assurance	51
4.1 Building blocks towards reasonable assurance.....	51
4.1.1 Building block 1: Assessment by JU's management.....	51
4.1.2 Building block 2: Results from audits during the reporting year and follow up of previous audits.....	64
4.1.3 Building block 3: Assurance from Heads of Unit	66
4.1.4 Completeness and reliability of the information reported in the building blocks	66
4.2 Reservations	67
4.3 Overall conclusion	68
5. Declaration of assurance	69
Annex A: 013-1 Call Process Outline	71
Annex B: Publications resulting from FCH JU-funded projects.....	73
Annex C: Patent applications realised through FCH JU-funded projects...	81
Annex 1: Statement of the internal control coordinator	83
Annex 2: Human resources - Establishment plan posts	85
Annex 3: Financial information.....	87
Annex 4: Materiality criteria.....	91
Annex 5: FCH JU internal control strategy.....	95
Annex 6: FCH JU internal control standards.....	101
Glossary	107



Foreword

“This is a marathon, not a sprint” is most likely one of the better paraphrases of the atmosphere building up in the Fuel Cells and Hydrogen community in Europe during 2013.

The most prominent achievement of the FCH 1 JU is the realisation of a real, strong, reliable and committed European platform on fuel cells and hydrogen where Industry, Research and Local, National and European officials can meet and debate on the technical ambitions and the societal challenges addressed as jobs, industrial growth and secure and clean energy and transport. It is only when we work closely together that we can make the difference towards success: the various H₂ Mobility studies are a clear illustration of this and does prove that cooperation before competition is indeed essential towards a market breakthrough Fuel Cells and Hydrogen.

Whereas changes are generally expected to be quick and smooth, we have to recognise that the build up of collective momentum will require endurance and perseverance together with new approaches and methods to allow for strong community cohesion and financial oxygen. Although we see that the industrial turnover, R&D expenditure and market deployment expenditure grow year by year, the concrete business cases, Return on Investment and width of the so called ‘Valley of Death’ are less easy to digest. Indeed, if it was easy, somebody would have done it before.

“We are doing good, but we will do better” will materialize with the FCH 2 JU under the Horizon 2020 program : shorter Time to Grant, better funding rates and less administrative aspects. All of this are fruits of the close cooperation and the hard work of the Industry grouping, the Research grouping and the European Commission together with the Program Office. With a total ring-fenced budget close to € 1, 4 billion by both the European Commission and the private partners, the European Fuel Cells and Hydrogen community can be sure about steady funding until 2020. Moreover, the ambition of having even a deeper involvement of the European Member States will allow for a wider dissemination and awareness of the technological benefits, the potential on industrial growth and self reliance on energy provision.

The technical progress and results of the 150 FCH JU projects, the majority of them still on-going, is impressive and puts Europe on par with US, Japan and Korea and even in some specific fields as fuel cell busses and electrolyzers in the lead. The edge Fuel Cell and Hydrogen research capacity in Europe will consolidate on the on-going efforts and assure this position to be kept and new to be taken.

From an administrative perspective, all activities of the FCH JU are financially sound and legally compliant as expressed by my declaration of assurance for 2013.

I count on the interest, motivation and commitment of all to bring the FCH JU that step closer to realise its ambitions together.

Bert De Colvenaer, Executive Director
Fuel Cells and Hydrogen Joint Undertaking





Executive summary

2013 was a crucial year for the FCH JU, marked in particular by (1) the last calls under the Seventh Framework Programme (FP7), (2) an increasing number of completed projects (23 out of 150 funded projects), (3) the second interim evaluation of the FCH JU and (4) the Commission proposal for an FCH 2 JU under Horizon 2020.

The main operational and financial highlights of the year 2013 can be summarized as follows:

- Successful negotiation and signature of 27 grant agreements for the call 2012 for an amount of 68.13 M € and in parallel negotiations of 21 projects for call 2013-1 and launch of call 2013-2 with the remaining budget of about 23 M €.
- Completion of 13 collaborative projects allowing to report for the first time on research publications and patent applications and showing positive results (69.2% with publications compared to a target of 55% and 30.8% with patents compared to a target of 30%). In this context, further improved monitoring and reporting on projects progress and achievements is expected following the Knowledge Manager and Policy Officer taking up duties and the delivery of the TEchnology MONitoring and ASsessment platform (TEMONAS), an integrated and functional application tailored to the needs of evaluation of research programme progress.
- Publication of a study commissioned by the FCH JU on 'Trends in investments, jobs and turnover in the Fuel cells and hydrogen sector' which reported that on average, annual turnover has increased by 10%, R&D expenditure by 8%, market deployment expenditure by 6% , patents granted in the EU to European companies by 16% and jobs by 6%.
- Reinforced effort to increase visibility of the FCH JU by organizing or participating in key events (among others: Info days, EU Open Days, Green Week, Innovation in Action, Hannover Messe, Programme Review Days, Stakeholders General Assembly....) and by visiting member states (including countries with the "smallest" funding with a view to encourage participation of the concerned research communities in the FCH JU calls).
- Development and implementation of new administrative IT tools aimed at increasing efficiency. This includes (1) an application for electronic processing, storage and retrieval of documents, (2) the launch of the Events Registration Tool (shared with other JTIs,) (3) the implementation of ISA, an HR tool for management of absences and (4) the Audit Database, a tool to monitor ex-post audits and report on audit results.
- Validation of 38 cost claims (29 in 2012) concerning 326 beneficiaries (209 in 2012) leading to payments for an amount of 9.07 M € and to clearing of 10.85 M €.
- Increased communication towards beneficiaries and CFS auditors to prevent errors in cost reporting with 2 new sessions of the communication campaign offering the

possibility to participate on-line as well as with the update of the FCH JU Guide on Financial Issues and of the Guidance notes on project reporting.

- Significant ex-post audit effort which has seen the consolidation of the positive trend in terms of low error rates and has allowed the closure of an important number of on-going audits (from 19 by the end of 2012 to 45 by the end of 2013) together with a further reinforcement of the FCH JU ex-ante controls as per the Internal Audit Capability's recommendations.

The second interim evaluation¹ concluded that the FCH JU has successfully demonstrated the viability of the PPP concept for research in FCH. In the view of the experts, the FCH JU has realized an adequate governance structure, created an effective dialogue between industry and research around a common strategic agenda, and has successfully implemented that agenda. The experts confirmed that the FCH JU continues to be relevant to the grand challenges facing Europe in particular it supports climate change objectives, helps improve energy security and contributes to status of Europe as an international leader in technology upon which the competitiveness and welfare of the Union will depend in the future. Therefore they recommended that the FCH JU be continued under Horizon 2020. The experts have nevertheless identified some room for improvement around four main axes: Programme Governance, design and management; technology monitoring and policy support; engagement with Member States and regions, and communication and dissemination. Actions are being designed to address these aspects and will be implemented in due time.

On 10 July 2013 the Commission launched a proposal² for a new phase of the FCH JTI, the FCH 2 JU that will continue to develop a portfolio of clean, efficient and affordable fuel cells and hydrogen technologies to the point of market introduction and help secure the future international competitiveness of this strategically important sector in Europe. The new FCH JTI is expected to start in 2014.

The 2013 Risk Management exercise identified as a critical point the need to ensure adequate preparation of the JU for an effective implementation of FCH 2 under Horizon 2020. Of particular relevance for the smooth transition to FCH 2 are the timely launching of the 2014 Call under new IT systems and rules, the practical implementation of the new provisions on in-kind contributions and the impact on the effectiveness of the JU's operations that some of the changes proposed in the control and governance aspect may have in the organisation. To address properly and timely these aspects, the JU has set up an internal task force which meets regularly and a Sherpa's Working Group comprising representatives from the Commission, Industry Grouping (IG), Research Grouping (RG) and the Programme Office.

¹ 2nd interim evaluation report

² COM(2013) 506 final Proposal for a Council regulation on the Fuel Cells and Hydrogen 2 Joint Undertaking

1. Operations

1.1 Overview

The Fuel Cells and Hydrogen Joint Undertaking (FCH JU) represents a public-private partnership at the European level. Its members are: the European Union, represented by the European Commission (EC) as a public representative; the 'New Energy World Industry Grouping Fuel Cell and Hydrogen for Sustainability – NEW-IG' (hereafter "the IG") which represents European companies; and the 'New European Research Grouping on Fuel Cells and Hydrogen - N.ERGHY' (hereafter "the RG"), representing European research organizations and universities.

Fuel Cell and Hydrogen technologies have enormous potential in terms of contributing to a number of Europe's key policy goals, including the reduction of carbon dioxide emissions (in the energy system and particularly in transport), improving energy security and promoting innovation-driven growth and employment. The European Strategic Energy Technology (SET) Plan has identified Fuel Cells and Hydrogen to be among the technologies needed for Europe to achieve the targets for 2020: 20% reduction in greenhouse gas emissions; 20% share of renewable energy sources in the energy mix and 20% reduction in primary energy use. Additionally, it has been identified as a key sector for contributing towards Europe's long-term (2050) vision for a decarbonized energy system. This is in line with the EC's Communication "Energy for a Changing World – An Energy Policy for Europe", the goals of the Lisbon Strategy and the European Strategic Transport Technology Plan.

In order to realize these public benefits, the FCH JU brings public and private interests together in a new, industry-led implementation structure, ensuring that the jointly defined research programme better matches industry's needs and expectations, while focusing on the objective of accelerating the commercialization of Fuel Cells and Hydrogen technologies. FCH JU is a Joint Technology Initiative (JTI) within the Seventh Framework Programme 2007 – 2013 (FP7) and implemented as a Joint Undertaking set up by the Council Regulation N° 521/2008 of 30 May 2008 for a period lasting up until 31 December 2017. This initiative will be pursued under the Horizon 2020 Framework Program as proposed by the European Commission in July 2013³.

The 2008 Council Regulation was amended on 14 November 2011 (Council Regulation N° 1183/2011 of 14 November 2011 – OJ L 302, 19.11.2011, p.3) in order to take into consideration the in-kind contributions from legal entities other than industries, participating in its activities (mainly research organizations including universities and research centers) in matching the Union's contribution.

³ Council Regulation on the Fuel Cells and Hydrogen 2 Joint Undertaking (COM(2013)0506-C7-0256/2013-2013/0245(NLE))

The FCH JU has a total financing of 947 M € for the period 2008-17. The Union contributes with a maximum of 470 M € for the purpose of covering operational and running costs. The operational costs of the JU shall be covered through in-kind contributions from the legal entities participating in the activities. The in-kind contribution from the participating legal entities shall at least match the financial contribution of the Union.

The mission of the FCH JU is to support long-term and breakthrough-orientated research, technological development and demonstration and support actions, including pre-normative research, following open and competitive calls for project proposals, independent evaluation and the conclusion of a Grant Agreement with the FCH JU and a Consortium Agreement within the participating project partners. In addition, the FCH JU funds studies and supporting actions through calls for tender and pursues support activities such as communication and dissemination of information on technologies and its projects.

1.2 Results of Calls and Operational Achievements

Results of Calls for Proposal in 2013

The operational objectives as they relate to the Call Process for the autonomous FCH JU in 2013 relate to three Calls for Proposals: those of 2012, 2013-1 and 2013-2.

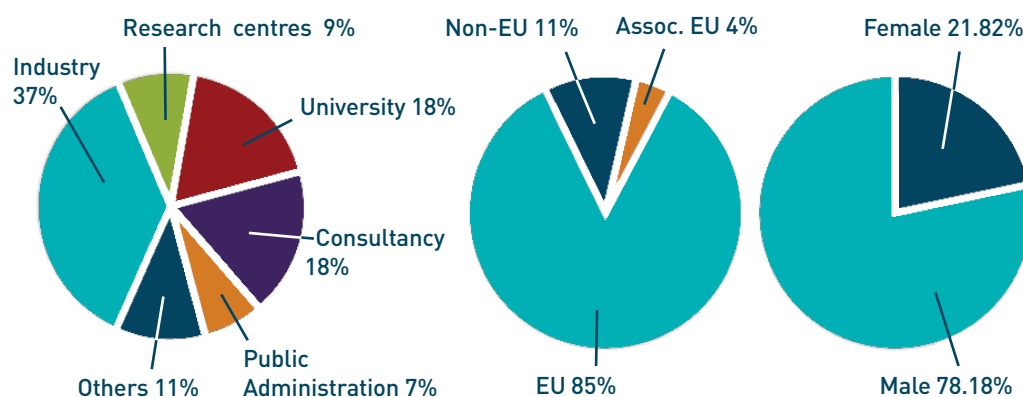
With respect to the 2012 call, the negotiations took place in 2012 and 2013 with the aim of concluding grant agreements for selected projects by the end of 2013. Two projects failed during negotiations and one project was negotiated from the reserve lists. The remaining budget is transferred to the call 2013-2. In conclusion, 27 projects⁴ were successfully negotiated for the 2012 call for proposals.

Concerning the 2013-1 call, the objective was to complete the evaluation stage and start the negotiations of the selected proposals in 2013. The evaluation was carried out in June 2013. An outline of the 2013-1 Call process is given in Annex A⁵: 70 proposals were received of which 64 were eligible; 33 proposals passed the evaluation threshold and in July 2013, the Governing Board decided to open negotiations with 21 projects and to open a limited second call (2013-2) with the remaining budget.

Figure 1 provides an overview of the gender and geographic distribution of the 39 evaluators, 2 chairs and 2 observers contributing to the evaluation exercise, together with the distribution of their affiliation.

⁴ Further details on these projects may be found on the FCH JU website:
<http://www.fch-ju.eu/finder/projects/%20/%20/%20/2012>

⁵ In order to keep the numbering of the financial and audit annexes as described in the EC model template, the numbering of the operational annexes is based on letters

Figure 1: Affiliation and distribution of experts contributing to the 2013-1 call evaluation


The call 2013-2 corresponded to the last call for the FCH JU under the FP7 regulations. The topics for the 2013-2 call (see Table 1) were selected and approved by the Governing Board (GB) during the second half of 2013 and the call was published on 28 November 2013. The deadline for submission is on 27 February 2014. The estimated FCH JU financial contribution to the call was 23 M €

Table 1: Overview of call 2013-2

Area/ Topics called	Funding Schemes
Area SP1-JTI-FCH.1: Transportation & Refuelling Infrastructure	
SP1-JTI-FCH.2013.1.1 Large-scale demonstration of buses and refuelling infrastructure VI	Collaborative Project
Area SP1-JTI-FCH.2: Hydrogen Production & Distribution	
SP1-JTI-FCH.2013.2.1: Demonstration of hydrogen production from biogas for supply to vehicle refuelling applications	Collaborative Project
Area SP1-JTI-FCH.4: Early Markets	
SP1-JTI-FCH.2013.4.2 Demonstration of portable generators, back-up power and uninterruptible power systems	Collaborative Project
Area SP1-JTI-FCH.5: Cross-cutting Issues	
SP1-JTI-FCH.2013.5.5 Development of a European framework for the generation of guarantees of origin for green H ₂	Coordination and Support Actions (Supporting Action)

The statistics on the 2013 achievements, as presented in subsequent sections, include the data of the 21 projects selected for funding under the 2013-1 call but do not include any information on the 2013-2 call for proposals.

Table 2 gives the main key performance indicators as it relates to the 2013-1 Call Process. Some topics of the 2013-1 call for proposals were not covered by successful proposals. This could explain the mismatch between the indicators for 2013 and the related targets. The full picture will only be available after the evaluation of the results of the 2013-2 call for proposals that will take place in 2014.

Table 2: Key performance indicators and achievements in 2013

Indicator	Target	Results		
		2011	2012	2013
Member States represented in selected proposals	15	17	19	18
SME participation in Call 2013	15%	26%	35%	27%
Coverage of topics called for	> 90%	80%	87%	83%
Topic coverage by selected projects	60%	55%	74%	56%

In addition to the management of grant agreements, 6 tenders were launched for conducting of comparative studies on the benefits of Fuel Cells and Hydrogen in different application areas. A brief description of their state of advancement is presented in section "Tendered studies".

Operational Achievements

The 2013 operational achievements are presented and structured according to the four (4) objectives of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) described in the revised Multiannual Implementation Plan (MAIP) adopted by the Governing Board in November 2011. Where relevant, the evolution of various indicators, over the period 2008 to 2013, is presented.

Objective 1: Place Europe at the forefront of FCH technologies worldwide and enable the market breakthrough of FCH technologies

The FCH JU has provided 450 M € in funding over the period 2008-13 for projects dedicated to enhancing Europe's technological know-how in FCH technologies and their rapid commercialisation.

These projects have produced and are producing research results towards 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 during international conferences, fairs and workshops, FCH JU-funded projects have produced almost 70 research publications in peers reviewed journals with high citation index (from 9 of the 13⁶ completed collaborative projects – see Annex B: Publications resulting from FCH JU-funded projects) and 12 patent applications (from 4 finished projects – see Annex C: Patent applications realised through FCH JU-funded projects). Before 2013, as very few projects had been completed and had produced publications or patents projects, no data were available. 2013 is the first year for which the FCH JU can report against these indicators, and, as indicated, the targets have been met.

Table 3: Results for Key Performance Indicators (not measurable before 2013)

Indicator	Target	Results			
		2010	2011	2012	2013
Percentage of projects which generate one or more patent applications	30% by 2013	N.A.	N.A.	N.A.	30.8%
Percentage of projects with publications in peer-reviewed journals	55% by 2013	N.A.	N.A.	N.A.	69.2%

Most of these publications are available through the web-sites of the related projects. These web-sites may be accessed via the FCH JU web-site that was consulted in 2013 more than 70,000 times (by almost 45,000 distinct entities) over 40% of which were new visitors to the site.

In terms of enabling market breakthrough of FCH technologies, the FCH JU is accelerating the commercialization of FCH JU technologies in line with European Union targets for technology development and deployment as outlined below.

FCH transport demonstration projects will see 150 cars and 45 buses deployed through projects financed over the 2008-2013 period. In addition, at least 20 hydrogen refueling stations will be realized through FCH JU-funded projects. In the stationary applications sector, deployment of micro-CHP (residential) units through the FCH JU programme alone is expected to exceed the EU 2015 target (see Table 4). In terms of material handling vehicles (MHVs), over 400 MHV units or 25% of the EU 2015 target, will be met through FCH JU projects (under the 7th Framework Program).

⁶ At the end of 2013, 13 collaborative projects and 10 support actions were completed, but their final reports have not been formally approved yet. This is expected to happen in the course of 2014.

Table 4: FCH JU contributing to EU-level targets

Application Area	Market application	Volume	
		Target increase EU-level (2010-15)	Target increase (& progress to date) via FCH JU (2008-13)
Transport	Cars	> 4000 vehicles	150 (33) vehicles
	Buses	~ 400 vehicles	45 (30) vehicles
	Refuelling stations	~200	20 (7) stations
H2 Production & Distribution	Distributed production of hydrogen by water electrolysis	Increase of 3% efficiency (65% to 68%)	Increase of 1% (65% to 66%)
	Distributed storage of gaseous H2	4t cap.	Data not yet available*
	H2 storage in solid materials	2 t cap.	Data not yet available*
	High capacity compressed H2 trailer	0,7 t cap	Data not yet available*
Stationary Applications	Residential micro-CHP (natural gas based)	1000 units	> 1000 (200)
	Industrial/Commercial (H2 based)	> 5MW	2MW (~)
	Industrial/Commercial (natural gas based)	> 5MW	0MW
Early Markets	Material Handling Vehcles (MHVs)	1500 MHVs	400 (11) MHVs

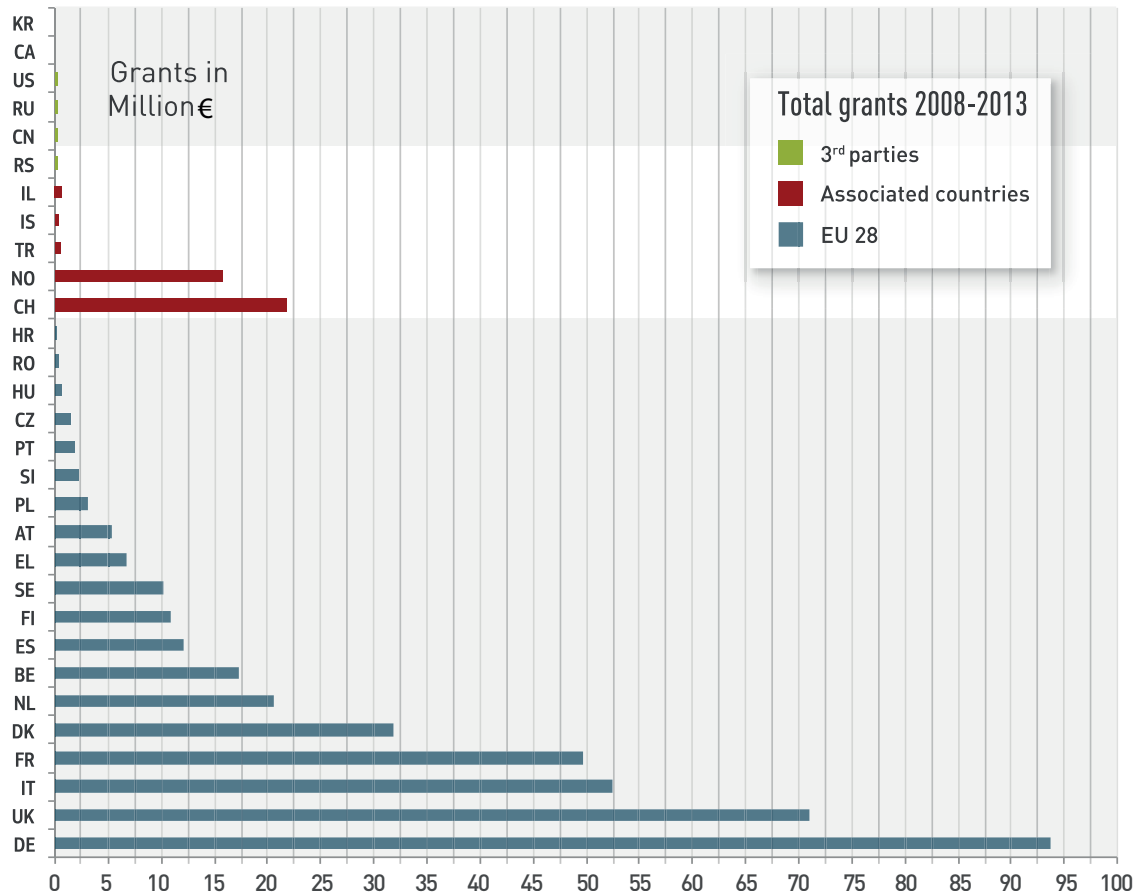
* Projects in this Activity Area are largely research-oriented, aimed at materials improvement. No installations have been deployed to-date

Objective 2: Support RTD in the Member States and countries associated with FP7 in a coordinated manner to facilitate additional industrial efforts towards a rapid development of FCH technologies

The FCH JU has helped foster a European-wide community in the field of FCH technologies (see Figure 2).

FFCH JU support for RTD aims to have a broad reach across all European Union Member States (MS) and Associated Countries (AC), thereby reinforcing Europe's position as a whole. The FCH JU has provided RTD support to MS and AC through projects: 24 countries were supported from the very first year of Calls for proposals (2008) and 28 countries overall supported throughout the period 2008-13 for FCH RTD activities.

Figure 3: Total grant funding awarded to MS and AC throughout 2008-13



DE	UK	IT	FR	DK	NL	BE	ES	FI	SE	EL	AT	PL	SI	PT
93.72	71.03	52.45	49.79	31.93	20.61	17.29	12.14	10.95	10.15	6.68	5.37	3.19	2.25	1.93
CZ	HU	RO	HR	CH	NO	TR	IS	IL	RS	CN	RU	US	CA	KR
1.61	0.74	0.36	0.16	21.79	15.85	0.57	0.39	0.73	0.20	0.16	0.15	0.14	0.00	0.00

There remains, however, a wide gap between those countries which feature prominently in FCH JU-funded activities and those at the other end of the scale, such as: Croatia, Romania, Hungary, Czech Republic and Portugal (see Figure 5). The combined funding of these 5 “smallest” countries over the first phase of operation of the FCH JU is almost one-twentieth of the funding that the largest country-beneficiary, Germany, has received over the same period. Moreover, the 5 largest country-beneficiaries are seen to account for almost 300 M € or almost 2/3rd of the FCH JU budget for the 2008-13. This is, to some extent, to be expected given the pre-existing technology base upon which these countries are building. However in 2013, the FCH JU strives to achieve greater inclusiveness by direct contacts and meetings in, for example Romania, Bulgaria, Hungary, Greece and Portugal and by encouraging the related national research communities to participate in the FCH JU calls for proposals. Another action was initiated via the energy National Contact Points (NCP) of the less represented countries to promote wider national dissemination of the FCH JU calls.

Figure 4: The 10 highest country beneficiaries of FCH-JU grant funding (budget figures)

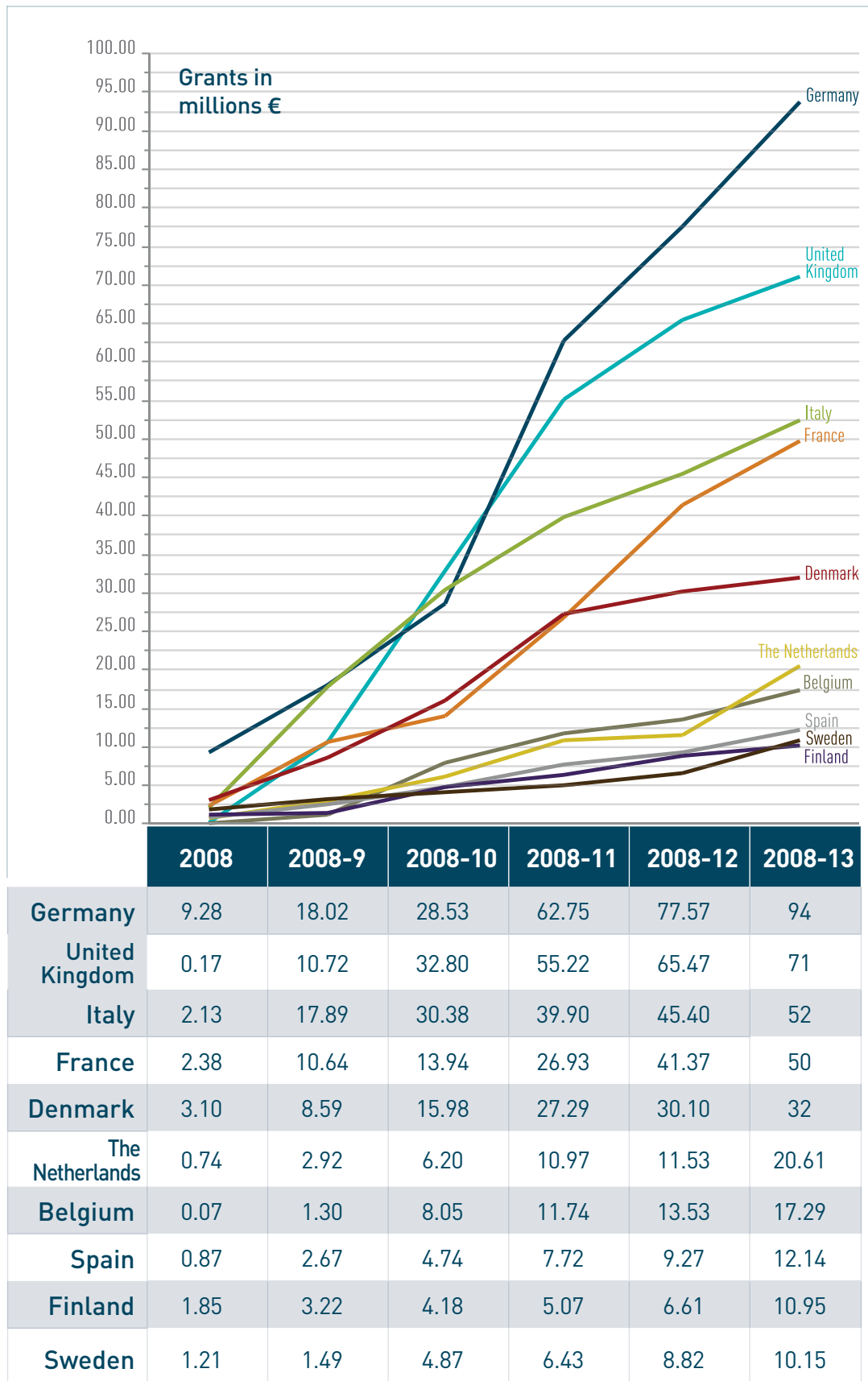
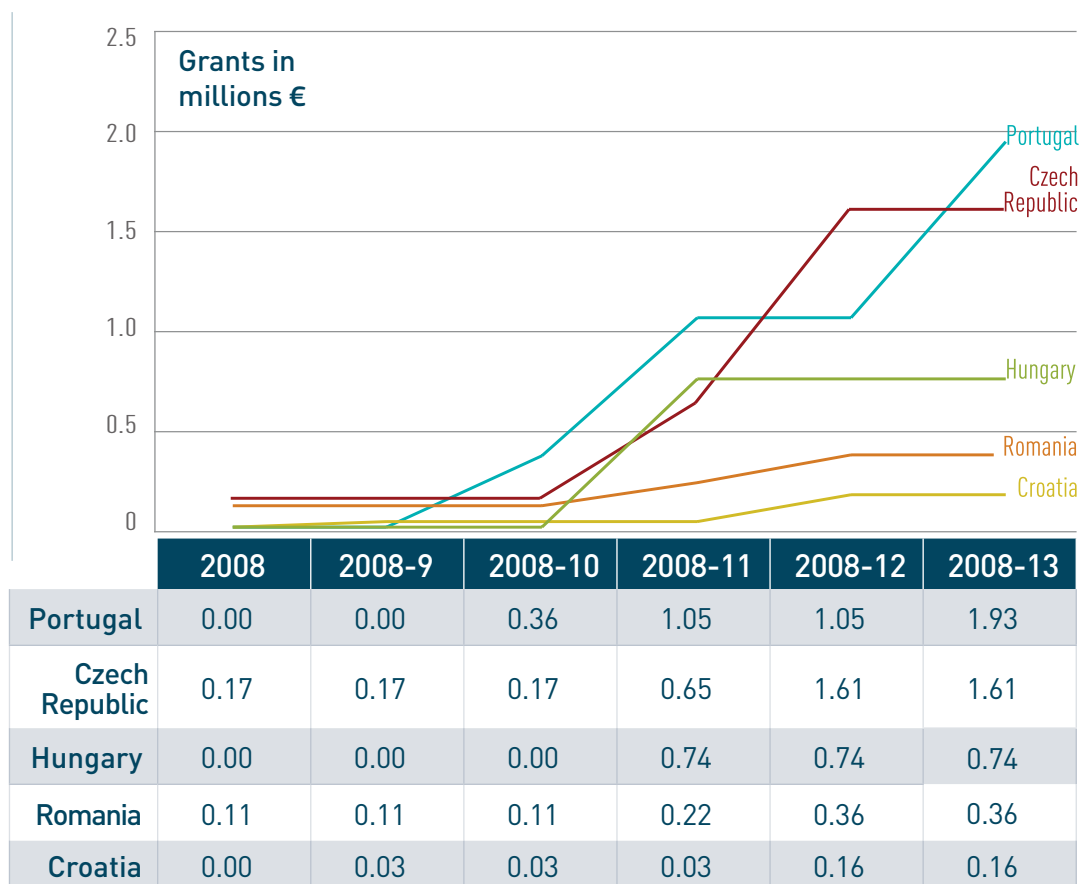
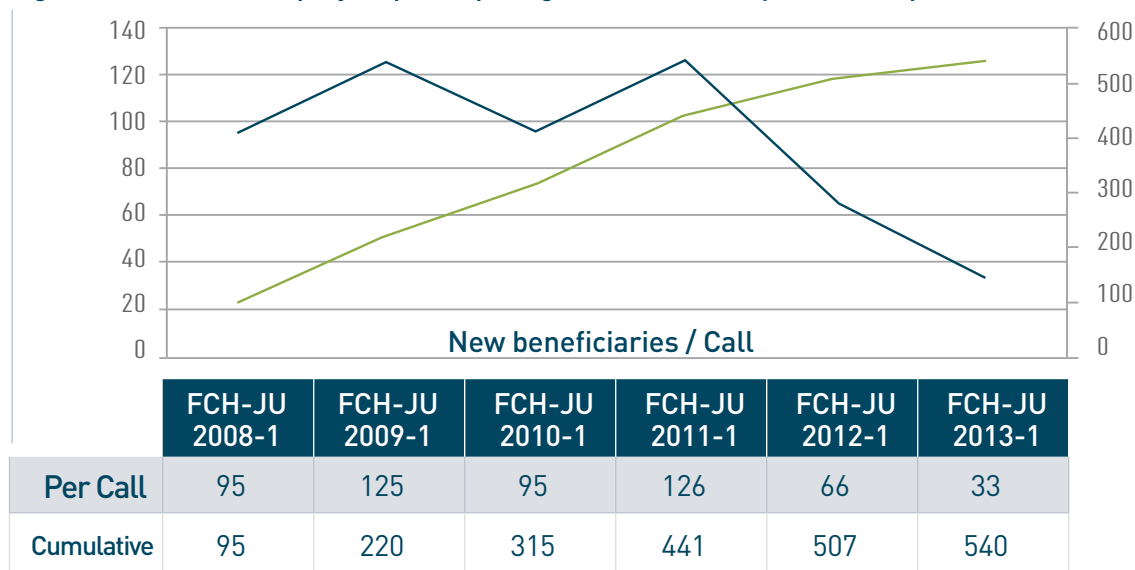


Figure 5: The 5 lowest country beneficiaries of FCH JU grant funding (budget figures)



The FCH JU is contributing to expanding the community interested in the development of fuel cells and hydrogen technologies. The programme has fostered the first-time participation of over 500 different entities to-date in the calls for proposals (see Figure 6).

Figure 6: New FCH JU project participating entities annually since inception



Blue line represents new participating entities per individual Call; Green line represents the cumulative total number of new participating entities, since the start of the FCH JU in 2008.

Moreover, results from a survey conducted amongst over 150 entities liaised to the FCH JU show that, on average, annual turnover has increased by 10%, R&D expenditures by 8% and market deployment expenditures by 6% (see Figure 7).

Figure 7: Annual growth experience by FCH JU respondent (2007-11/12)⁸

Turnover		R&D expenditures		Market introduction/ deployment expenditure	
N = 45 (IG), 53 (Beneficiaries)		N = 46 (IG), 106 (Beneficiaries)		N = 43 (IG), 41 (Beneficiaries)	
Decrease	17%	Decrease	21%	Decrease	22%
0-20% p.a.	42%	0-20% p.a.	54%	0-20% p.a.	58%
> 20% p.a.	42%	> 20% p.a.	25%	> 20% p.a.	20%
Average	10%	Average	8%	Average	6%
Total annual increase EUR mln	+265 mln	Total annual increase EUR mln	+533 mln	Total annual increase EUR mln	+188 mln

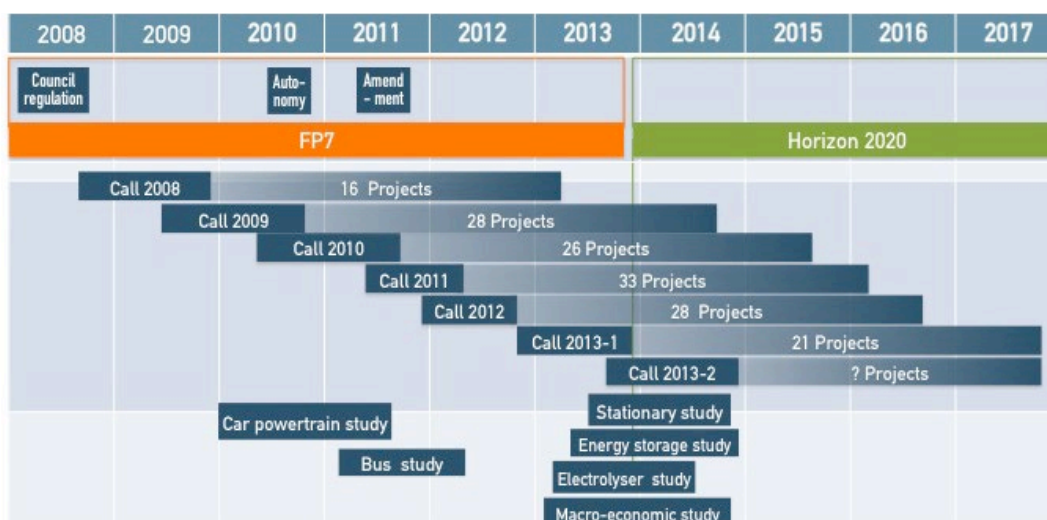
The FCH JU also supports MS and AC through partnerships and collaborations with national FCH initiatives. The FCH JU is a formal member of the UK and French H2 mobility coalitions and strives to set up similar activities in other EU MS. The FCH JU has also been supporting the build of a coalition of the major actors from the bus sector with whom a multi-annual strategy for the commercialization of fuel cell buses is being prepared (refer to the section “Tendered studies”).

Objective 3: Support the 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

Grant projects

The FCH JU has supported over 150 projects through calls for proposals since its commencement in 2008 (see Figure 8).

Figure 8: Projects and supporting actions supported through the FCH JU



⁸ Source: FCH JU (2013). Trends in investments, jobs and turnover in the Fuel cells and Hydrogen sector. Published Feb. 2013) and available on the FCH JU website

As mentioned above, in 2013, two calls for proposals were launched. The process for the second call is still ongoing.

Table 5 shows the extent to which the FCH JU call process has supported the RTD priorities of the MAIP over the five years since its inception. While the majority of MAIP topics were addressed through the various Calls, actual projects were not always achieved 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 (without the 2013-2 call) is presently 83% (target 100% by 2013).

Table 5: Coverage of MAIP RTD target areas through FCH JU AIPs and Calls for Proposals

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 that the Topic was not foreseen in the MAIP when it was originally formulated, but was subsequently included as a topic for the AIP and as the subject of a Call for Proposal

- Included in Call Topics for AIP of the given year
- ✗ Included in Call Topics for the AIPs over the period 2008-13
- Project awarded in the Call Topic for the AIP of given year/period
- ✗ Project awarded in the Call Topic for the given period

Year	2008	2009	2010	2011	2012	2013	PERIOD
Transport							
T01	•	•	••	••	•	•	✗
T02	•						✗
T03	•				•		✗
T04		•		•	•		✗
T05		•	•	••••	•••		✗
T06			•	•			✗
T07			•	•			✗
T08			•	•		•	✗

Year		2008	2009	2010	2011	2012	2013	PERIOD
T09	Components for hydrogen refuelling stations				•		•	X
T10	Fuel cell systems for H2-fuelled airborne platforms				•	•		X
T11	Storage cryogenic H2		•					X
T12	Rail Propulsion							
T13	Periphery H2 tank system & conditioning components							
T14	Auxiliary Power Units (APU) for rail and maritime application			••			•	X
T15	H2-Internal Combustion Engine (ICE)							
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							
T21	PNR on H2 vehicles in confined spaces							
	Preparation for large-scale vehicle demo	•						X
H2 Production and Distribution								
H01	Low-cost, low-temperature, high-efficiency electrolyser	••		••			•	X
H02	Fuel processing catalyst, modules & systems		•	••				X
H03	Gas purification technologies		•	•				X

Year		2008	2009	2010	2011	2012	2013	PERIOD
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 H2 storage							
H08	Low-temperature H2 production processes			•	•			X
H09	Solid and liquid H2 storage		•					X
H10	Large-scale H2 liquefaction			•				X
H11	H2 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 H2 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 H2 distribution						•	X
	Diagnosis and monitoring of electrolyser performance						•	X
	Validation of photoelectro-chemical hydrogen production processes						•	X
H12	PNR & RCS				•			X

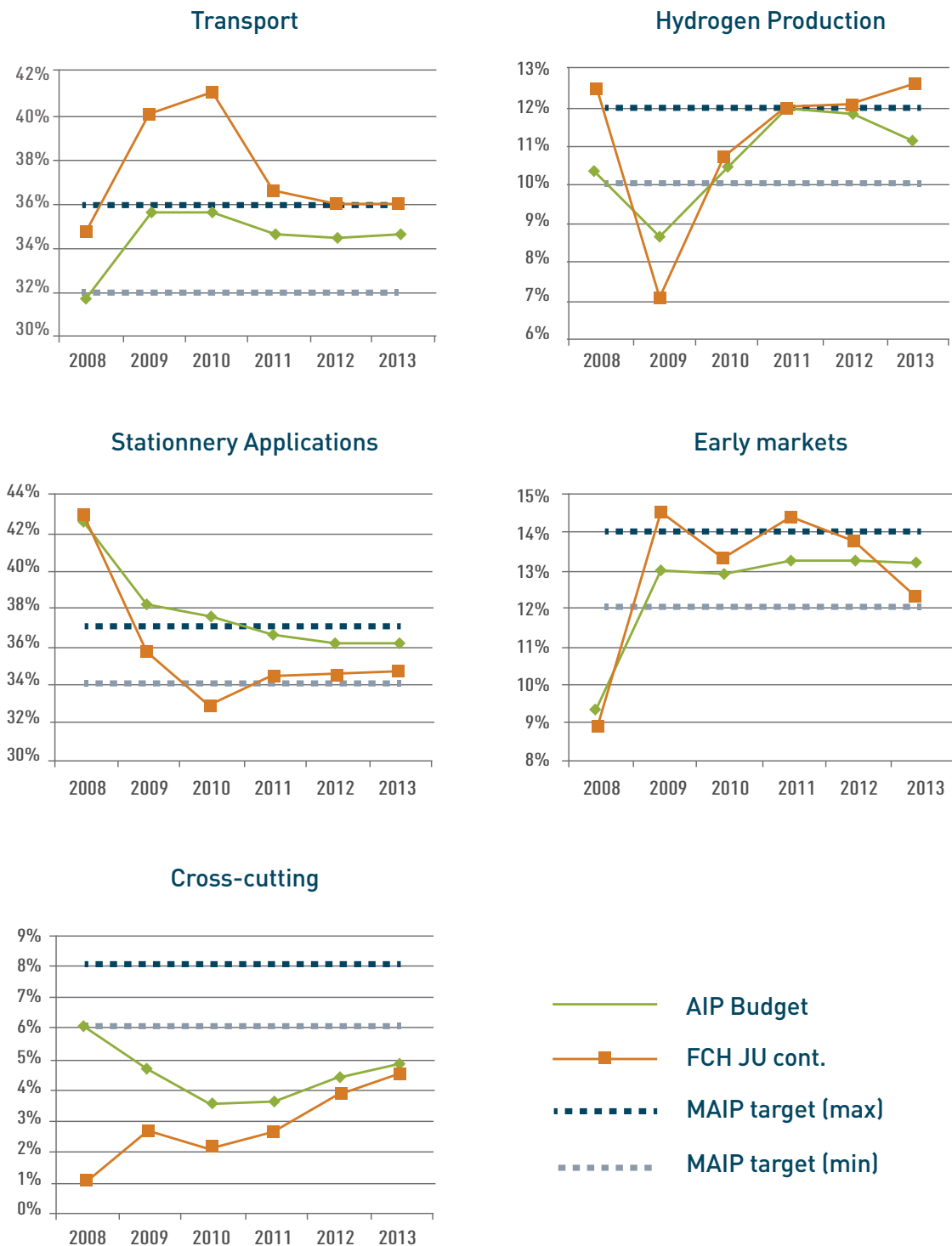
Year		2008	2009	2010	2011	2012	2013	PERIOD
Stationary Markets								
S01	Degradation & lifetime fundamentals	•••••	•••			•	••	X
S02	Materials development for cells, stacks and balance of plant (BoP)		•••	••				X
S03	Next generation stack and cell designs			••	••	••	••	X
S04	Controls, modelling, diagnostics	•	••		•	•		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 H2 devices for residential CHP							
S11	PNR on industrial H2 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

Year		2008	2009	2010	2011	2012	2013	PERIOD
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 1-10kW 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 1-30kW 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							
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							
C07	SME promotion: Supply chain							

Year		2008	2009	2010	2011	2012	2013	PERIOD
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 H2 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 H2&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 H2						•	X
	Pre-normative research on resistance to mechanical impact of pressure vessels in composite materials						•	X
Total projects funded under AIP topics		16	28	26	33	28	21	152
Total topics covered by AIP (covered by actual projects)		14(10)	29(18)	27(18)	37(21)	30(22)	27(15)	82(68)

As shown in Figure 9, the budget distribution per activity area has, based on annual cumulative budgets, progressively come in 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 in terms of actual 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 9: Target budget per Activity Area (AA) compared to actual commitments per AA resulting from Call process (based on cumulative relative budget figures with each year)



Tendered studies

In addition, the FCH JU has funded a number of studies and supporting actions through calls for tender. In the Annual implementation Plan (AIP) 2013, the following areas for benchmarking studies were identified (see Table 6).

Table 6: Benchmarking studies in the 2013 AIP

Subject (Indicative title)	Indicative funding (€)
1. Development of a European Fuel Cell and Hydrogen Vehicles Roll Out Plan including support to national rollout strategies	0.2 M
2. Macroeconomic impacts of fuel cell and hydrogen technologies	0.3 M
3. Development of a European Urban Fuel Cell Bus Commercialization Strategy based on the results of the fact based comparison of alternative powertrains done in 2012	1 M
4. Development of a European commercialization strategy for fuel cell stationary applications (distributed power generation)	1.5 M
5. Economic and technical assessment of the role of Hydrogen in Energy Storage	1.25 M
6. Financing Hydrogen Refueling Infrastructure: conditions for private investments and required forms of public support	0.4 M
Total FCH JU Funding	4.65 M

The status on the above studies, identified for execution 2013, is given below:

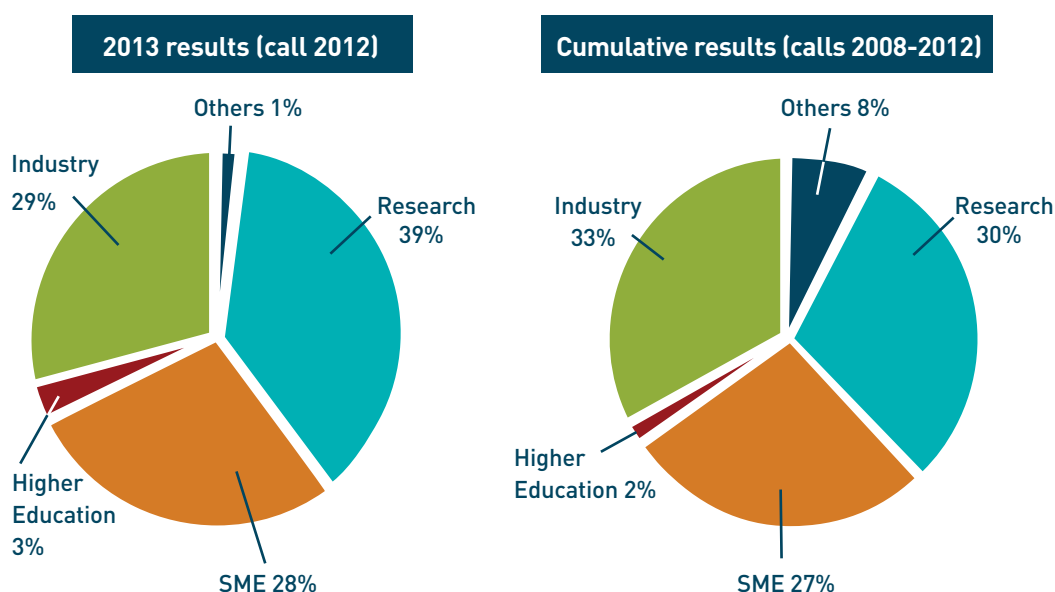
1. Development of a European Fuel Cell and Hydrogen Vehicles Roll Out Plan including support to national rollout strategies: The FCH JU has been actively involved in several national roll-outs planning, most notably in France and the UK. This year, these planning exercises did not request the financial support of the FCH JU. Several national roll-outs have indeed received support from another EU programme (TEN-T). The FCH JU also supported the roll out of fuel cells cars by contracting a financing study (see §6)
2. Macroeconomic impacts of fuel cell and hydrogen technologies: A call for tender was issued for a study on the macro-economic impact of the deployment of fuel cells and hydrogen technologies. However, it was decided to cancel the procedure and reformulate the terms of reference with a view to contracting a study, with redefined scope, early 2014.

3. Development of a European Urban Fuel Cell Bus Commercialization Strategy based on the results of the fact based comparison of alternative powertrains done in 2012: The FCH JU has been building a coalition of the major actors from the bus sector ready to promote the commercialization of fuel cells buses (with the relevant hydrogen refuelling infrastructure). Together with this coalition the FCH JU has been preparing a multi-annual strategy for the commercialization of fuel cell buses. As a result, the commercialization study planned in the AIP 2013 will be contracted in the beginning of the year 2014.
4. Development of a European commercialization strategy for fuel cell stationary applications (distributed power generation): The FCH JU contracted the support of a consultant to help in building an industrial coalition able to support the study and define its terms of reference. In December a coalition of 38 companies gave its agreement to the terms of reference and agreed to support the study. The study itself will be contracted in January 2014.
5. Economic and technical assessment of the role of Hydrogen in Energy Storage: This topic was divided in two.
 - a) As a first stage the FCH JU contracted a study on electrolyzers, the key technology to ensure a role for hydrogen in storing energy. This study consists of a techno-economic assessment of electrolyser technologies and will also include recommendations for research funding priorities for the FCH JU. The study is on-going and will be finalized by the end of January 2014.
 - b) The second stage includes identification and quantification of the demand for energy storage, a fact-based comparison of available technologies including hydrogen together with recommendations in terms of regulatory changes, business models and research priorities. The FCH JU contracted the support of a consultant to help in building an industrial coalition able to support the study and define its terms of reference. In December a coalition of 30 companies gave its agreement to the terms of reference and agreed to support the study. The objective is to further extend the coalition and to contract the study itself in January 2014.
6. Financing Hydrogen Refuelling Infrastructure: conditions for private investments and required forms of public support: The FCH JU contracted the support of a consultant to explore the conditions in which private investments, in particular debt finance, could become available to finance the H₂ infrastructure and the necessary support from public authorities. The study was done in collaboration with the coalitions which are preparing a roll-out of fuel cells cars in Germany and in the UK and with the assistance of the European Investment Bank (EIB). The study shows clearly that in the first years refuelling stations are not profitable as there are not enough cars on the road to ensure a high volume of H₂ sales. As a result, the role of governments and strategic investors is crucial. Debt finance (in a project finance setting) will not be available immediately unless public authorities ensure the reimbursement by subsidizing the infrastructure and/or guarantee the repayment of debt. Corporate Debt finance could obviously become available earlier, if not immediately, if strategic investors are willing to borrow on the face of their balance sheet. The study explores a few scenarios on how to accelerate the roll out and access to debt finance.

Objective 4: Increased public and private RTD investment in FCH technologies in the MS and Associated countries

The FCH JU has encouraged investment co-operation amongst a diverse set of organizations, ranging from industry, and small and medium enterprises, to research and higher education. Importantly, the programme has fostered increased participation of SME's throughout its first 5-year cycle, whilst maintaining the ever-important presence of the other sectors active in the field (see Figure 10).

Figure 10: Participation of various organization types in FCH RTD through FCH JU projects



Notably, the percentage of SME participation in projects was 28% for 2013 (based on results of the 2012 call for proposals), compared to the target of 15% as identified in the AIP 2013. This represents an increase in SME participation compared to the earlier years of the FCH JU operation, and remains in line with figure from last year (refer to Table 7). Industry participation (including SMEs) also continues to be in line with (and even above) the target. The relative decline in industrial participation (a decline of 14% from 2010 to 2013) is largely due to the increase in participation from research institutions (an increase of 12%, from 27% in 2010 to 39% in 2013).

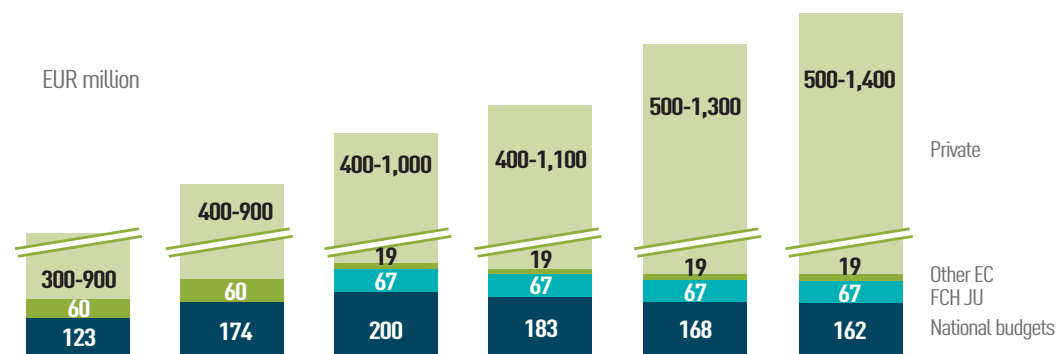
Table 7: Participation of SMEs and industry in FCH JU-funded projects

Indicator	Target	Results*			
		call 2010	call 2011	call 2012	call 2013
Percentage of SME participation in projects	15%	19%	24%	30%	28%
Percentage of industry participation in projects	50%	71%	65%	68%	57%

* The result presented for each year represents the results for the Call of the year prior to the year in question (due to the time lag between Call launch and actual contracting of projects from a Call, the full results from one Call year are generally only visible in the following year)

Moreover, support from the FCH JU has helped leverage additional funds in the industry sector towards RTD in FCH technologies. A survey conducted amongst over 150 entities liaised to the FCH JU found that national and EU programmes, such as the FCH JU, play a pivotal role in enabling private investment. Since the start of its existence, the FCH JU has come together with national-level public funding to leverage over an estimated amount of 1 billion euros investment annually from private sector in the area of FCH (see Figure 11). The FCH JU has served as a signal of EU commitment and policy direction in the way of FCH technologies, while also providing funding to support research and cost reductions in the sector – particularly important for small R&D companies.

Figure 11: FCH expenditure (M €) in the EU (2005-10)⁹



Source: RD&D budget split from FCH JU survey; public support for FC&H from OECD/IEA statistics

Note: For consistency and ease of comparison, EU budgets (including FCH JU budgets) are represented in line with the time horizons of the various Framework Programmes. As such, the (EU) FCH JU budget of 450 M € for the period 2008-13 has been spread uniformly over the 2007-13 timeline of Framework Programme Seven (FP7).

1.3 Cooperation

International cooperation

International cooperation was continued during 2013 mainly with the USA. The FCH JU's approach is to develop cooperation at operational levels through projects and information exchange. Policy cooperation with international partners remains the EC's prerogative.

United States of America (USA): Staff of the FCH JU participated in the Department of Energy's (DoE) Annual Merit Review and DoE experts were in turn represented at the FCH JU's 2013 Programme Review Days and in the evaluation of the proposals from the 2013 Call for Proposals.

In addition, bilateral meetings were held either in person or via teleconference to discuss ways for operational cooperation. Work programmes were shared in order to identify areas of common interest at project level. One project of the 2012 call for proposals started in coordination with US partners identified, approved and funded by the DoE (eligibility criterion). For the 2013-1 selected projects, DoE identified the FCH JU topics of common

⁹ Source: FCH JU (2013). Trends in investments, jobs and turnover in the Fuel cells and Hydrogen sector. Published Feb. 2013

interest and the project coordinators of the related grant agreements were contacted and encouraged to promote cooperation with US partners (to be funded by DoE as appropriate).

Republic of Korea: Discussions were established through contacts with KETEP (Korea Energy Technology Evaluation and Planning). Due to internal changes in the Korean funding of research devoted to fuel cells and hydrogen technologies, these contacts were kept informal and did not lead to implementation of cooperation actions. Cooperation efforts with the Republic of Korea will continue to be pursued in 2014.

Member States

Exchange of information with the Member States and countries associated with the 7th Framework Programme were sustained and further developed in 2013 through the FCH JU States Representatives Group (SRG) (see the Governance section).

In addition to the formal cooperation through the States Representatives Group, the relationship with the Member States continued through the National Contacts Points (NCPs) for energy in all member states. These have regularly been informed about FCH JU activities, invited to its events and received specific information material. FCH JU also participated in the relevant events organized by the NCPs.

Regions

The communication taskforce established by the Programme Office, IG, RG and HyER (Hydrogen Fuel Cells and Electromobility for European Regions) to align activities and messages as well as to develop communication synergies, continued its activities. Joint actions were organised as part of the project dissemination strategy, for example during the EU sustainable energy week.

Joint Research Centre

The Joint Research Centre (JRC) of the European Commission continued to support FCH JU activities in 2013 under the Framework Agreement concluded between the two entities in 2009.

At programme level, the JRC provided the FCH JU with inputs and technical data for strategic planning (mainly in the field of hydrogen safety). The JRC participated also in the planning of international cooperation strategies and meetings with international partners. Additionally, the JRC provided a strong and very useful link between the FCH JU and activities within the SET Plan aimed at reinforcing the FCH JU links with other relevant European Industrial Initiatives and integrating the FCH JU contribution into the SETIS monitoring tool.

At project level, JRC initiated the H2Sense proposal in cooperation with US national laboratories and was a consortium partner in 3 projects selected from the 2013-1 call for proposals. It maintained and updated databases and associated tools for public access to EC-funded and JTI-funded R&D on FCH technologies: NESSHY-DB and HIAD. The JRC also initiated harmonisation amongst the FCH JU funded projects of the test protocols for fuel cells vehicles. It contributed to the definition of the call topics for the Annual Implementation Plan.

The JRC provided policy support to the European Commission in the field of FCH technologies (for example technical inputs to relevant legislation and standardization) and support in international cooperation activities (IPHE, IEA).

The JRC participated in the 2013 Programme Review Days with 3 reviewers and contributed to the new format of the event. It contributed also to setting the scope and the terms of reference of FCH JU financed coalition studies as foreseen in the Annual Implementation Plan 2013.

2. Support activities

2.1 Administrative functions

2.1.1 Legal and Financial Framework

In 2013, the main activities carried out by the Program Office in this field included the following:

Revisions of the model grant agreement

The model grant agreement was revised to reduce the time to pay (maximum deadline before which the FCH JU must pay the beneficiaries) and provide for electronic submission only.

Guidance note on reporting

The Guidance notes on project reporting for FCH JU beneficiaries were updated to take into account changes stemming from the improvement of IT tools including electronic submission only. The objective of the Guidance notes is to increase the quality of the reporting by project beneficiaries and to help the later to comply with the expectations from the FCH JU.

Guide to financial issues for FCH JU beneficiaries

An updated version of the financial guide was produced and shared with the FCH JU beneficiaries. The objective is to provide detailed explanations of the financial provisions of the grant agreement. It helps the FCH JU in ensuring equality of treatment of the beneficiaries.

Communication campaign¹⁰:

In order to facilitate the financial implementation of projects and to avoid errors in the costs reporting by beneficiaries, the FCH JU organised two additional sessions of a one-day-training for its beneficiaries. The training included a detailed explanation of the financial provisions of the grant agreement, an explanation of the control system applicable to the FCH JU funding as well as an analysis of the most frequent errors in the costs reporting of beneficiaries. It also comprised a presentation from an external audit firm (contracted by the FCH JU to carry out ex-post audits) on the “lessons learned from ex-post audits”.

Preparation of Horizon 2020 and of FCH 2 JU

During 2013, the European Commission has been working to prepare the legal framework for Horizon 2020 (the 8th multi-annual R&D framework programme) and for the new generation of joint undertakings. The FCH JU contributed by formulating proposals and providing technical analysis, by commenting on draft texts and making improvement and clarifying suggestions.

¹⁰ Presentations are available on the FCH JU website under Reference document for reporting- financial issues (<http://www.fch-ju.eu/content/how-participate-fch-ju-projects>)

2.1.2 Human Resources

Two selection procedures were completed (replacement of the staff who resigned):

- Secretary/AST3 (took up the duties on 01/05/2013)
- Knowledge Management and Policy Officer/AD8 (took up the duties on 16/11/2013)

By the end of 2013 the FCH JU Programme Office has been staffed with 16 Temporary Agents and 2 Contract Agents. The 2 vacant posts (to reach full establishment plan) should be filled in the course of 2014 (one recruitment procedure was launched end 2013).

In the year 2013 the FCH JU recruited also 5 trainees, each of them for a period of 6 months, to support various activities both in the Programme Unit and the Finance and Administration Unit.

A number of policies and procedures were updated (learning & development, training, recruitment,...) aiming at improvement and simplification. Two teambuilding sessions were organized to increase team performance and enhance internal communication.

2.1.3 Offices

The seat of the FCH JU Programme Office has been located in the White Atrium in Brussels, Av. de la Toison d'Or 56-60 since 2011 together with other four established Joint Undertakings.

2.1.4 IT Infrastructure

FCH 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, 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.

FCH core business	
EC Framework Program 7 IT tool family	<ul style="list-style-type: none"> • ESS - Submission of Application, Call Management • NEF/CPM - Negotiation, Grant Agreement • Force/SESAM - Submission Form C, Project reporting • EMI – Expert management for evaluations • CORDA – Statistical database for calls and projects
ABAC	<ul style="list-style-type: none"> • accrual-based accounting system of the Commission
Public business support tools	
Support to Governance Bodies (GB, SC, SRG, BCP) (New)	<ul style="list-style-type: none"> • Dedicated, secured and highly available IT platforms for Governance bodies were setup on CIRCA BC.

Events Registration Tool (New)	<ul style="list-style-type: none"> • New modular tool to manage events organized for communication team.
TEMONAS tool (New)	<ul style="list-style-type: none"> • Technology monitoring and assessment platform delivered by one FCH project
FCH JU website	<ul style="list-style-type: none"> • Public communication channel for the JTI
FCH internal support	
JTI common infrastructure	<ul style="list-style-type: none"> • Hosted inside the building premises • Supported by third-party contractors • Common JTI IT Governance chaired by FCH
M-FILES (New) (Document Repository Application)	<ul style="list-style-type: none"> • Implementation of a new tool for electronic processing, storage and retrieval of documents • Integrated one-page intranet to centralize helpdesk information and access to tools and applications
ISA (New) (Information System for Absences)	<ul style="list-style-type: none"> • Development in 2013 and launch on 1st January 2014 of the IMI tool to manage the several types of absences as JTI common integrated internal tool.

In 2013, FCH capitalised on its investments to set up and avail itself of a modern and efficient IT work environment. It was marked by the parallel implementation of the document management system and technology monitoring and assessment platform to support the business processes mentioned above.

Support to FCH Core Business

In 2013 we have ensured adequate access for the FCH staff to the complete set of FP7 IT applications provided by the Commission, with improved system of access rights in accordance with the IAC 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 we have reinforced the use of CORDA as the source of statistical reporting. The automated generation of cost claims in ABAC Workflow was also activated in agreement with DG RTD and DG BUDG. Participation in coordination meetings with the Commission and other JUs was also improved for follow-up on the adjustments needed to allow and ensure smooth functioning of FP7 IT tools and preparation of the H2020 period.

Business Support Tools

The collaborative platforms for supporting the Governance Bodies like Governing Board, Scientific Committee, States Representatives Group or Business Continuity Group were created under the facility, provided by the Commission, as a standard and integrated solution, secured by the authentication process commonly used by FP7 and H2020 IT tools.

A tool developed by IMI has been delivered to all the JTIs to manage the registration of attendees to Events. The Events Registration Tool is modular and customizable depending on the needs for the event.

The TEchnology MONitoring and ASsessment platform (TEMONAS) has been delivered to FCH as a result of a financed project under Cross-Cutting activities. The database and application portals are now hosted in the FCH premises. It provides a functional and integrated tool specifically tailored for the needs of research program progress evaluation with:

- Data entry addressing inconsistent data descriptions and parameter names as well as inaccurate results, different levels of information reliability and confidentiality.
- Design and implement a data process including Validation
- Develop a methodology to assess, benchmark and monitor the progress of individual projects and technologies
- Implement a methodology for multi-criteria comparison
- Expert opinion integration in a structured format
- Develop the necessary query, result integration and reporting tools

FCH Internal Support

Internal common IT systems were set on a server in the premises building of FCH, stabilised and enhanced throughout the years. The stabilisation, root-cause analysis of the problems, reporting and monitoring of IT issues and Service Level Agreements in an efficient IT Governance group have significantly reduced the IT risks in the organization as proven by the risk assessment performed on IT by the IAS this year.

The FCH document management system was delivered and implemented. It 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 to access information and connect with other systems.

The Information System for Absences (ISA) initially developed by IMI has been adopted by all the JTIs for implementation with the new staff regulation on 1st January 2014 to automate and digitalise a series of internal workflows in human resource management.

With the prolongation of the FCH JU under the H2020 program and the FP7 ending, a number of potential problems were identified. Core business IT tools will be different which could cause the risk level of the processes for a call to increase. Particular attention is already given to those issues as they have a direct impact on the workload and planning activities of the staff. Aside from this, efforts were put to ensure adequate development, training and test of the new H2020 applications package in line with the new FCH regulatory program. New telecommunication lines (Stesta) will be replaced end 2014 which are key to access the business processes and a procurement procedure will generate the next Framework Contract for IT services for 2015 onwards.

2.2 Communication activities

In 2013, all the activities initiated in the past years have been further developed and strengthened. FCH-JU organised, co-organised, sponsored and attended many conferences/meetings with a view to foster awareness towards EU & national policy makers, multipliers' networks as well as towards opinion leaders and stakeholders of the FCH sector and related communities. The messages focused on the overall potential and

market readiness of FCH technologies, the progress of the program so far and the dissemination of projects.

2.2.1 Advocacy and awareness-raising

The awareness-raising campaign of the FCH JU has been quite intense over the last years. In particular in 2013, the Executive Director and/or a Programme Office representative participated in many meetings, conferences and Info Days in Brussels and in several EU Member States in order to provide information about FCH JU activities (i.e. calls for proposals). A strong communication campaign was in place to foster an effective involvement of all players (e.g. SMEs, Research Organizations) in the FCH JU Programme in view of boosting the deployment and implementation of FCH technologies at EU and national level.

A very relevant institutional communication strategy was also in place in order to ensure political visibility and support to the overall FCH JU programme. In addition to more than 30 activities carried out at MS level (e.g. conferences, meetings, Info Days) the FCH JU undertook an impressive set of actions at EU level for presenting the partnership, its achievements and perspectives for delivering the objectives.

About the European Parliament, these exchanges took place in the framework of discussions related in particular to the definition of Horizon 2020 and Clean Power for Transport Package. The FCH JU has had contacts with more than 70 MEPs of the main political groups (e.g. EPP, S&D, ALDE and Greens). In particular, MEPs representatives of the ITRE/ENVI/TRAN Committees have been targeted.

FCH JU has coordinated the organization of the 2nd joint exhibition of the JTI which took place from 30 September to 4 October 2013 at the European Parliament premises. This joint event aimed at conveying important messages to MEPs by stressing the ability of JUs to facilitate a leverage effect and increase R&D investment in the sectors concerned. JUs were presented as quicker and more flexible tool to provide responses to stakeholders, to establish a market driven networks of partners (facilitating the engagement of SMEs) and to keep leadership (competitiveness and quality of life) in Europe.

Moreover, FCH JU was regularly invited in high level events at the European Parliament and organised some dinner debates as well.

About the Council, all the activities initiated in the past years have been further developed and strengthened. The FCH JU has had regular contacts with Councillors and Scientific attachés of some National Permanent Representations to present an update on the achievements of the FCH JU in view of the Horizon 2020 legislative process.

The FCH JU has also participated in national information sessions in UK, Portugal, Spain, Italy, France, Belgium, Hungary, Romania and Bulgaria to present the annual call for proposals.

About the European Commission, FCH JU has been very active in having regular contacts with the main DGs involved in the FCH JU Programme (i.e. RTD&I, ENER and MOVE). In the spirit of an effective institutional collaboration, FCH JU has been providing data and information with accuracy and transparency.

Publications and electronic communication

New brochure: FCH JU General presentation



In addition to the existing general leaflet about FCH JU, a new brochure for communication purposes has been entirely designed and produced based on the Programme Office recommendations. It has been distributed on the day of the Stakeholders General Assembly 2013. It gathers general information about FCH activities as well as facts and figures by application area. The folder's design focuses on main FCH technologies and gathers 7 loose pages (the document is available on the FC JU website: www.fch-ju.eu)

- 1) General information on FCH 1 JU
- 2) Transportation & Refuelling Infrastructure
- 3) Hydrogen Production and Distribution
- 4) Stationary Power Generation and Combined Heat & Power (CHP)
- 5) Early Markets
- 6) Cross-Cuttings activities
- 7) FCH 2 JU under Horizon 2020

Poster template for the Programme Review Days 2013

A fact-sheet template has been developed in order to gather information from coordinators per project. This template has then been re-designed based on FCH JU visual identity. 110 posters based on this design and templates have been displayed on occasion of the Programme Review Days and Stakeholders General Assembly of the FCH JU from 11 to 13 November 2013.

Poster example:

CHIC
CLEAN HYDROGEN IN EUROPEAN CITIES

Duration: April 2010 - December 2016

Application Area: Aargau / Switzerland, Bozen / Italy, London / UK, Milan / Italy, Oslo / Norway

Budget: 51.2 Million EUR
FCH-JU contribution: 26 Million EUR

Partnership / consortium list: 10 cities across Europe, 18 industrial partners, 7 research and consultancy partners

Summary / main objectives of the project:

- Implementation of clean urban mobility in 5 major EU regions through the deployment of 26 hydrogen fuel cell powered buses and the enlargement of H₂ infrastructure systems
- Facilitation of the development of clean urban public transport systems into at least 14 new EU regions
- Collaboration, transfer and securing of significant key learning from previous fuel cell projects into the CHIC stakeholders
- Greater community understanding of "green" H₂ powered fuel cell buses, leading to increased political acceptance and commitment

Technical accomplishment / progress / result:

- 48 Fuel Cell Buses are on the road in day-to-day passenger daily
- The vehicles are able to satisfy the daily demands of urban bus routes without returning to the depot
- The high throughput 320 bar H₂ stations deployed in the project have performed availabilities over 95%, and full times < 10 min.

Contribution to the Programme Objectives:

Hydrogen Infrastructure	Fuel Cell Bus Scale
<ul style="list-style-type: none"> H₂ refueling station capacity of 200 kg/day Average availability of refueling stations 84% Provision of refueling for H₂ stations 92 and 70% 48 320 bar trucks 19 trucks 	<ul style="list-style-type: none"> Fuel cell lifetime greater than 100k km Average availability of all fuel cell buses greater than 88% 100000 km of bus operation 100000 km of bus operation

Conclusions, major findings and perspectives:

The CHIC-Project is a demonstration project where buses from a number of different bus manufacturers are evaluated with different fuel cell suppliers and an appropriate H₂ infrastructure. The buses and the hydrogen refueling stations are integrated in the daily public services to show their reliability, availability and also the possible need of technical improvement. This technology is well accepted by the bus drivers and passengers

Future Steps:

- Operation of all 26 Buses in the "Phase 1 Cities" by the end of 2013
- Completion of the Hydrogen infrastructure in the "Phase 1 Cities" by the end of 2013
- Showing reliability and availability of this technology during day-to-day operation
- Discussions of the project with 10 workshops for interested "Phase 2 Cities"

New Energy World JU
Fuel cells & hydrogen for sustainability

CHIC

Electronic communication

The FCH JU web site, operational since March 2011, has been regularly updating its content.



Main updates for 2013:

- Adaptation of the “Stakeholders General Assembly” and “Programme Review Days” page with information on the 2013 edition
- The publication of call 2013 part II
- Follow-up of information on Innovation Investment Package and Horizon 2020 by publishing these in the “News” section
- An Index has been added at the beginning of the “Document” section with the creation of a new part dedicated to Horizon 2020 and FCH 2 JU

The statistics about the FCH JU website show that it is possible to extract reports out of these whenever needed (e.g. for the period along the organization and progress of PRD and SGA (22 October until 22 November) there were 5925 visitors amongst which 53.65% were new visitors).

2.2.2 Public relations & dissemination of projects

FCH JU was regularly invited in high level events and was present as speaker and/or sponsor in more than 40 initiatives organized in Europe. Public relations were part of a strong communication campaign which has raised the visibility’s level of the FCH JU all over Europe.

In 2013, FCH JU took also part of some key events such as (the list is not exhaustive):

1) Hannover Messe from 8 to 12 April 2013

The Hannover Messe is the world’s biggest industrial fair with about 6,500 exhibitors and 250,000 visitors. Experts from policy, research and industry debated all the key trends and issues confronting the energy industry.

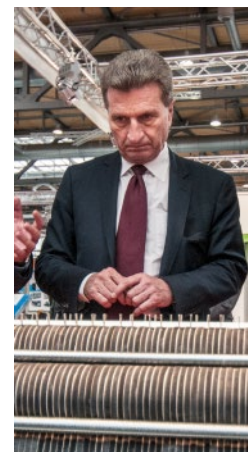
A Renewable Energy forum was located within the same named exhibition sector. The forum featured informative presentations on renewable energy sources. A specific pavilion was dedicated to fuel cells and hydrogen.



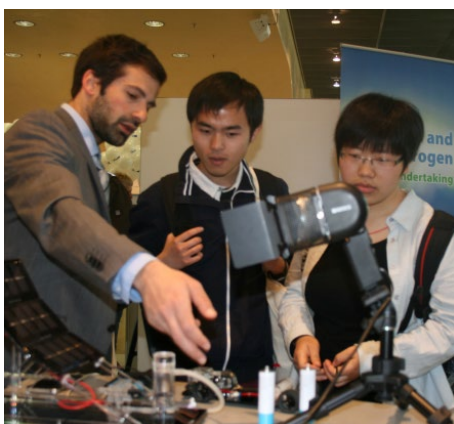
The FCH JU was present with an information booth for the whole week.

DG ENER and DG RTD&I Commissioners stopped at the FCH JU stand and expressed appreciation on the organization as well as Mr Jo Leinen, German MEP.

With its clear focus on core technologies and services, Hannover Messe was a great platform for networking and information exchanges. Moreover, it was ideal to raise FCH JU profile, in particular by participating at some of the fair's numerous forums, conferences and group events.



2) EU Open Doors Day and La Fête de l'Iris from 11 to 12 May 2013



On occasion of the EU Open Day, FCH JU exhibited and displayed a Fuel Cell and Hydrogen car on the Esplanade of the Berlaymont building in order to allow the general public to view some applications of Fuel Cell technology and its current and future potential in transport sector. Of particular interest to the participants were the zero-emission Hyundai Ix35 FCEV and the Van Hool Hydrogen Bus which served as the venue for a debate on alternative fuels.



On the next day, FCH JU participated to "La Fête de l'Iris", a celebration of the city of Brussels, to promote the benefits of fuel cells and hydrogen. An FCH demo car was available at the FCH JU booth, whilst the eco-exhibition and FCH mobile chargers were used to show the functioning of a FCH circuit and raise awareness of the environmental and infrastructural importance of hydrogen.

3) The Green Week 2013 on 05 June 2013

FCH JU participated to the 2013 edition of the Green Week, the biggest annual conference on European environment policy, which took place from 4 to 7 June 2013 at the Egg Conference Centre in Brussels. European Commissioner for Environment, Mr J. Potocniks, visited the FCH JU booth and reconfirmed his high interest in FCH activities.



4) Fuel Cells and Hydrogen for Maritime and Harbour Applications on 14 June 2013 - Venice

On 14 June 2013, a full-day workshop organized by FCH JU on "Fuel Cells and Hydrogen for maritime and harbour applications: current status and future perspectives in the EU" took place in Venice. As part of this program, a visit of some hydrogen initiatives funded by the Veneto Regional Government was organized on the day before. With a focus on current and future clean energy technology solutions for marine applications, the workshop brought together stakeholders varying from a range of public and private bodies to experts and researchers, in order to exchange information on this topic. Three varied sessions have been organized amongst which diverse speakers have provided the audience with the latest developments and trends in these applications.



5) The 5th International Conference on Hydrogen Safety from 9 to 11 September 2013

FCH JU participated to the 5th International Conference on Hydrogen Safety (ICHHS 2013) held in Brussels at the European Commission, Charlemagne building. The conference was hosted by the Joint Research Centre (Institute for Energy and Transport) of the European Commission and had the purpose of improving the public awareness and trust in hydrogen technologies.

An FCH JU booth was present for the three days of the conference and some posters of 11 running projects addressing safety-related issues were exhibited. A FCEV car was displayed during the whole week on the esplanade of the Charlemagne. FCH JU hosted also a gala dinner on the last evening of the conference.



6) Joint Technology Initiatives “Innovation in Action” - Exhibition and events from 30/09 till 04/10 2013

The five Joint Technology Initiatives – IMI, Clean Sky, Eniac, FCH, and ARTEMIS – held a week-long event, Innovation in Action, at the European Parliament. The objective was to present their achievements to date as well as their vision on future challenges. The JTIs ran a series of joint sessions, including a debate, press breakfast and exhibition targeted at an audience that included policy makers, press, industry, academic and research organisations. The event was sponsored by Ms Maria da Graça Carvalho, MEP and Antonio Fernando Correia de Campos, MEP & Chairman of STOA.



The entire event focussed on the added value of the public-private model for innovative research and the positive contributions that the JTIs make to an improved European quality of life. In light of the on-going discussions on the Innovation Investment Package within the EU Horizon 2020 Programme, presented on 10 July 2013 by the European Commission, the event was an opportunity to raise awareness amongst key stakeholders for the on-going need for these type of initiatives in the area of European policy on research and development.

7) Programme Review Days (11 & 12 November 2013) and Stakeholders' General Assembly (13 November 2013)

Programme Review Days

The third edition of the Programme Review Days was organized on 11 and 12 November at the Autoworld museum in Brussels. The objective was to assess, over the years, progress of the programme funded by the FCH JU, notably in relation to the targets of its Multi-annual Implementation Plan (MAIP), annual implementation plans as well as in relation to international developments in the field.

The 2013 edition followed the new concept proposal made by the Scientific Committee. The course of this event was done in two phases: there was a remote assessment during the preparation of the PRD (based on the evaluation of FCH JU progresses by experts against the MAIP and AIP road map) and then the public event (plenary sessions plus two parallel sessions on Transport and Energy).



In addition, a general poster session was organized in order to provide a global picture of the projects funded by the programme. 337 participants have been registered.

Stakeholders General Assembly

Leading speakers from the fuel cell and hydrogen community met on 13 November on the occasion of the 2013 Stakeholder General Assembly of the Fuel Cells and Hydrogen Joint Undertaking. The 6th edition of this high-level forum marked the 10th anniversary of a European strategy for fuel cells and hydrogen and contributed to set out the strategic vision of how fuel cells and hydrogen can help achieve EU 2020 targets.

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.



The event was opened by a welcome speech of Mr Robert-Jan Smits, Director General of DG Research & Innovation and registered the presence of Mr Günther Oettinger, European Commissioner for Energy, who delivered a keynote address.

In addition, a video message from Mrs Maire Geoghegan-Quinn, European Commissioner for Research & Innovation was delivered.

The plenary session was complemented by a poster session about projects funded by FCH JU, 11 booths managed by industry and research partners and two FCH vehicles were displayed on the stage.

More than 350 European and international stakeholders participated in the 6th SGA and according to the evaluation form sent back by the participants the 2013 event was a great success in term of organization, contents and information provided (see FCH JU web-site: www.fch-ju.eu).

2.2.3 Media relations

On occasion of the main 2013 events organized (e.g. Joint Exhibition at the EP, Stakeholders General Assembly, etc.) or participated (e.g. Innovation Investment Package etc.) by the FCH JU, the Programme Office set a specific press session with journalists of the sector.

Bert De Colvenaer explains to PEN how fuel cells and hydrogen technology could help solve some of the major future energy challenges that are racing towards Europe

Fuels cells and hydrogen: the next steps

AS Europe faces up to dwindling resources and environmental degradation, efforts to find clean and sustainable forms of energy continue to increase. When it comes to hydrogen and fuel cell technologies, the region enjoys a scientific lead in the research of these promising technologies. In order to speed up the development, commercialisation and deployment of hydrogen and fuel cell technologies, a European initiative, the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) exists to guide close to €1bn in project funding provided equally by the European Commission in cash and the industry and research sector in kind.

Bringing together over 40 technology leaders from industry including vehicle manufacturers, transport firms, technology providers and infrastructure



Bert De Colvenaer

He feels that the solutions to this are actually accessible and reasonably easy – indeed, what is required is a mind shift towards a more sustainable society. As he explains, fuel cells and hydrogen technologies can help in this respect: “We need to look towards technologies that are sustainable and do not contaminate our environment, and there aren’t so many that can do that. This is why many now look at electricity-based or hydrogen-based technologies. In this respect, electricity and hydrogen are just other ways of carrying energy.”

Several press releases were issued in 2013 and numerous inputs were also provided to journalists upon request.

The Programme Office provided relevant contributions to research media and some articles on FCH technologies were directly published (e.g. Pan European Networks Government; Issue 5; February 2013) according to that.

3. Management and internal control systems

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

3.1 Nature and characteristics of the FCH 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 Industry Grouping' and the 'N.ERGHY Research Grouping').

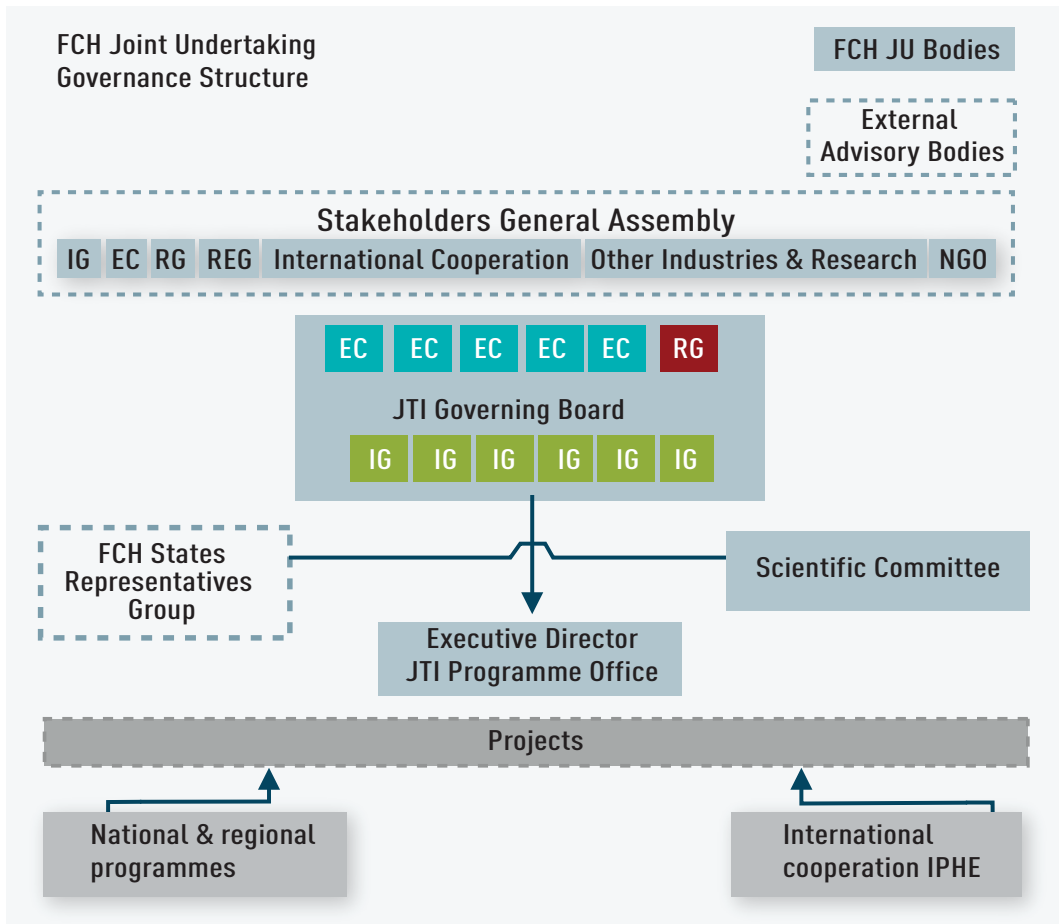
FCH JU was set up in 2008 for a period up to 31 December 2017 and its total financing, consisting of contributions of all the members, is 947 M € for the whole period. The operational costs, which represent more than 90% of the total budget, shall be covered in roughly equal parts through the financial contribution of the Union and through in-kind contributions from the legal entities participating in the activities. The contribution from the participating legal entities shall at least match the financial contribution from the Union.

FCH JU as a legal entity is responsible for the correct implementation of its budget. FCH JU provides funds through grants to beneficiaries which are 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

The governance structure of FCH JU is composed of two executive bodies (i.e. the Governing Board and the Executive Director assisted by the staff in the Program Office) and three advisory bodies (i.e. the Scientific Committee, the FCH States Representatives Group and the Stakeholders' General Assembly). It provides a solid accountability chain and can be represented as shown in Graph 3.2 below.

Graph 3.2: FCH 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 Industry Grouping has six seats, the Commission has five seats and the Research Grouping 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 annual implementation plan, budget and annual accounts and the approval of the list of selected project proposals.

The Governing Board meets at least twice a year. Additional meetings may be organised at the request of one of the Members, or at the request of the Executive Director. Decisions of the Governing Board may also be taken by written procedure on a proposal from the Chair.

In 2013, the Governing Board met four times respectively on 14 March, 26 June, 25 July (by teleconference) and 14 November. Important decisions were taken at the meetings or by written procedure in particular the adoption of the Annual Implementation Plan 2014, the FCH JU 2014 Budget and establishment plan, the 2012 final annual accounts,

the appointment of new Scientific Committee members, the Annual Activity Report 2012, the annual assessment of the level of in-kind contributions for the year 2012, the renewal of the contract of the FCH JU Executive Director, the election of the Chair and Vice Chair of the GB etc.

Moreover the GB decided to contract some studies (e.g. building coalition for commercialisation studies for stationary applications and energy storage; financing options for H₂ refuelling infrastructure; developing of electrolysis in the EU and its role in using H₂ as a mechanism for energy storage, etc.) to better analyse specific areas of interest in order to further support the deployment of Fuel Cells and Hydrogen technologies in the EU market.

Executive Director and Program Office

The Executive Director is the legal representative of the FCH JU and is supported by the staff of the Program Office. He is the chief executive responsible for the day-to-day management of the FCH JU, in accordance with the decisions of the Governing Board. The Executive Director as Authorising Officer is responsible for the proper management of the FCH JU's budget and has to report and give assurance on the use of the budget in accordance with sound financial management principles (Chapter 5).

The Program 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, the launching of the calls for proposals, the evaluation and selection of projects, the monitoring and update the Multi-Annual and Annual Implementation Plans, the coordination with other relevant programs at national and regional levels and communication and other support activities.

In 2013, the Executive Director and/or a Programme Office representative participated in many meetings, conferences and Info Days in Brussels and in several EU Member States in order to provide information about FCH JU activities (i.e. calls for proposals). A strong communication campaign was in place to foster an effective involvement of all players (e.g. SMEs, Research Organizations) in the FCH JU Programme in view of boosting deployment and implementation of FCH technologies at EU and national level.

A strong institutional communication strategy, in particular towards EU and National policy makers, was also in place in order to ensure political visibility and support to the overall activities carried out by the FCH JU (for more details please refer to Chapter 2.2.1).

3.2.2 Advisory bodies

Scientific Committee

The Scientific Committee has nine members, appointed by the Governing Board on the basis of 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 expertise from academia, industry and regulatory bodies and from different fields of expertise within Fuel Cell and Hydrogen technologies.

The Scientific Committee's first priority is to advise on the R&D agenda set out in the Multi-Annual and Annual Implementation Plans of the FCH JU.

In 2013, the Scientific Committee met four times respectively on 30 January, 20/21 March, 16 May and 23/24 October.

During the SC meetings, relevant suggestions were provided by the SC members on the elaboration of the Multi-annual Work Program (MAWP) and for improvements and optimization of the FCH 2 JU. Moreover, the SC members, in cooperation with the FCH JU Programme Office, elaborated a new concept of the 2013 edition of the Programme Review Days.

One new SC member was appointed by the Governing Board on 26 June 2013.

States Representatives Group

The States Representatives Group (SRG) consists of one representative of each Member State and of each country associated with the 7th Framework Program. 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 shall act as an interface between the FCH JU and the relevant stakeholders within their respective countries. The most important tasks of the SRG comprise: 1) providing opinions on program progress in the FCH JU; 2) monitoring compliance and respect of targets and 3) coordination with national programs to avoid overlapping.

In 2013, the SRG met three times respectively on 12/13 February, 25 June and 1 October. Amongst many other activities focused on monitoring achievements and results of the FCH JU, a particular attention was reserved on 1) the most important EU pieces of legislation concerning FCH technologies deployment (i.e. Clean Power for Transport Package and Horizon 2020); contributions of experts (e.g. from Industry/Research Community or National Agencies) providing information on development and boundary for FCH technology introduction and implementation in Europe and 3) contributions of SRG members to define a new role of Member States within the FCH 2 JU.

All the above mentioned activities aimed at ensuring an alignment between the industrial objectives and EU/national programmes. Moreover, SRG members stressed the need to find additional financial mechanisms at Member States' level to strengthen the leverage effects of the FCH JU. This complementary approach could contribute to make up for the different level of deployment of FCH technologies in the EU Members States.

Stakeholders' General Assembly

The Stakeholders' General Assembly (SGA) has an advisory role in the FCH JU. It is open to all public and private stakeholders, international interest groups from Member States and Associated countries, as well as from third countries.

At the General Assembly, which is convened once a year, stakeholders are informed of the activities of the FCH JU and invited to provide comments. The Stakeholders' General Assembly is an important communication channel to ensure transparency and openness in the FCH JU's activities with its stakeholders.

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. The Standards are inspired by the internationally recognized COSO framework¹¹ and are structured around six areas, namely: 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 Internal Control Standards in Annex 6).

3.3.1 Effectiveness of implementation of the control standards

FCH JU has established 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 is needed:

- **ICS 3 – Staff allocation and flexibility.**

The increased workload linked to the increased number of on-going projects remains a challenge for the FCH JU. Understaffing which was a 'critical' risk in 2012 remains a 'high' risk in the FCH JU 2013 Risk Management exercise. It is expected that this will be mitigated by 1) further simplification measures and increased paperless processes; 2) filling the full establishment plan and 3) additional staff resources in relation to the new mandate linked to the establishment of FCH 2 JU.

- **ICS 8 – Processes and procedures and ICS 9 Management supervision.**

Main FCH JU processes and procedures are documented; a few procedures need to be further formalized. Furthermore the audit of "Grant management: negotiation, contracting and pre-financing" identified a number of weaknesses; an action plan to address those issues has been adopted and implementation of corrective measures is under way. The effectiveness of the supervision system could still be improved by enhancing the monitoring tools; measures to that effect mainly through more regular and automatic IT tools, will be implemented during 2014.

- **ICS 11 – Document Management.**

A document management tool was implemented and is operational. There is further potential in its use by developing its functionalities in terms of workflow and processes. An analysis will be carried out to assess the relevance of new developments in the context of the implementation of the new programme Horizon 2020 taking into account the tools of the programme and possible services of the Common Support Center.

11 <http://www.coso.org/>

- **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 & responsibilities...). This will be done in 2014.

- **ICS 13 – Accounting and Financial Reporting.**

The action plan to address the few weaknesses identified by the Accountant in the frame of the validation of the accounting systems was monitored and actions were implemented. A follow-up to confirm the effective implementation will be done in 2014.

3.3.2 Conclusion

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), interviews with some staff members and an awareness session with all staff on ICS on the occasion of the team working day on 21 November 2013. This has led to an assessment of the FCH JU's internal control status at the end of the reporting year, with respect to both the ICS compliance with requirements and the effectiveness of the control arrangements in place. In addition, information on internal control issues received through the mid-year Management Reports from the Heads of Unit has been considered. Furthermore information from the monitoring of action plans including (1) the effective implementation of almost all recommendations of the Internal Audit Capability (IAC) related to the audit of "ex-ante controls" and (2) the state of play of the action plan on the recommendations of the IAC audit of "grant management: negotiation, contracting and prefinancing" has also been taken into account. Finally, the information on results from other audits performed by the IAS and European Court of auditors as referred to in section 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 functioning of the internal control systems has also been monitored throughout the year by the systematic registration of exceptions (under ICS 8). The underlying causes behind these exceptions have been analyzed and corrective and alternative mitigating controls have been implemented when necessary.

Concerning the overall state of the internal control system, generally the FCH JU complies with the three assessment criteria for effectiveness; i.e. (a) staff having the required knowledge and skills, (b) systems and procedures designed and implemented to manage the key risks effectively, and (c) no instances of ineffective controls that have exposed the FCH JU to its key risks.

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

In conclusion, management has reasonable assurance that, overall:

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

4. 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', namely: (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's 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, grant management being the core business of the JU and representing more than 90% of its operational budget, this chapter focuses on such process. As indicated in Chapter 3.1, 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 payment is made to make funds available and allow the starting of the project. During project implementation, grants are paid on the basis of the beneficiary's declaration of eligible costs (i.e. cost claims).

Since the setting up of FCH JU, seven Calls have been 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 Calls – Key dates

	Call 2008	Call 2009	Call 2010	Call 2011	Call 2012	Call 2013-1
Publication	October 2008	July 2009	June 2010	May 2011	January 2012	January 2013
Signature of Grant Agreements	December 2009	October-December 2010	October-December 2011	June-December 2012	April-December 2013	Not yet. Negotiations on-going
Payment of Pre-financings	December 2009, except € 27,220 in January 2010	December 2010, except € 519,508 in Q1 2011 at the request of the beneficiary.	November-December 2011	July to December 2012	May to December 2013	Not yet. Negotiations on-going

	Call 2008	Call 2009	Call 2010	Call 2011	Call 2012	Call 2013-1
Payments of experts	Q1-2 2009 (app.)	Q2 2010 (app.)	Q1 2011 (app.)	Q4 2011	Q3 2012	Q3 2013
Cost claims validated	6 Cost Claims validated in 2011 (44 beneficiaries) 12 Cost claims validated in 2012 (97 beneficiaries) 5 cost claims validated in 2013 (32 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)	2 Cost Claims validated in 2012 (18 beneficiaries) 11 cost claims validated in 2013 (93 beneficiaries)	1 cost claims validated in 2013 (12 beneficiaries)	First cost claims expected in 2014	N/A

Call 2013-2 was published on 28 November 2013 with a deadline for submission by 27 February 2014.

Table 4.1.1(b): 2012 operational payments (amounts in €)

year	Pre-financings	Payments against cost claims	Clearing	Other operational payments	Total operational payments
2013	31,079,943****	9,070,763	10,854,534	541,076	40,691,782
2012	44,980,842*	5,246,904	12,094,499	1,215,150	51,442,896
2011	48,515,320**	4,626,994	1,658,664	120,888	53,263,202
2010	39,894,107***	-	-	-	39,894,107

*of which 197,908 on calls 2008-2010 and 44,782,934 on call 2011

** of which 759,508 on calls 2008-2009 and 47,755,812 on call 2010

*** of which 553, 941 on call 2008 and 39,340,166 on call 2009

****of which 2,928,664 on call 2008-2011 and 28,151,279 on call 2012

Therefore, the following main conclusions can be extracted from the tables 4.1.1 (a) and (b) above with an impact on the 2013 Annual Activity report:

- The largest proportion of 2013 operational payments relate to pre-financings, mainly for the Call 2012 projects.
- Following the reporting requirements established in the signed grant agreements, 38 cost claims involving 331 beneficiaries and related to Calls 2008 to 2011 projects have been validated in 2013.

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 (c): ‘Ex-ante’ vs. ‘Ex-post’ controls.

	‘Ex-ante’ Controls	‘Ex-post’ Controls
When?	Before the transaction is authorised	After the transaction is authorised
Frequency?	Obligatory on all transactions	Made on a sample basis
How?	Mainly desk review 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 On-the-spot checks at the beneficiary's premises.
Impact?	Errors detected should be corrected before the transaction is approved	Errors detected (e.g. ineligible expenditure) should be corrected through recovery orders or offsetting with future payments.
Assurance?	Primary means of ensuring sound financial management and legality and regularity of transactions but less 'evidence' (in particular for the eligibility of costs) as normally based on desk review.	Secondary means of ensuring sound financial management and legality and regularity of transactions but more robust 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 defined 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 (d): Stages in the Project Lifecycle: Objectives; Controls; Outputs & Indicators

	Stage 1 Evaluation	Stage 2 Negotiation & Selection	Stage 3 Project & Contract management	Stage 4 Ex-post controls: audits & recoveries
Objectives	Select projects to be financed according to their research credentials to ensure the achievement of the JU’s operational objectives.	For each proposal: Clarify objectives and work to be carried out. Substantiate costs and determine its duration and JU’s contribution	Translation of each of the selected proposals into a legally binding instrument and making of pre-financing. Verification of (1) interim and final beneficiaries’ payment requests and (2) achievement of key milestones.	Contribute to ensure the legality and regularity of the payments. Provide an indication of the effectiveness of previous ex-ante controls.

	Stage 1 Evaluation	Stage 2 Negotiation & Selection	Stage 3 Project & Contract management	Stage 4 Ex-post controls: audits & recoveries
Controls	<ul style="list-style-type: none"> • Screening of submitted proposals for eligibility. • Choice of independent (i.e. no conflict of interest) expert evaluators. • Evaluation by a minimum of three independent experts. • Panel review for consistency, quality control and ranking of proposals. 	<ul style="list-style-type: none"> • Use of 'Evaluation Summary Report' as starting point for the negotiation. • Requests for Budget clarifications, if deemed necessary. • Legal status verifications • Financial viability checks • Adoption of safeguarding measures (e.g. guarantees) • When deemed necessary, 'on the spot' control visits 	<p>Contracting and pre-financing payment:</p> <ul style="list-style-type: none"> • JU Financial circuits in place ensuring all operational and financial aspects are checked by two independent members of JU staff before (i.e. ex-ante) authorisation. <p>Interim and final payments:</p> <ul style="list-style-type: none"> • Analysis of beneficiaries' technical and financial reports (intermediate and final) • Certificates on Financial Statements (i.e. cost claims)¹² by certifying auditor¹³ and on the methodology used for the calculation of costs¹⁴. • Midterm reviews by external experts, when applicable in the Grant Agreement. • When deemed necessary, 'on the spot' control visits. • JU Financial circuits in place as for 'contracting and pre-financing payment' above. 	<p>(representative and risk-based) and Technical audits after (i.e. ex-post) JU's authorisation of interim or final payments and up to 5 years after the end of the project¹⁵.</p>
Outputs	<ul style="list-style-type: none"> • Evaluation Summary Report (ESR) for each proposal • Ranking list of proposals • Initial Information letter to applicants 	<ul style="list-style-type: none"> • Final list of selected proposals 	<p>Financial transactions:</p> <ul style="list-style-type: none"> • Budgetary and Legal Commitment. • Pre-financing, interim and final payments 	<p>Financial transaction:</p> <ul style="list-style-type: none"> • Recovery order (e.g. in case of ineligible expenditure identified after ex-post audits) or offsetting with future payments

12 Mandatory if above thresholds (Model Grant Agreement , article II.4.4)

13 Independent from the beneficiary and qualified to carry out statutory audits.

14 Optional (Model Grant Agreement , articles II.4.4 and II.14.1)

15 Model Grant Agreement , articles II.22 and II.23

	Stage 1 Evaluation	Stage 2 Negotiation & Selection	Stage 3 Project & Contract management	Stage 4 Ex-post controls: audits & recoveries
Indicator	<ul style="list-style-type: none"> Redress procedure: Number of applicants' complaints / Total proposals 	<ul style="list-style-type: none"> Financial impact of the negotiation process: Difference between the total value of the JU contribution 'requested' in project proposals (1); 'recommended' in the negotiation mandates (2) and 'agreed' in the signed grant agreements (3). 	<ul style="list-style-type: none"> 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). 	<ul style="list-style-type: none"> Representative error rate (i.e. average of individual error rates (in percentage) detected by representative ex-post audits). Residual error rate (i.e. error rate left in the population after the correction of (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).

The indicators defined 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). An analysis of each indicator is the following:

Stage 1: Evaluation

A 'redress procedure' gives applicants the possibility to file a complaint in case they think that there were shortcomings in the handling of their proposal 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(e): Redress procedure

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

The low number of complaints in the different calls of which none led to a re-evaluation, (1) is an indication of the robustness of the evaluation and grant award process and (2) provides assurance on the legality and regularity of the commitments (i.e. signed Grant Agreements) in stage 3 below.

Stage 2: Negotiation and selection

The negotiation is the main process to ensure the efficient use of the JU's budget as it discards 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(f): Financial impact of the negotiation process (in thousands €)

	Call 2008	Call 2009	Call 2010	Call 2011	Call 2012	Call 2013-1
Number of grant agreements	16	28	26	33	27	Negotiations on-going
JU contribution 'requested' in project proposals (1)	36,046	85,643	99,382	141,126	82,816	
JU contribution 'recommended' in Negotiation mandates (2)	29,076	75,202	84,907	119,733	70,256	
JU contribution 'agreed' in the signed grant agreements (3)	27,222	72,527	83,676	117,522	68,135	
Reduction in percentage from contribution 'requested' (1) – (3)	24%	15%	16%	17%	18%	
Reduction in percentage from contribution recommended' (2) – (3)	6%	4%	1.5%	1.8%	3%	

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 experts recommendations made during the evaluation stage.

Stage 3: 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 from the 2008-2011 calls is increasing. In terms of amount paid, pre-financings remain the core part (76.4% of operational payments). The financial transactions involved are mainly the contract signature (commitment), the payments of either pre-financings or interim 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.

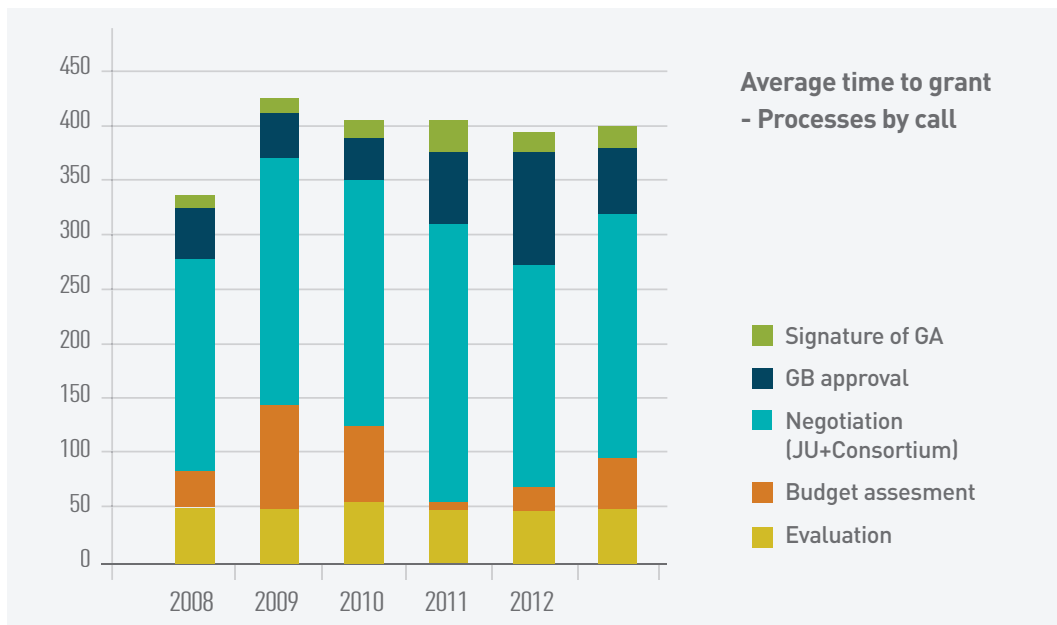
Table 4.1.1(g): Percentage of the number of payments made on time

	Call 2008	Call 2009	Call 2010	Call 2011	Call 2012	Call 2013
Grants: payment of pre-financings and against cost claims	100%	100%	100%	100%	100%	100%
Payments of experts (evaluators and mid-term reviewers)	71%	34%	53%	62%	89%	96%

The data shows that 100% of grant payments, which represent more than 75% of the total value of JU’s payments, were done on time. 96% of the payments to experts were made on time (100% for expert evaluators) showing a significant improvement compared to the previous years.

Table 4.1.1(h):

Time-to-Grant (TTG), although not specified as a performance indicator in AIP 2013, gives an indication of the efficiency of the FCH JU's operations in concluding Grant Agreements. Figure below highlights the evolution of the TTG for the calls for proposals 2008 to 2012 and the evolution of the different processes contributing to this time-to-grant.



It can be observed that the average time to grant is close to 400 days (which is significantly above the future legal requirements) and within the different processes, the negotiation stage is the longest (close to 200 days). In line with the IAC recommendations an action plan has been adopted to reduce the time to grant and some measures (such as a stricter monitoring of deadlines for submission of documents by participants) have already been implemented in particular to shorten the negotiation process.

Stage 4: Ex-post controls

Ex-post controls are the fourth and last **stage** of JU's control strategy in the project lifecycle as shown in Table 4.1.1(d). 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**, namely: (1) to assess the legality and regularity of expenditure on a multiannual 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 **multiannual 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 multiannual 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.(k)). 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 contribution¹⁶.

- **Overall Error Rate** – it 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 JU¹⁷. 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 due to 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 most representative ones for inferring conclusions.
- **Representative Error Rate** – it 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, in accordance with FCH JU ex-post audit strategy approved by the Governing Board, is shown in Annex 4.
- **Residual Error Rate** – it is the level of error remaining in the population after the corrections and recoveries 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 accordance with the Ex-post strategy and shown in Annex 4, is based on the following assumptions: (1) all the errors detected will be corrected; (2) the residual error rate for participations subject to extrapolation is estimated to be equal to the non-systematic error rate; and (3) all participations subject to extrapolation are clean from systematic material errors.

¹⁶ 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.

¹⁷ When considering the value of errors detected, 3 calculations are provided, namely: (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. 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. The beneficiary 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).

Ex-post audit **resources**. The lean structure of the FCH JU does not allow for the setting 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) and (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(i): Input indicators (amounts in €)

	2011	2012	2013
Internal resources ex-post audits ¹⁸	1 FTE	1,5 FTE	2 FTE
Cost of externalised audits (Commitments, in €)	€ 77,820	€ 208,665	€ 161,082

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(j): Indicators of coverage: Number of audits and audit coverage (cumulative)

Batch	Year	To be launched	On-going	Finalised ¹⁹	Total	Of which	
						Representative	Risk-Based
1st batch	2011	0	0	5	5	5	0
2nd batch	2011	0	0	7	7	6	1
3rd batch	2012	0	0	9	9	7	2
4th batch	2012	0	0	12	12	12	0
5th batch	2013	0	3	12	15	11	4
Total (audits)		0	3	45	48	41	7
Total (cost claims)					122		
Total costs accepted by FCH JU (cumulative) (in €) (A)					101,089,138		
Total costs of audits launched (cumulative) (in €) (B)					33,946,848		
Total costs of audits finalised (cumulative) (in €) (C)					32,707,346		
Audit coverage of total audits (in %) (B/A)					34%		
Audit coverage of finalised audits (in %) (C/A)					32%		

¹⁸ Due to the lean structure of the FCH JU and cost-efficiency reasons, there is not a 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 persons of the JU's staff to ex-post audits in order to manage the 3 processes under the JU's responsibility (i.e. (1) Planning, (2) Monitoring/quality checks and (3) evaluation/implementation of audit results).

¹⁹ An audit is considered finalised when the audit adjustment and the related 'error rate' is final as of the cut-off date for the preparation of the AAR (i.e. 07/02/2014). 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.

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 1st batch (5 audits) in September 2011 and the 2nd batch (7 audits) in December 2011. During 2012, two additional batches were launched: 3rd batch (9 audits) in February 2012 and 4th Batch (12 audits) in December 2012. In the calendar year 2013, one additional batch has been launched: 5th batch (15 audits) in May 2013.

In conclusion, since the launching of Ex-post audits, 48 audits have been launched of which, 41 'representative' and 7 'risk-based'. Out of the 48 audits (comprising 122 cost claims), 45 are finalised and 3 on-going. The cumulative audit coverage represents 32% (on finalised audits) and 34% (on total audits) of the value of validated cost claims at the cut-off reporting date (i.e. 07/02/2014).

The error rates resulting from the 45 finalised audits (of which 38 representative and 7 risk-based) are the following:

Table 4.1.1(k): Indicators of Error

	Achieved cumulative period (as of 07/02/2014)	
	Total cost	FCH JU contribution
Costs accepted by FCH JU Financial Officers (FO) (in €) (A)	32,707,346	13,866,750
Overall errors (in €) in favour of the FCH JU (B)	-1,502,015	-591,741
'Overall Error rate' (only in favour of the FCH JU) (B/A)	-4.59%	-4.27%
Overall errors (in €) in favour of the beneficiary (C)	1,337,114	134,909
'Overall Error rate' (only in favour of the beneficiary) (C/A)	4.09%	0.97%
Total Overall errors (in €) (in favour of the FCH JU and in favour of the beneficiary) (D)	-164,900	-456,833
'Overall Error rate' (netting off errors in favour of the JU and of the beneficiary) (D/A)	-0.50%	-3.29%
'Representative error rate' (formula in Annex 4) (%)	-1.83%	-2.18%
'Residual error rate' (formula in Annex 4) (%)	-0.91%	-1.15%

The difference between the 'representative error rate' and the 'residual error rate' is the result of (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 a set-off against a future payment).

The detailed situation on the implementation of ex-post audit results is as follows:

Table 4.1.1 (I) Implementation of ex-post audit results in favour of the FCH JU (in €)

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	211,666	23,287	10,788	801,673	200,878
2012	573,350	324,390	569,208	322,195	4,142	2,195
2013	103,705	49,305	103,705	49,305	-	-
Total	1,502,015	585,361	696,200	382,288	805,815	203,073

At the cut-off reporting date (i.e. 07/02/2014), the percentages of total adjustments effectively implemented are 54 % and 35% 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 all the audits launched in 2013 and part of the audits launched in 2012 for which the letters of conclusion have been sent very recently (December 2013).

So far, the FCH JU has focussed its ex-post audit effort in finalising a representative number of audits in order to have sufficient information for the calculation of a 'representative error rate' in preparation of the 2013 'Annual Activity Report'. During the second quarter of 2014, the FCH JU will swift focuss on the implementation of audit results in order to effectively correct the errors by the closure of the 2013 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 as follows:

Table 4.1.1 (m) Implementation of extrapolation of ex-post audit results

	Beneficiaries	Projects	Cost claims
Audits finalised	45		
Letters of conclusion sent as of reporting date	31		
Of which potentially concerned by extrapolation	12		
Extrapolation feedback not received from beneficiary	5		
Extrapolation feedback received from beneficiary	7	14	16
• Of which projects not affected		5	5
• Of which projects affected		9	11
Of which non-implemented		6	7
Of which implemented		3	4

At the cut-off reporting date (i.e. 07/02/2014), out of the 45 finalised audits, 12 were potentially concerned by extrapolation. Feedback was not received from the beneficiary in 5 of those cases simply because the Letters of conclusion have just been sent. For the 7 remaining audits, the beneficiary has provided the necessary information which covers 14 projects and 16 cost claims. Out of the 14 projects, 9 are affected by extrapolation and the FCH JU has implemented the extrapolation in 3 of them.

As explained above in section 'Implementation of audit results', the FCH JU will monitor closely in the second quarter of 2014 the pending extrapolation cases with the objective to close as much cases as possible for the closure of the 2013 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'²⁰. At the cut-off reporting date (i.e. 07/02/2014), out of the 118 cost claims with finalised audits, 9 have been assessed as requiring liquidated damages for a total amount of € 23,150.94. Pre-information letters (i.e. Letters of conclusion) have been sent to beneficiaries in all 9 of these cases and recovery orders have already been issued and cashed for 8 cases for a total value of € 13,150.94. This represents a 57% and 89% of liquidated damages in number and value, respectively implemented. The only case pending implementation is due to the fact that the Letter of conclusion has been sent very recently. This case will be finalised for the closure of the 2013 final accounts.

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

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 2013, the IAC of the Joint Undertaking carried out two assurance engagements (i.e. 'Audit on Grant management: Negotiation, contracting and pre-financing' and 'Annual Assessment of the level of in-kind contributions' (jointly with the IAS)), provided consulting services on the AAR process and was responsible for the management of ex-post audits in coordination with the Finance unit. In addition, the IAC updated the auditor's risk assessment of the previous year in order to establish the IAC work plan for 2014 which was approved by the Executive Director on 23 January 2014.

Regarding the **assurance** engagements, the most relevant audit findings concern the following issues:

- On the Audit on '**Grant management: Negotiation, contracting and pre-financing**': (1) the need to reduce the 'Time to grant' through a more effective monitoring of the steps leading to this total time; (2) negotiation deadlines not respected by the consortium and not enforced in practice by the JU leading to a 'time to close negotiations' significantly above the planned date; (3) the need to strengthen or better document certain controls within the negotiation process²¹ and (4) the need to clarify some aspects of the JU's procedure for 'Financial Viability checks – FVC' ²². In addition, the IAC acknowledged the measures implemented by the JU to prevent conflicts of interests of its staff and to raise awareness amongst staff on Fraud related issues. However, the auditor pointed out the need for (1) a comprehensive policy on management of conflicts of interests, which should cover all levels of the organisation (i.e. JU staff, Governing Board members, independent experts and members of other FCH JU bodies) and processes (e.g. grant management, procurement, controls & audits) and (2) an 'Anti-fraud strategy'.

FCH JU actions: To properly address these findings, an action plan was established by the JU with target dates for implementation of the audit recommendations by end of 2014. Some important actions are already on-going such as a more effective monitoring on the 'Time to grant' and the 'Time to close negotiations'.

- On the '**Annual Assessment of the level of in-kind contributions**': the auditors (IAC and IAS) concluded that the aggregated level of in-kind contributions certified by the JU's Executive Director (cut-off date 08/02/2013) for an amount of 414.9 M €, should be increased by 0.28 M € (or 0.07%).

21 The controls to be strengthened or better documented are: timely reception of signed accession forms per beneficiary; confirmation of IG/RG membership during the life of the project; involvement of 3rd countries duly justified, assessment of operational capacity of new beneficiaries joining the consortium during negotiation better documented, follow up of the recommendations from experts-evaluators better documented and level of pre-financing adequately linked with project cash flow needs.

22 The aspects to be clarified in the FVC procedure are: (1) when to apply the 'immediate distribution' of pre-financing to beneficiaries as a protection measure and how to follow up their effective distribution; (2) how to approach the FVCs of 'third parties' (e.g. through the FVC of the beneficiary linked to the third party); (3) measures to be taken in cases of 'Financial exposure flag'; (4) how to address changes in financial figures or new Financial Statements being available during negotiations with an impact on the financial ratios and FVC results and (5) how to address in the FVCs the financial capacity issues identified in a financial audit.

FCH JU action: the amount of in-kind contribution was corrected. The auditor's assessment on the level of in-kind contributions is to be carried out on a yearly basis. The next assessment will be performed this year and the results presented by April 2014.

Concerning IAC **consulting** services on the **AAR 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'.

As far as the **ex-post audits** managed by the IAC (jointly with the Finance Unit) are concerned, the ex-post audit strategy is being implemented since September 2011. 48 Audits have been launched so far of which 45 are finalised. See more details on the objectives of ex-post audits and on the relevant indicators and results in section 4.1.1 – Stage 4 (ex-post controls)

Regarding the **risk assessment exercise**, the following high risk areas were identified by the auditor as requiring further management intervention: monitoring of operational and administrative activities, data protection, IT development and management, document management, business continuity, matching assessment and ex-post controls. To address these high risk areas, the management of the JU defined appropriate actions²³ which are all implemented at the date of this report.

Finally, concerning the FCH JU's **follow up of action plans addressing the audit recommendations resulting from IAC previous audits**²⁴, all the audit recommendations have been implemented with the following two exceptions: (1) the control approach for participants providing in-kind contributions but not requesting JU funding needs to be clarified and (2) the guidance for technical review of projects has to be formally adopted. The IAC will carry out the necessary follow-up assignments in 2014 to confirm their effective implementation.

Commission's Internal Audit Service (IAS)

During 2013, the IAS carried out, jointly with the IAC, the assessment on the level of in-kind contributions (see results above).

In addition, the IAS finalised in 2013 an 'IT risk assessment on the common IT infrastructure of the Joint Undertakings'²⁵. The IAS concluded that the JUs who shared the IT infrastructure showed a good level of control for the risks in the area of IT management except for the following two main risks (1) Information Security and Data Management (i.e. lack of a comprehensive IT security plan) and (2) Service Level Management (i.e. specific contracts with the IT providers do not give adequate details about the procedures/controls the contractors have to follow). To address these two aspects, the

²³ Identification of Key Performance Indicators and their monitoring through mid-year management reports by Heads of Units, data protection system, timely reporting of IT issues, follow up of FCH-FP7 IT tools, 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) and a few of them are on-going (i.e. establishment and monitoring of IT SLAs and document management system).

²⁴ 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') and one audit in 2012 (i.e. 'Ex-ante controls for eligibility of declared costs and related payments').

²⁵ The assessment covered five Joint Undertakings, including FCH JU.

FCH JU has defined an action plan which includes the formalisation of the IT security plan and the inclusion of adequate provisions in future contracts. These actions will be implemented by end 2014.

Finally, an audit on the 'Use and dissemination of research results' was launched and is currently on-going. The final audit report is expected to be received during the second quarter of 2014.

European Court of Auditors (ECA)

In its last annual report concerning the financial year 2012, the Court provided a 'clean opinion' on (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 opinion.

Without calling into question the clean opinion referred to above, the Court indicated that the JU's monitoring of the implementation of the beneficiaries' plans for the use and dissemination of the foreground, could be improved. In this context, the JU is exploring the possibility of using the Commission's IT system for that purpose. In parallel, the JU has increased its own capacity to use and analyse the results of projects and to assess the achievement of its programme. To that effect, the JU recruited a 'Knowledge Management and Policy officer' who took up duties in November 2013. This Officer is using a newly developed IT tool result of the TEMONAS (TEchnology MONitoring and ASsessment) project to analyse and synthesize the results of the finished projects.

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 Internal Control Coordinator 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, respect of the principles of sound financial management, and the fact that the implemented control procedures give the necessary guarantees concerning 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 guarantee as

of the completeness and reliability of the information reported and result in a complete coverage of the FCH JU budget.

4.2 Reservations

The **representative error rate** resulting from the 38 representative audits finalised is - 1.83% at total cost level and - 2.18% at FCH JU contribution level.

The **residual error rate** calculated at this point is **-0.91%** at total cost level and **-1.15%** 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.

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 **reinforcement** of **ex-ante** controls
- The **improved quality** of beneficiaries' cost claims and of 'audit certificates' (i.e. CFS - Certificates on Financial Statements) as a result of the communication campaigns carried out by the FCH JU in 2012 and 2013.

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 program the residual error rate will be below the materiality threshold (i.e. 2%) defined in Annex 4 ('Materiality Criteria').

Follow up of last year's reservation and action plan:

The reservation of last year was mainly due to the relatively limited number of audits closed by the end of 2012 which did not provide sufficient information to the Executive Director to state with reasonable assurance that the residual error rate **at the end of the program** would be below 2%.

The action plan defined by the JU last year included a combination of **preventive, detective and corrective measures** all of them with the objective of reducing the residual error rate. The measures/actions can be grouped around three main axes:

- Organisation of **communication campaigns** to prevent financial errors in cost reporting by improving awareness within the beneficiaries of the regulatory framework. In total 5 campaigns have been organised by FCH JU so far (3 in 2012 and 2 in 2013). The set-up of the campaigns was reviewed in 2013 to maximise its impact with the possibility to participate on-site and on-line, a focussed audience (including auditors responsible for the preparation of the CFS and ex-post auditors) and a focused scope on the most recurrent issues. A total of 130 beneficiaries involved in 95 projects have attended the communication campaigns. This represents

22% and 73% of FCH JU beneficiaries and projects, respectively. The communication campaigns were highly appreciated by the participants and their positive impact is already visible through an improved quality in cost reporting and audit certificates.

- FCH JU **ex-ante controls** were reinforced in order to allow for a higher detection and correction of errors before validation of cost claims (e.g. JU's scrutiny of CFS has been strengthened, JU's ex-ante checklists have been updated and other aspects have been reinforced following the IAC audit recommendations on ex-ante controls).
- FCH JU **ex-post audit effort** has been very important this year which has seen the consolidation of the positive trend in terms of low error rates and has allowed the closure of an important number of on-going audits (i.e. the number of audits finalised has increased from 19 by the end of 2012 to 45 by the end of 2013). The combination of high audit coverage and relatively low detected error rate have resulted in a residual error rate below 2%.

4.3 Overall conclusion

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

It is important to note that only material weaknesses/risks lead to a reservation to the assurance in Section 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 FCH JU's policy activities, no qualification is to be made. There is also no reservation on 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 on 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 detected by the auditors (i.e. JU's Internal Audit Capability (IAC) and the European Court of Auditors) are being implemented. Therefore, the Executive Director, in his capacity as Authorising Officer, has signed the declaration of Assurance presented in section 5.

5. 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 view²⁶.

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, 14 February 2014

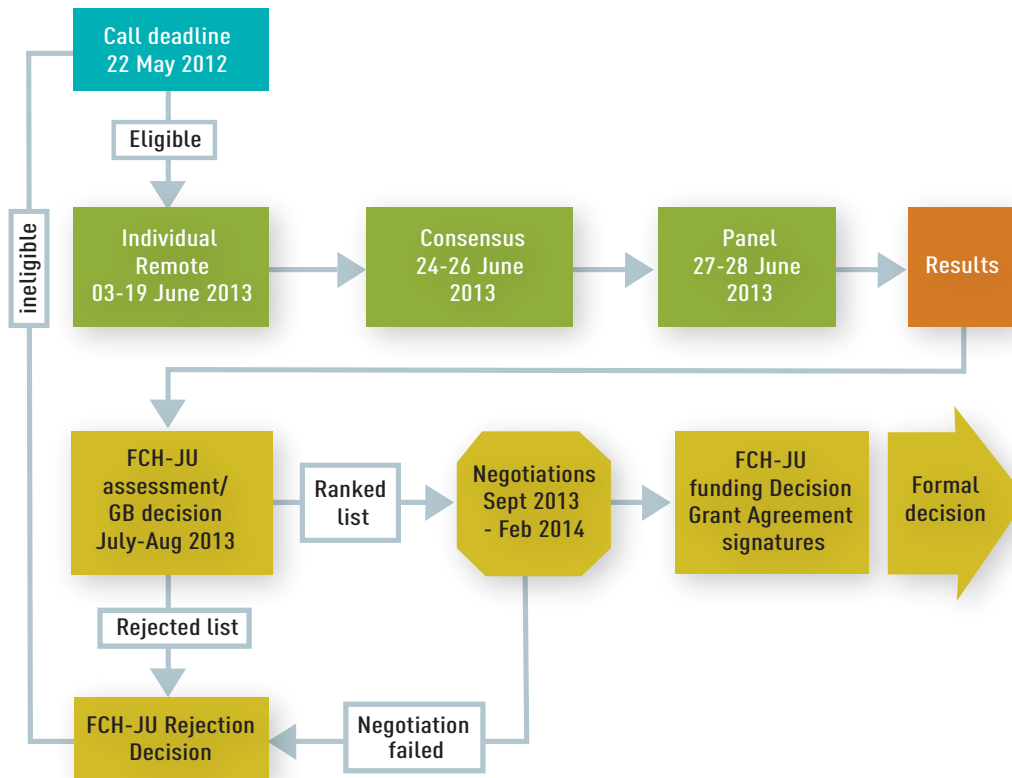
Bert De Colvenaer
Executive Director



²⁶ True and fair in this context means a reliable, complete and correct view on the state of affairs in the JU.



Annex A: 2013-1 Call Process Outline





Annex B:

Publications resulting from FCH JU-funded projects

Project Acronym	Publication Title	Authors	Title of the periodical	Vol.	Pages	Publication Date	Publisher
GENIUS	Implementation of a model-based methodology aimed at detecting degradation and faulty operation in SOFC systems	Marra, D.	Proceedings of the ASME Design Engineering Technical Conference	2011-54686	449-455	07-Aug-2011	
	Application of Fault Tree Analysis to Fuel cell diagnosis	Yousfi Steiner, N.	Fuel Cells	2	302-309	27-Mar-2012	John Wiley and Sons Ltd
	A Review on Solid Oxide Fuel Cell Models	Wang, K.	International Journal of Hydrogen Energy	12	7212-7228	01-Jun-2011	Elsevier Limited
	A Neural Network Estimator Of SOFC Performance For On-Field Diagnostics And Prognostics Applications	Marra, D.	Journal of Power Sources	30/04/2013	in press	30-Apr-2013	Elsevier
ASSENT	Effect of anode off-gas recycling on reforming of natural gas for solid oxide fuel cell systems	Halinen, M.	Fuel Cells	Vol. 12 (2012) No:5	754-760	08-Aug-2012	John Wiley and Sons Ltd
	Analysis of solid oxide fuel cell system concepts with anoderecycling	Roland, P.	International Journal of Hydrogen Energy	in press	in press	19-Apr-2013	Elsevier Limited
ROBANODE	Mathematical modeling of Ni/GDC and Au-Ni/GDC SOFC anodes performance under internal methane steam reforming conditions	Souentie, S., Athanasiou, M., Niakolas, D.K., Katsaounis, A., Neophytides, S.G., Vayenas, C.G.	Journal of Catalysis	306	116-128	01-Oct-2013	Academic Press Inc.
	Study of the synergistic interaction between nickel, gold and molybdenum in novel modified NiO/GDC cermets, possible anode materials for CH ₄ fueled SOFCs	Niakolasa, D.K., Athanasiou, M., Dracopoulou, V., Tsiaoussis, I., Bebelisa, S., Neophytides, S.G.	Applied Catalysis A: General	223	223-232	05-Mar-2013	Elsevier

ROBANODE	On the active surface state of nickel-ceria solid oxide fuel cell anodes during methane electrooxidation	Papaefthimiou, V., Shishkin, M., Niakolas, D.K., Athanasiou, M., Law, Y.T., Arrigo, R., Teschner, D., Hävecker, M.	Advanced Materials	3	762-769	31-Jan-2013	Wiley-VCH Verlag
	Fundamental Studies of Sonoelectrochemical Nanomaterials Preparation	Sakkas, P., Schneider, O., Martens, S., Thanou, P., Sourkouni, G., Arairuis, C.	Journal of Applied Electrochemistry	49	763-777	01-Sep-2012	Springer Netherlands
	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., Wullemin, Z., Tanasini, P., Accardo, N., Modena, S., Schindler, H.J., Cantoni, M., Lübbe, H., Diethelm, S., Hessler-Wyser, A., Van Herle, J.	Journal of Power Sources	196	8909-8917	01-Nov-2011	Elsevier
	Redox stable Ni-YSZ anode support in solid oxide fuel cell stack configuration	Faes, A., Wullemin, Z., Tanasini, P., Accardo, N., Van Herle, J.	Journal of Power Sources	196	3553-3558	01-Apr-2011	Elsevier
IRAFC	Cross-Linking of Side Chain Unsaturated Aromatic Polyethers for High Temperature Polymer Electrolyte Membrane Fuel Cell Applications	Papadimitriou, K. D., Paloukis, F., Neophytides, S.G., Kallitsis, J.K.	Macromolecules	41	4942-4951	18-May-2011	American Chemical Society
	Nontrivial Redox Behavior of Nanosized Cobalt: New Insights from Ambient Pressure X-ray Photoelectron and Absorption Spectroscopies	Papaefthimiou, V., Dintzer, T., Dupuis, V., Tamion, A., Tournus, F., Hillion, A., Teschner, D., Hävecker, M., Knop-Gericke, A.R.	ACS Nano	5	2182-2190	10-Feb-2011	American Chemical Society
	When a Metastable Oxide Stabilizes at the Nanoscale: Wurtzite CoO Formation upon Dealloying of PtCo Nanoparticles	Papaefthimiou, V., Dintzer, T., Dupuis, V., Tamion, A., Tournus, F., Hillion, A., Teschner, D., Hävecker, M., Knop-Gericke, A.R.	Journal of Physical Chemistry Letters	2	900-904	04-Apr-2011	American Chemical Society

IRAFc	Development of an Internal Reforming Methanol Fuel Cell: Concept, Challenges and Opportunities	Avgouropoulos, G., Ioannides, T., Kallitsis, J.K., Neophytides, S.	Chemical Engineering Journal	177	95-101	23-May-2011	Elsevier
	The effect of structural variations on aromatic polyethers for high temperature PEM fuel cells	Morfopoulou, C., Andreopoulou, A.K., Kallitsis, J.K.	Journal of Polymer Science, Part A: Polymer Chemistry	49	4325-4334	15-Oct-2011	John Wiley and Sons Inc.
	CuMnOx catalysts for internal reforming methanol fuel cells: Application aspects	Papavasiliou, J., Avgouropoulos, G., Ioannides, T.	International Journal of Hydrogen Energy	37	16739-16747	01-Nov-2012	Elsevier Limited
	Performance of internal reforming methanol fuel cell under various methanol/water concentrations	Avgouropoulos, G., Neophytides, S. G.	Journal of Applied Electrochemistry	42	719-726	01-Sep-2012	Springer Netherlands
	Thermal crosslinking of aromatic polyethers bearing pyridine groups for use as high temperature polymer electrolytes	Kalamaras, I., Daletou, M.K., Neophytides, S.G., Kallitsis, J.K.	Journal of Membranes Science	415-416	42-50	01-Oct-2012	Elsevier
	Alloys in catalysis: phase separation and surface segregation phenomena in response to the reactive environment	Zafeiratos, S., Piccinin, S., Teschner, D.	Catalysis Science and Technology	2	1787-1801	26-Jan-2012	Royal Society of Chemistry
	Bimetallic Nickel-Cobalt Nanosized Layers Supported on Polar ZnO Surfaces: Metal-Support Interaction and Alloy Effects Studied by Synchrotron Radiation X-ray Photoelectron Spectroscopy	Law, Y.T., Skála, T., Píš, I., Nehasil, V., Vondráček, M., Zafeiratos, S.	Journal of Physical Chemistry C	116	10048-10056	12-Apr-2012	American Chemical Society
	Probing Metal-Support Interaction in Reactive Environments: An in Situ Study of PtCo Bimetallic Nanoparticles Supported on TiO ₂	Papaefthimiou, V., Dintzer, T., Lebedeva, M., Teschner, D., Hävecker, M., Knop-Gericke, A., Schlögl, R., Pierron-Bohnes, V., Savinova, E., Zafeiratos, S.	Journal of Physical Chemistry C	116	14342-14349	11-Jun-2012	American Chemical Society
	Side chain crosslinking of aromatic polyethers for high temperature polymer electrolyte membrane fuel cell applications	Vöge, A., Deimede, V.A., Kallitsis, J.K.	Journal of Polymer Science, Part A: Polymer Chemistry	50	207-216	04-Oct-2011	John Wiley and Sons Inc.

IRAFC	Methanol Steam Reforming over Indium-Promoted Pt/Al ₂ O ₃ Catalyst: Nature of the Active Surface	Barbosa, R.L., Papaefthimiou, V., Law, Y. T., Teschner, D., Hävecker, M., Knop-Gericke, A., Zapf, R., Kolb, G., Schlögl, R.	Journal of Physical Chemistry C	113	6143-6150	07-Mar-2013	American Chemical Society
	Cross linked high temperature polymer electrolytes through oxadiazole bond formation and their applications in HT PEM fuel cells	Morfopoulou, C.I., Andreopoulou, A.K., Daletou, M.K., Neophytides, S.G., Kallitsis, J.K.	Journal of Materials Chemistry	1	1613-1622	07-Dec-2012	Royal Society of Chemistry
	Covalent crosslinking in phosphoric acid of pyridine based aromatic polyethers bearing side double bonds for use in high temperature polymer electrolyte membrane fuel cells	Papadimitriou, K.D., Geormezi, M., eophytides, S.G., Kallitsis, J.K.	Journal of Membranes Science	433	1-9	15-Apr-2013	Elsevier
	Microchannel Fuel Processors as Hydrogen Source for Fuel Cells in Distributed Energy Supply Systems	Kolb, G., Keller, S., O'Connell, M., Pecov, S., Schuerer, J., Spasova, B., Tiemann, D., Ziogas, A.	Energy and Fuels	27	4395-4402	13-Feb-2013	American Chemical Society
HYDRO-SOL-3D	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.	AICHE Journal	Volume 59, Issue 4	1213-1225	28-Aug-2012	American Institute of Chemical Engineers
	Hydrogen production via solar-aided water splitting thermochemical cycles: Combustion synthesis and preliminary evaluation of spinel redox-pair materials	Agrafiotis, C.C., Pagkoura, C., Zygogianni, A., Karagiannakis, G., Kostoglou, M., Konstandopoulos, A.G.	International Journal of Hydrogen Energy	Volume 37, Issue 11	8964-8980	06-Apr-2012	Elsevier Limited
	Development of a system model for a hydrogen production process on a solar tower	Sack, J.P., Roeb, M., Sattler, C., Pitz-Paal, R., Heinzl, A.	Solar Energy	86	99-111	12-Oct-2011	Elsevier Limited
LOLLIPEM	Durability of Sulfonated Aromatic Polymers for Proton-Exchange-Membrane Fuel Cells	Hou, H., Di Vona, M.L., Knauth, P.	ChemSusChem	4	1-12	18-Nov-2011	Wiley-VCH Verlag

LOLLIPEM	Thermogravimetric analysis of SPEEK membranes: Thermal stability, degree of sulfonation and cross-linking reaction	Knauth, P., Hou, H., Bloch, E., Sgreccia, E., Di Vona, M.L.	Journal of Analytical and Applied Pyrolysis	92	361-365	29-Jul-2011	Elsevier
	Water activity coefficient and proton mobility in hydrate acidic polymers	Knauth, P., Sgreccia, E., Donnadio, A., Casciola, M., Di Vona, M. L.	Journal of the Electrochemical Society	158 (2)	159-165	07-Dec-2010	Electrochemical Society, Inc.
	Building Bridges: Crosslinking of Sulfonated Aromatic Polymers – a Review	Hou, H., Di Vona, M.L., Knauth, P.	Journal of Membranes Science	423–424	113-127	17-Aug-2012	Elsevier
	Sulfonated aromatic ionomers: Analysis of proton conductivity and proton mobility	Knauth, P., Di Vona, M.L.	Solid State Ionics	225	255-259	25-Feb-2012	Elsevier
	High Performance Sulfonated Aromatic Ionomers by Solvothermal Macromolecular Synthesis	Di Vona, M.L., Alberti, G., Sgreccia, E., Casciola, M., Knauth, P.	International Journal of Hydrogen Energy	37	8672-8680	24-Mar-2012	Elsevier Limited
	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	Alberti, G., Di Vona, M.L., Narducci, R.	International Journal of Hydrogen Energy	37	6302-6307	15-Sep-2011	Elsevier Limited
	Influence of the preparation conditions on the properties of polymeric and hybrid cation exchange membranes	Fontanovana E., Cucunato V., Curcio E., Trotta F., Biasizzo M., Drioli E., Barbieri G.	Electrochimica Acta	66	164-172	30-Jan-2012	Elsevier Limited
	New approach for the evaluation of membranes transport properties for polymer electrolyte membrane fuel cells	Brunetti A., Fontanovana E., Donnadio A., Casciola M., Di Vona M.L., Sgreccia E., Drioli E., Barbieri G.	Journal of Power Sources	205	222-230	24-Jan-2012	Elsevier
	Conductivity and hydration of sulfonated polyethersulfone in the range 70-120°C: effect of temperature and relative humidity cycling	Donnadio, A., Casciola, M., Di Vona, M.L., Tamilvanan, M.	Journal of Power Sources	205	145-150	11-Jan-2012	Elsevier

LOLLIPEM	Permeability and Diffusivity Measurements on Polymer Electrolyte Membranes	Arena, F., Mitzel, J., Hempelmann, R.	Fuel Cells	13(1)	56-64	19-Dec-2012	John Wiley and Sons Ltd
	Electrodeposition Of PEM Fuel Cell Catalysts By The Use Of A Hydrogen Depolarized Anode	Mitzel, J., Arena, F., Natter, H., Walter, T., Batzer, M., Stefener, M., Hempelmann, R.	International Journal of Hydrogen Energy	37	6261-6267	11-Oct-2011	Elsevier Limited
	Stabilization of Sulfonated Aromatic Polymer (SAP) Membranes Based on SPEEK-WC for PEMFCs	Fontananova, E., Brunetti, A., Trotta, F., Biasizzo, M., Drioli, E., Barbieri, G.	Fuel Cells	13(1)	86-97	08-Nov-2012	John Wiley and Sons Ltd
	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.	Fuel Cells	13(1)	42-47	08-Nov-2012	John Wiley and Sons Ltd
	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.	Fuel Cells	13(1)	79-95	16-Mar-2013	John Wiley and Sons Ltd
	Crosslinked SPEEK membranes: Mechanical, thermal and hydrothermal properties	Hou, H., Maranesi, B., Chailan, J.F., Khadhraoui, M., Polini, R., Di Vona, M.L., Knauth, P.	Journal of Materials Research	27	1950-1957	14-Aug-2012	Materials Research Society
	Proton-Conducting Cross-Linked Sulfonated Aromatic Polymers for Fuel Cells Application	Maranesi, B., Pasquini, L., Khadhraoui, M., Knauth, P., Di Vona, M.L.	Materials Research Society Symposium – Proceedings	1384	60-65	01-Mar-2012	Materials Research Society
	Cross-linking of sulfonated poly ether ether ketone by thermal treatment: how does the reaction occur?	Maranesi, B., Hou, H., Polini, R., Sgreccia, E., Alberti, G., Narducci, R., Knauth, P., Di Vona, M.L.	Fuel Cells	13(2)	107-117	18-Feb-2013	John Wiley and Sons Ltd
	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.	Industrial and Engineering Chemistry Research	0	0-0	14-Mar-2013	American Chemical Society

	Electrocatalyst–Membrane Interface and Fuel Cell Performance with Sulfonated Polyetheretherketone as Ionomer	Arena, F., Mittel, J., Hempelmann, R.	Zeitschrift für Physikalische Chemie	0	0-0	11-Feb-2013	Oldenbourg Wissenschaftsverlag GmbH
DEMMEA	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	Papadimitriou, K. D., Geormezi, M., Neophytides, S.G., Kallitsis, J. K.	Journal of Membranes Science	433	1-9	25-Jan-2013	Elsevier
	Cross linked high temperature polymer electrolytes through oxadiazole bond formation and their applications in HT PEM fuel cells	Morfopoulou, C.I., Andreopoulou, A.K., Daletou, M.K., Neophytides, S.G., Kallitsis, J.K.	Journal of Materials Chemistry	1	1613-1622	07-Dec-2012	Royal Society of Chemistry
	Design of a reference electrode for high temperature PEM fuel cells	Kaserer, S., Rakousky, C., Melke, J., Roth, C.	Journal of Applied Electrochemistry	-	-	28-Apr-2013	Springer Netherlands
	Cooperative behaviour of Pt microelectrodes during CO bulk electrooxidation	Crespo-Yapur, A., Bonnefont, A. Schuster, R., Krischer, K., Savinova, E.R.	ChemPhysChem	14	1117-1121	01-Mar-2013	Wiley-VCH Verlag
	Thermal crosslinking of aromatic polyethers bearing pyridine groups for use as high temperature polymer electrolytes	Kalamaras, I., Daletou, M.K., Neophytides, S.G., Kallitsis, J.K.	Journal of Membranes Science	415-416	42-50	22-May-2012	Elsevier
	Polymer blends based on copolymers bearing both side and main chain pyridine units as proton exchange membranes for high temperature fuel cells	Geormezi, M., Deimede, V., Kallitsis, J.K., Neophytides, S.	Journal of Membranes Science	396	57-66	02-Jan-2012	Elsevier
	Analyzing the Influence of H ₃ PO ₄ as Catalyst Poison in High Temperature PEM Fuel Cells Using in-operando X-ray Absorption Spectroscopy	Kaserer, S., Caldwell, K.M., Ramaker, D.E., Roth, C.	Journal of Physical Chemistry C	117	6210-6217	01-Mar-2013	American Chemical Society
	3D ordered layers of vertically aligned carbon nanofilaments as a model approach to study electrocatalysis on nanomaterials	Ruvinskiy, P.S., Bonnefont, A., Savinova, E.R.	Electrochimica Acta	84	174-186	03-Apr-2012	Elsevier Limited

DEMMEA	Using Ordered Carbon Nanomaterials for Shedding Light on the Mechanism of the Cathodic Oxygen Reduction Reaction	Ruvinskiy, P.S., Bonnefont, A., Pham-Huu, C., Savinova, E. R.	Langmuir	27	9018-9027	14-Jun-2011	American Chemical Society
	Sulfonated aromatic polyethers containing pyridine units as electrolytes for high temperature fuel cells	Kalamaras, I., Daletou, M. K., Gregoriou, V.G., Kallitsis, J.K.	Fuel Cells	11	921-931	17-Nov-2011	John Wiley and Sons Ltd
	Preparation and characterization of Pt on modified multi-wall carbon nanotubes to be used as electrocatalysts for high temperature fuel cell applications	Orfanidi, A., Daletou, M.K., Neophytides, S.G.	Applied Catalysis B: Environmental	106	379-389	22-Jun-2011	Elsevier
	The Effect of Structural Variations on Aromatic Polyethers for High-Temperature PEM Fuel Cells	Morfopoulou, C., Andreopoulou, A.K., Kallitsis, J.K.	Polymer Chemistry	49	4325-4334	09-Aug-2011	Royal Society of Chemistry
	Mass transport effects in CO bulk electrooxidation on Pt nanoparticles supported on vertically aligned carbon nanofilaments	Ruvinskiy, P.S., Bonnefont, A., Bayati, M., Savinova, E.R.	Physical Chemistry Chemical Physics	12	15207-15216	08-Sep-2010	Royal Society of Chemistry
	Preparation, testing and modeling of three-dimensionally ordered catalytic layers for electrocatalysis of fuel cell reactions	Ruvinskiy, P.S., Bonnefont, A., Houllé, M., Pham-Huu, C., Savinova, E.R.	Electrochimica Acta	55	3245-3256	18-Jan-2010	Elsevier Limited
	Further insight into the oxygen reduction reaction on Pt nanoparticles supported on spatially structured catalytic layers	Ruvinskiy, P.S., Bonnefont, A., Savinova, E.R.	Electrocatalysis	2	123-133	13-Apr-2011	Springer Publishing Company
	Cross linking of side chain unsaturated aromatic polyethers for high temperature polymer electrolyte membrane fuel cell applications	Papadimitriou, K.D., Paloukis, F., Neophytides, S.G., Kallitsis, J.K.	Macromolecules	44	4942-4951	18-May-2011	American Chemical Society
NEXPEL	A Microblock Ionomer in Proton Exchange Membrane Electrolysis for the Production of High Purity Hydrogen	Smith, D.W.	Macromolecules	4 / 46	1504 - 1511	26-Feb-2013	American Chemical Society
H2FC-LCA	How can life cycle assessment foster environmentally sound fuel cell production and use?	Zucaro, A.	International Journal of Hydrogen Energy	accepted	58-69	19-Oct-2012	Elsevier

Annex C:

Patent applications realised through FCH JU-funded projects

Project Acronym	Application Reference	Subject Title	Applicants
ASSENT	EP11006485.4-2119	Festoxid-Brennstoffzellen-System sowie Verfahren zum Betreiben eines solchen – Solid Oxide Fuel Cell System and Method for Operating the Same	R. Deja, R. Peters, L. Blum, Forschungszentrum Jülich GmbH
	FI 20105697	Control arrangement and method in fuel cell system	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
	FI 20106241	Method and control arrangement for a fuel cell device	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
	FI 20116281	Method and arrangement for controlling water content of cell anode gas	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2
	FI 20125147	Method and arrangement for utilizing recirculation for high temperature fuel cell system	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
	PCT/FI2012/050405	Method and arrangement for determining enthalpy balance of a fuel cell system	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
	PCT/FI2012/050407	Method and arrangement for determining enthalpy change of a fuel cell system	Wärtsilä Finland Oy, ownership transferred to Convion Oy 14.1.2013
IRAFC	GR20110100058 A	Cross-linked or non-cross-linked aromatic copolymeric proton-conducting electrolytes for polymeric membrane fuel cells	Advent S.A., University of Patras, Forth/ICE-HT
	US2012/0202,129	Crosslinked or non-crosslinked aromatic (co)polymers as proton conductors for use in high temperature PEM fuel cells	Advent S.A., Forth/ice, University of Patras
HYDRO-SOL-3D	US 2011/0135566 A1	Gas/solid phase reaction	M. Roeb, C. Sattler, P.M. Rietbrock, R. Kuster, A.G. Konstandopoulos, C. Agrafiotis, L. De Oliveira, M. Schmitz
DEMMEA	GR 20110100058 A	Cross-linked or non-cross-linked aromatic copolymeric proton-conducting electrolytes for polymeric membrane fuel cells	Advent S.A., University of Patras, Forth/ICE-HT
	US2012202129	Crosslinked or non-crosslinked aromatic (co)polymers as proton conductors for use in high temperature PEM fuel cells	Advent Technologies (GR)



Annex 1:

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 Commission²⁷ 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 AAR and in its annexes 2 to 5 is, to the best of my knowledge, accurate and exhaustive

Brussels, 14 February 2014



Elisabeth Robino
Internal Control Coordinator

²⁷ SEC(2003)59 of 21.01.2003.



Annex 2:

Human resources - Establishment plan posts

Category and grade	Establishment plan 2013		Posts actually filled at 31.12.2012		Posts filled in by external publication in 2013		Promotion / reclassification in 2013		Departures 2013		Posts actually filled at 31.12.2013	
	perm	temp	perm	temp	perm ²⁸	temp ²⁹	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		1						1		0
AD 8		4		4		1						5
AD 7		2		2								2
AD 6												
AD 5												
Total AD		11		11						1		10
AST 11												
AST 10												
AST 9												
AST 8		1		1						1		0
AST 7		3		3								3
AST 6												
AST 5												
AST 4		1		1								1
AST 3		2		2		1				1		2
AST 2												
AST 1												
Total AST		7		7		1				1		6
Total		18		18		1				2		16

In addition the FCH JU employs 2 contract agents of FG III and FG IV.

²⁸ Recruitment + transfer

²⁹ All new contracts, including the inter-agency job market



Annex 3:

Financial information

In accordance with the Council Regulation 521/2008 setting up the Fuel Cells and Hydrogen Joint Undertaking (article 12 of its Statutes), the FCH 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.

Budget structure

The budget of the FCH JU is divided into 3 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 JU budget 2013 was as follows (in €):

For Title 1 and 2 appropriations are non-differentiated: commitment and payment appropriations are of equal amount. For Title 3 appropriations are differentiated. Commitments are paid over several years in accordance with contractual obligations.

The funding of the FCH JU budget 2013 was as follows (in €):

Heading	CA	PA	Cashed in 2013
Union contribution* for operational expenditure	69,991,039	55,201,460	55,201,460
Union contribution* for administrative expenditure	1,191,805	1,191,805	1,191,805
Industry Grouping	2,712,167	2,712,167	2,088,545
Research Grouping	452,028	452,028	348,091
Other revenues	135,000	135,000	312,910
Re-activation of appropriations	8,056,325	8,574,191	
TOTAL	82,538,364	68,266,651	59,142,811

* Includes EFTA contribution

Budget expenditure

Budget execution at year end for fund source C1 reached 98.91% in terms of commitment appropriations and 56.68 % in terms of payment execution.

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

2013 - C 1

(amounts in €)

	Commitment Appropriations	Committed	% committed	Payment Appropriations	Paid	% paid	Carry over to 2014 (automatic C8)	To be cancelled/reactivated
Title 1	2,605,200.00	2,342,617.00	89.92%	2,605,200.00	2,264,469.81	86.92	78,147.19	262,583.00
Title 2	1,885,800.00	1,723,628.03	91.40%	1,885,800.00	1,183,604.60	62.76	540,023.43	162,171.97
<i>Sub-total</i>	4,491,000.00	4,066,245.03	90.54%	4,491,000.00	3,448,074.41	76.77	618,170.62	424,754.97
Title 3	69,991,039.00	69,606,239.00	99.45%	55,201,460.00	30,387,290.40	55.04	0.00	24,814,169.60
Total	74,482,039.00	73,672,484.03	98.91%	59,692,460.00	33,835,364.81	56.68	618,170.62	25,238,924.57

2013 - C 2

(amounts in €)

	Commitment appropriations	Committed	% committed	Balance commitment	Payment appropriations	Paid	% Paid
Title 3	8.056.325,00	8.056.325,00	100 %	0	8.574.191,00	8.574.191,00	100 %

These amounts correspond to reactivation of unused appropriations cancelled in 2012 and entered in 2013 budget initially or by amendment.

2013 - C 4

(amounts in €)

	Appropriations	Committed	%	Paid	%
Title 1	104.53	0	0	0	0
Title 2	294.21	0	0	0	0
<i>Sub-total</i>	398.74	0	0	0	0
Title 3	171,999.96	94,322.84	54,71 %	0	0
Total	172,398.70	94,322.84	54,71 %	0	0

The funds relate to recovery of amounts due by third parties. These amounts are carried over automatically to 2014 (C5) and will be used for the FCH JU activity.

2013 - C 5

(amounts in €)

	Commitment appropriations	Committed	% committed	Payment appropriations	Paid	% Paid	To be cancelled/ reactivated
Title 1	645.00	645.00	100 %	645.00	645.00	100%	0
Title 2	1,135.61	1,135.61	100 %	1,135.61	693.67	61.08%	441.94
<i>Sub-total</i>	1,780.61	1,780.61	100 %	1,780.61	1,338.67	75.18%	441.94
Title 3	1,302,010.34	1,302,010.34	100 %	1,730,300.30	1,730,300.30	100%	0
Total	1,303,790.95	1,303,790.95	100 %	1,732,080.91	1,731,638.97	99.97%	441.94

The funds correspond to assigned revenues of 2012 carried over in 2013.
The amount of 441.94 € from Title 2 is carried over automatically to C8, in 2014.

2013 -C 8

(amounts in €)

	Commitment appropriations	Committed	% committed	Payment appropriations	Paid	% Paid	To be cancelled/ reactivated
Title 1	50,991.31	47,363.62	92,89%	50,991.31	47,363.62	92,89%	3,627.69
Title 2	756,646.31	707,251.42	93,47%	756,646.31	704,824.22	93,15%	49,394.89
<i>Sub-total</i>	807,637.62	754,615.04	93,43%	807,637.62	752,187.84	93,13%	53,022.58
Title 3	218,192,995.32	206,530,006.98	94,65%	0	0		11,662,988.34
Total	219,000,632.94	207,284,622.02	94,65%	807,637.62	752,187.84		11,716,010.92

The unused commitment appropriations from operations (11,662,988.34 €) include an amount of 11,654,464.40 € related to call 2012 (2 large projects for which the negotiation failed), and of 8,523.94 € related to studies 2011.

The total payments made in 2013 (all fund sources) amount to 44 893 382.62 € (33 835 364.81+ 8 574 191.00 +1 731 638.97+752 187.84)



Annex 4:

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) and
- 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 **multiannual nature** (i.e. the effectiveness of the JU's control strategy can only be assessed at the end of the program 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 multiannual perspective.

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 program**. The question of being on track 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 program lifecycle, a reservation would (still) be made. Nevertheless, the Executive Director apart from the residual error rate 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.

In case an adequate calculation of the residual error rate is not possible for reasons not involving control deficiencies ³⁰, the consequences are to be assessed quantitatively

³⁰ For example, in the early stages of implementation of audits when the number of audit results is limited.

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.

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 favor 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 in accordance with 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 € of the auditable population.

A = total of all audited amounts, expressed in €.

E = total non-audited amounts of all audited beneficiaries. This will consist of the total amount, expressed in €, of all non-audited validated cost statements for all audited beneficiaries (whether extrapolation has been launched or not).

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 referred to in the ex-post audit strategy.



Annex 5:

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, namely: Planning & Programming and Communication & Information.

1. 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:

Complex legal framework 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 to be complied with, and the relative 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 European Parliament, 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 Internal Control Coordinator prepares the annual assessment of the FCH JU in-

ternal control system and issues recommendations to the Executive Director. Furthermore, he certifies the accuracy and exhaustiveness of the information on management and internal controls as well as the information contained in the annexes to the AAR.

The Internal Audit Capability provides the Executive Director with expertise and advice on internal control and on risk management. Furthermore the Internal Audit Capability and the Internal Audit Service 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. Certificates on Financial Statements – 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.

Grant period: Between x and y months (average x months)	12 - 81 (36.5)
Average value (in €)	2,837,427
Median value (in €)	1,994,744
Range of grants (in thousand €)	257 - 25,907
Percentage of grants under 1 M €.	10.00%
Number of coordinators/beneficiaries:	130/1107

2. Stages and actors and main issues addressed at each stage

Horizontal process: Planning & Program- ming

The Council regulation 521/2008 setting up FCH JU is the primary element from which the objectives of the JU derive for the preparation of the Multi-Annual (MAIP) and annual (AIP) implementation planning.

The AIP 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.

<p>Project Lifecycle Stage 1 - Evaluation</p>	<p>Proposals are evaluated and selected according to their research credentials (i.e. best value for public money).</p> <p>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.</p>
<p>Project Lifecycle Stage 2 –Negotiation & selection</p>	<p>Based on the ranking list, the JU establishes the final list of proposals and proceeds to negotiate the grant agreements with the successful applicants.</p> <p>The purpose of the negotiation is to clarify and adapt the work to be carried out and the operational objectives of the project, substantiate its costs and determine its duration and the maximum contribution from the FCH budget which is of key importance for the JU in order to respect the 'matching principle'³¹.</p> <p>The JU seeks to implement the advice of the independent expert evaluators. This negotiation generates significant efficiencies in the use of JU funds by discarding work which is not essential for the achievement of the scientific objectives of the project and ensuring that the budgeted costs are commensurate to the work to be carried out.</p> <p>Negotiation results are put forward to the Governing Board which approves the final list of selected proposals.</p> <p>This phase includes legal and financial verifications (the legal status of the beneficiary, its possible inclusion in the Early Warning System (EWS)³², its financial viability and its capacity to co-fund the project) as well as safeguarding measures (e.g. bank guarantees, reduced level of pre-financing and shorter reporting periods).</p>

³¹ Council Regulation 521/2008 as amended by Regulation 1183/2011, FCH Statues, article 12(3):

"The operational costs of the FCH JU shall be covered through the financial contribution of the Union and through in-kind contributions from the legal entities participating in the activities. The contribution from the participating legal entities shall at least match the financial contribution of the Union Receipts shall be dealt with in accordance with the Rules of Participation set out in the Decision No 1982/2006/EC.

³² So far, access to the EWS by FCH is limited to some EWS levels.

Project Lifecycle Stage 3 – Project & contract man- agement

Contracting and pre-financing

After final approval of proposals for funding, the grant agreements are prepared for signature based on a model. Before the commitment is authorised and the pre-financing is paid, financial circuits are in place ensuring that all relevant operational and financial aspects are verified by at least two independent members of staff.

Interim and final payments

For beneficiaries' payment requests (i.e. cost claims), the JU relies on two main sources:

- (1) Beneficiaries' technical and financial progress reports (intermediate and final).
- (2) Audit certificates by certifying auditor who must be independent from the beneficiary and qualified to carry out statutory audits of accounting documents. In particular:
 - a. *'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.*
 - b. *'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 with regard to both personnel and indirect costs.*

The approval of interim and final payments to beneficiaries is subject to the ex-ante 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 is in all respects in compliance 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 in accordance with the provisions of the grant agreement. The authorising officer ascertains that these checks on the supporting documents have been done and validates the expenditure.

When deemed necessary, ex-ante 'on the spot' control visits and/or ex-ante '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>Project Lifecycle Stage 4 – Ex-post controls: audits and recoveries</p>	<p>Ex-post audits are one of the main elements for the provision of assurance because many errors can only be detected by ex-post audits ‘on the spot’. This control is intended to (1) contribute to ensure the legality and regularity of the financial transactions; (2) to provide an indication of the effectiveness of ex-ante controls and (3) to provide the basis for corrective and recovery mechanisms.</p> <p>The JU has developed an ex-post audit strategy which is harmonised with the Commission’s strategy as requested by the General Financing Agreement signed between the Commission and the JU.</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>
<p>Horizontal process: Communication & Information</p>	<p>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.</p> <p>In this respect, 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.</p> <p>The FCH JU also participates in meetings with units responsible for ex-post audits in the Commission in order to spread their best practices across JU’s beneficiaries and auditors and ensure a common understanding of similar critical issues and harmonised methodology.</p>
<p>Horizontal process: Anti-fraud measures</p>	<p>Anti-fraud measures and actions are embedded in various ex-ante and ex-post controls for prevention and detection purposes.</p> <p>The FCH JU cooperates with the Commission services in particular 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 RTD) aiming at raising fraud risk awareness.</p> <p>The FCH JU is in the process of elaborating an anti-fraud strategy which will take into account (1) the “Methodology and guidance for the Agencies’ anti-fraud strategies” issued by OLAF on 25/11/2013 and (2) DG RTD anti-fraud strategy as both entities work under a similar legal framework, they have similar processes and control systems and they face the same risks.</p>

3. Supervision and monitoring of the internal control systems and audit follow up

The FCH JU complies with all Internal Control Standards, 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 Internal Audit Capability .
- The Internal Audit Service .
- The European Court of Auditors – (annual audit with a clean opinion)

There is a systematic monitoring of the implementation of audit recommendations. It is aimed to ensure that the internal control weaknesses and risks identified by both external (the European Court of Auditors) and internal auditors (currently mainly the Internal Audit Capability) are reported and adequately addressed; defining appropriate action to remedy systemic weaknesses and monitoring the implementation of action plans.

Annex 6:

FCH JU internal control standards

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;

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 Annual Implementation Plan (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. MAIP), 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 Annual Implementation Plan (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 Annual Implementation Plan 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 regular-

ity aspects and operational performance (i.e. achievement of AIP objectives).

- The supervision of activities involving potentially critical risks is adequately documented³³.
- Management monitors the implementation of accepted audit recommendations and related action plans.
- At least annually in the Annual Activity Report (AAR) 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 continuity of service in case of "business-as-usual" interruption. Business Continuity Plans (BCP) 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 ef-

³³ 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

fective, 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.

Glossary

AA	Activity Area
AAR	Annual Activity Report
ABAC	Accrual Based Accounting
AC	Associated Country
AD	Administrator
AIP	Annual Implementation Plan
ALDE	Group of the Alliance of the Liberals and Democrats for Europe in the European Parliament
APU	Auxiliary Power Unit
ARTEMIS	Advanced Research and Technology for Embedded intelligence and Systems
AST	Assistant
BCP	Business Continuity Plan
BoP	Balance of Plant
BTH	Biomass To Hydrogen
BUDG	Directorate General for Budget
CA	Committment Appropriation
CA	Contractual Agent
CFD	Computational Fluid Dynamics
CFS	Certificate of Financial Statements
CHP	Combined Heat and Power
CIRCA	Communication and Information Resource Centre for Administrations
CORDA	Common Research Data Warehouse
COSO	Committee of Sponsoring Organizations of the Tradeway Commission
CPM	Contract and Project Management
DG	Directorate General
DoE	Department of Energy
EC	European Commission
ECA	European Court of Auditors
EIB	European Investment Bank
EMI	Experts Management Tool
ENER	Directorate general for Energy
ENIAC	European Nanoelectronics Initiative Advisory Council
ENVI	Environment
EPP	Group of the European People's Party in the European Parliament
ESS	Electronic Submission System
EU	European Union
FCEV	Fuel Cell Electric Vehicle
FCH JU	Fuel Cell and Hydrogen Joint Undertaking
FGIII	Function Group III
FGIV	Function Group IV
FORCE	Form C Editor
FP7	Seventh Framework Programme
FTE	Full Time Equivalent

FVC	Financial Viability Check
GA	Grant Agreement
GB	Governing Board
H2020	Horizon 2020
HFC	Hydrogen and Fuel Cells
HR	Human Resources
HyER	Hydrogen Fuel Cells and Electromobility for European Regions
IAC	Internal Audit Capability
IAS	Internal Audit Service
ICC	Internal Control Coordinator
ICE	Internal Combustion Engine
ICHS	International Conference on Hydrogen Safety
ICS	Internal Codes and Standards
IEA	International Energy Agency
IG	New Energy World Industry Grouping Fuel Cells and hydrogen for Sustainability
IMI	Innovative Medicine Initiative
IPHE	International Partnership for the Hydrogen Economy
ISA	Information System for Absences
IT	Information Technology
ITRE	European Parliament Committee on Industry Research and Energy
JRC	Joint Research Center
JTI	Joint Technology Initiative
KETEP	Korea Energy Technology Evaluation and Planning
KPI	Key Performance Indicator
MAIP	Multi-Annual Implementation Plan
MAWP	Multi-Annual Work Plan
MEA	Membrane Electrode Assembly
MEP	Member of the European Parliament
MHV	Materials Handling Vehicle
MOVE	Directorate General for Mobility and Transport
MS	Member State
N.ERGHY	New European Research Grouping on Fuel cells and Hydrogen
NCP	National Contact Point
NEF	NEgotiation Form Facility
NEW-IG	New Energy World Industry Grouping Fuel Cells and Hydrogen for Sustainability
OLAF	European Anti-Fraud Office
PA	Payment Appropriation
PEM	Proton Exchange Membrane
PEM	Polymer Electrolyte Membrane
PNR	Pre-Normative Research
PPP	Public Private Partnership
PRD	Program Review Day
R&D	Research and Development
RACER	Relevant Accepted Credible Easy and Robust
RCS	Regulation Code and Standards
RE	Renewable Energy
RG	New European Research Grouping on Fuel cells and Hydrogen
RTD	Research and Technological Development
S&D	Group of the Progressive Alliance of Socialists and Democrats in the European Parliament
SC	Scientific Committee

SESAM	European Commission Online Reporting Tool for Research and Technological Projects
SET Plan	Strategic Energy Technology Plan
SETIS	Strategic Energy Technologies information System
SGA	Stakeholders General Assembly
SLA	Service-Level Agreement
SME	Small and Medium Enterprise
SRG	States Representatives Group
STOA	Science and Technology Options Assessment Unit of the European Parliament
TEMONAS	TEchnology MONitoring and ASsessment platform
TEN-T	Trans-European Network - Transport
TRAN	Directorate General for Transport
TTG	Time To Grant
UK	United Kingdom
USA	United States of America
VAT	Value Added Tax

