

Tender Specifications: Study on development of electrolysis in the EU

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1. Introduction

1.1 The FCH JU activities

The Fuel Cells and Hydrogen Joint Undertaking (**FCH JU**) represents a public-private research partnership at the European level. Its members are the EU represented by the Commission as public representative, the 'Industry Grouping' and the 'Research Grouping'. 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, and accelerates hydrogen and fuel cell technology acquisition and deployment processes. Carried out with the involvement and cooperation of stakeholders from industry (including SMEs), research centres, universities, Member States and regions, the Joint Undertaking builds on the achievements of the European Hydrogen and Fuel Cell Technology Platform and on the results of completed and ongoing EU funded activities. The FCH JU is a Joint Technology Initiative (JTI) within the Seventh Framework Programme 2007 – 2013 (FP7) and has a total budget of approx. EUR 1 billion, with an EU contribution of approx. € 0.5 billion.

Beyond its support to R&D activities, the FCH JU aims at placing Europe at the forefront of fuel cell and hydrogen technologies worldwide and enabling the market breakthrough of fuel cell and hydrogen technologies, thereby allowing market forces to drive the substantial potential public benefits.

It is hoped that the EU authorities will extend the duration of the FCH JU and entrust it with the implementation of a part of the Horizon 2020 budget. More information on the proposal for the continuation of the FCH JU can be found in the annexed document: *Scientific and Technical Background document for the Fuel Cells and Hydrogen Joint Undertaking under the Article 187 in Horizon 2020*.

1.2 Context

Over 25% of the FCH JU 2007-2013 hydrogen production and distribution budget has been spent on electrolysis and this is likely to increase over the next 7 years.

It is the intent of the FCH JU to leverage future funds to stimulate a European electrolysis industry that enables an increased share of renewable electricity and the production of low-CO₂ hydrogen.

Three example cases for electrolysers have been identified during a meeting between the European Commission, the FCH JU and industry partners:

1. The use of hydrogen as storage medium for excess (renewable) energy

Large scale (100-1000 MW range) electrolysis capacity converting excess energy (from renewable or other sources) to hydrogen for later re-electrification, storage in the natural gas grid and other applications

2. Central hydrogen production as low-carbon energy input for medium size European industry

Medium scale (10-250 MW range) hydrogen production from excess or low-carbon electricity to replace natural gas in local gas networks in order to reduce CO2 emissions from small and medium scale industry.

3. Hydrogen production for local applications

Small scale (up to 15 MW range) hydrogen production, for example for hydrogen refuelling stations and bus depots.

These “use cases” will be used as a guideline to define electrolyser targets and the European research, development and demonstration program with as target to make them economically viable (whereby this should not disqualify RD&D on smaller systems with later scaling-up targets). For each of these cases commercial implementation between 2020 and 2030 is sought. Further information on the use cases is given later in this document.

2. Requested Services

2.1 Objectives

The study will

- Validate and possible adjust the targets for electrolysis set in the Scientific and Technology Background Document for the FCH JU 2.0
- Identify technology gaps and to define the improvements needed for the different electrolysis technologies to achieve the expected targets
- Propose priorities for topics of the future calls for proposals, including a call for a demonstration project on hydrogen production and storage for balancing the grid in 2014

The study should include and if possible combine the views of EU and national authorities, industry and research institutes. The results will be used as a reference that is independent of the aims of single companies or research institutes.

The business case related to renewable electricity storage will be the link between this study and a second larger study devoted to the techno-economic assessment of the role of hydrogen in energy storage that will be launched later.

2.2 Tasks

1. Review the status of electrolyser technology and deployment and identify the main areas for development

Sources of information are expected to be FCH JU projects, relevant members of NEW-IG, N.ERGHY and officials in the FCH-JU, relevant companies and institutes that received FCH-JU funding, national hydrogen organisations and public literature

2. Validation of long-term targets for electrolyser technology and electrolyser deployment

The targets should be derived from the three use cases and be based on how European governments, industry and research institutes expect electrolyser technology to enable an increased share of renewable electricity and the production of low-CO2 hydrogen.

A distinction should be made between targets for technologies that enable commercial roll-out of electrolyser technology from or before 2020 and targets for technologies and can offer improvements after this time.

Provisional targets that need validation are included in “Scientific and Technology Background Document for the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) under Article 187 in Horizon 2020”. Additional targets may be needed to meet the objectives of this study.

3. Recommendation of priority areas for RD&D under the FCH JU from 2014 to 2020, including a proposal for set of topics for the 2014 call for proposals.

The set of topics for 2014 should include a call for demonstrating the large-scale use of excess electricity for hydrogen production.

Approval of the results by different stakeholder groups is not within the scope of the work. If stakeholder groups have significantly different views on the targets or ways to reach the targets, the work should highlight these differences and offer recommendations how to align the views.

The consultant is encouraged to make suggestions for improvement of the scope of work and the deliverables in their proposal to better meet the objective and intent.

2.3 Focus of the work

Use Case 1: Large scale energy storage use case

The use of excess energy to prevent the need for curtailment of intermittent renewable or nuclear power plants, potentially with re-electrification:

- 250 MW electrolysis capacity
- Several outlets for hydrogen will be revenue optimised
 - o Re-electrification
 - o Mobility market
 - o Local hydrogen pipeline connected to industry
 - o Natural gas grid injection
- Electrolyser utilisation depends on future renewable energy production and energy consumption patterns as well as future upgrades of the electricity grid
- Boundary: hydrogen produced at industrial grade (99.5%) and a correction for potential energy use and cost to compress hydrogen to the pressure required for the application.

Use Case 2: Industry hydrogen production case

In some industrial areas hydrogen is produced from natural gas and supplied via pipelines to a number of plants. Replacing part of this hydrogen with hydrogen from excess renewable energy would reduce greenhouse gas emissions of these plants. An example would be the combination of a 100 tpd SMR plant and 20 tpd electrolyser capacity that would relieve the SMR if electricity is in excess.

- SMR can fully supply the hydrogen if needed

- Operator uses electrolyser if hydrogen can be produced cheaper than with SMR + cost of CO2 emissions
- Space is no concern
- Water treatment and transformers can be outside the electrolyser system
- Electrolyser may be used in the control power market (for example by providing secondary negative control power capacity) and thus generate a capacity income
- Boundary: hydrogen produced at industrial grade (99.5%) and a correction for potential energy use and cost to compress hydrogen to the pressure required for the application.

Use Case 3: Forecourt hydrogen production use case

The forecourt case means hydrogen production at the point of use, for example at a hydrogen filling station or a bus depot:

- Hydrogen demand 200 (small station) to 3000 (bus depot) kg/day¹
- Hydrogen demand can vary within limits, especially for stations
- Alternative hydrogen supply is available via truck delivery
- Operator reduces cost by switching between electrolysis (if power is cheap) and truck delivery (if power is expensive)
- Electrolyser may be used in the control power market (for example by providing secondary negative control power capacity) and thus generate a capacity income
- Space is likely constrained on the premises
- For stations (<1000 kg/day), the system must be “plug & play”: containerized with tap water and 400V AC connection; for depots more civil works can be done external to the electrolyser system
- Boundary: hydrogen produced at fuel cell quality (99.999%) and a correction for potential energy use and cost to compress hydrogen to the pressure required for the application.

Technologies to be included

Different applications or even different emphasis within the same application may require different electrolysis technology. Technologies that should be included are

- Alkaline electrolysis
- PEM electrolysis
- High temperature electrolysis

Targets that should be set for each technology depend on the best use of the electrolyser. They include

- Capital cost
- Maintenance cost
- Lifetime

¹ The study should also consider smaller size installations to be considered (some tens of kW). It seems that Germany is now subsidizing the storage of domestic energy from renewables (notably photovoltaic)

- Energy use (as function of load in some cases)
- Flexibility (i.e. ramp-up & ramp down rate, over capacity, idle energy use)
- Footprint (in some cases)
- ...

Existing information

The consultant is encouraged to use existing information as much as possible. Studies that have been identified are

- Scientific & technical background document for the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) under Article 187 in Horizon 2020
- Ernst & Young (2013) Wind hydrogen business case study for northern Germany, to be published in July 2013
- NREL (2009) status of electrolyser technology
- Fuel Cells Today (2013), Electrolysers for Renewable Energy Efficiency
- Fraunhofer (201-2011) Stand und Entwicklungspotenzial der Wasserelektrolyse zur Herstellung von H₂ aus regenerativen Energien“, study done for NOW
- EASE/EERA (2013) Recommendations for a European Energy Storage Technology Development Roadmap towards 2030.

Entities to contact

The applicant is invited to indicate in its proposal the entities it plans to contact notably in the following categories: Electrolyser development; Electrolyser deployment and Hydrogen associations, etc. Once the study is contracted, the FCH JU can also suggest other names and facilitate the contact.

The applicant is also invited to indicate in its proposal the source of information it plans to resort to.

2.4 Deliverables

1. A document outlining
 - a. the views of EU and National authorities-, industry- and research organizations on the role of electrolysis in the future energy system
 - b. a proposal for an overall aim for the role of electrolysis in the future energy system combining the views of the stakeholder groups
 - c. a set of stretched, but realistic 2020 targets for electrolysis equipment and electrolyser deployment
2. A document giving
 - a. a summary of electrolysis technologies, including
 - i. estimates of current efficiency, cost and deployment level
 - ii. estimates of potential 2020 efficiency, cost and deployment level
 - iii. a benchmarking table of European and non-European suppliers with their current state of the art and challenges and future outlook and gap analysis.

- b. an assessment which technologies are most likely to contribute significantly to increasing the share of renewable electricity and low-CO₂ hydrogen production
 - c. a development timeline (2014-2020) for these technologies, including priorities for FCH-JU funding over time
4. A document giving a recommendation for topics to be called in the 2014 call, including a written proposal for a call for demonstrating the use of excess energy via hydrogen production and storage

2.5 Definition of success

The study will have to meet the following success criteria:

- EU and National authorities, industry and research institutes recognise their views in the documents provided or clear recommendation to align the views of these stakeholders
- The documents provide a framework that can be used for developing call proposals for the years 2014 to 2020
- It should give a high level overview of the state of technology and potential progress until 2020, which enables governments and industry to plan investments

2.6 Information and confidentiality

No individual views of companies or research institutes should be included in the deliverables. Where confidential information needs to be obtained and used, the consultant is responsible for setting up the appropriate confidentiality agreement and to remain within its boundaries.

2.7 Interim steer and final review of the work

The work will be facilitated and reviewed by the FCH JU.

The contractor is expected to present the results of the study to internal groups of the FCH JU: working group in charge of the defining the FCH JU scientific priorities, Scientific Committee, Governing board, etc.)

A presentation of interim results in the middle of the study could be requested to the contractor.

3. Contractual obligations

3.1 General

The contract will be a bilateral contract between the FCH JU and the winning tenderer. In drawing up the tender, the tenderer should bear in mind the provisions of template contract attached to these Specifications.

The contractor must perform this contract to the highest professional standards.

The contractor will have the sole responsibility for complying with all legal obligations incumbent on him, notably those arising from employment law, tax law and social legislation.

The contractor may neither represent the Fuel Cells and Hydrogen Joint Undertaking nor behave in any way that would give such an impression. The contractor must inform third parties that he does not belong to the European public service, but is exercising the tasks on behalf of the Fuel Cells and Hydrogen Joint Undertaking.

3.2 Subcontracting

Sub-contracting is permitted. Certain tasks provided for in the contract may be entrusted to subcontractors, but the main contractor retains full responsibility and liability towards FCH JU for the performance of the contract as a whole. Accordingly, FCH JU will treat all contractual matters (e.g. payment) exclusively with the main contractor, whether or not the tasks are performed by a subcontractor. Under no circumstances can the main contractor avoid liability towards the JUs on the grounds that the subcontractor is at fault.

If subcontracting is proposed, the file must include a document mentioning the reasons why subcontracting is proposed; stating clearly the roles, activities and responsibilities of subcontractor(s) and a letter of intent by each subcontractor stating their intention to collaborate with the tenderer if he wins the contract.

During execution of the contract, the contractor will need FCH JU express authorisation to replace a subcontractor with another and/or to subcontract tasks for which subcontracting was not envisaged in the original tender.

Please note that if subcontractors are proposed, the declaration relating to the exclusion criteria and the documents relating to the selection criteria must be provided by each of them.

4. Calendar

Interested applicants have to submit their proposal, by 25 June 2013.

It is expected that the evaluation will take place at the end of June and beginning of July and that the contract will start in the first half of August.

The contractor shall submit draft reports by 15 November 2013 and the final reports of its study by 15 December 2013.

5. Volume of the contract and Prices

The maximum amount for this study including all the deliverables as mentioned under 2.4 is €125.000.

Tenderers shall indicate the total price they propose for carrying out the study.

In addition, the tenderers shall give an indicative repartition of this price between different categories of costs (staff, travel including accommodation and per diem costs, publication costs, etc.) and the tasks/roles of the various staff members involved in the project.

The price for the tender must be quoted in euro. Tenderers from countries outside the euro zone have to quote their prices in euro. The price quoted may not be revised in line with exchange rate movements.

Prices should be fixed amounts.

Prices should be quoted free of all duties, taxes and other charges, including VAT, as the FCH JU is exempt from such charges under Articles 3 and 4 of the Protocol on the privileges and immunities of the EU; the amount of VAT should be shown separately.

Prices are indexed according to Article I.3 of the contract.

6. Legal Situation of the Tenderer: Exclusion Criteria

Tenderers shall be excluded from participation in the present procurement procedure if:

- a) they are bankrupt or being wound up, are having their affairs administered by the courts, have entered into an arrangement with creditors, have suspended business activities, are the subject of proceedings concerning those matters, or are in any analogous situation arising from a similar procedure provided for in national legislation or regulations;
- b) they have been convicted of an offence concerning their professional conduct by a judgement which has the force of res judicata;
- c) they have been guilty of grave professional misconduct proven by any means which the contracting authority can justify;
- d) they have not fulfilled obligations relating to the payment of social security contributions or the payment of taxes in accordance with the legal provisions of the country in which they are established or with those of the country of the contracting authority or those of the country where the contract is to be performed;
- e) they have been the subject of a judgement which has the force of res judicata for fraud, corruption, involvement in a criminal organisation or any other illegal activity detrimental to the Communities financial interests;
- f) Following another procurement procedure or grant award procedure financed by the Community budget, they have been declared to be in serious breach of contract for failure to comply with their contractual obligations.

Tenderers shall be excluded from awarding if during the present procurement procedure:

- g) they are subject to a conflict of interest;
- h) they are guilty of misrepresentation in supplying the information required by the contracting authority as a condition of participation in the contract procedure or fail to supply this information.

In their tenders, tenderers shall provide a declaration on their honour (based on the Model attached), duly signed and dated, stating that they are not in one of the situations listed above.

The FCH JU has the right to verify all information contained in the declaration by requiring further the documents. The tenderer is also aware of the possible consequences that may arise from any false declaration in providing the information required by the awarding authority in order to take part in the contract.

7. Selection Criteria

The tenderer has to have the necessary technical, professional, economic and financial capacity to execute the contract.

This invitation is being sent to a range of potential applicants that are regarded as suitably qualified. In order to confirm this preliminary assessment of their technical and professional capacity, tenderers shall provide:

- Details of no more than five previous assignments, in no more than 10 pages, demonstrating capacity to undertake the work required;
- CV of the staff proposed for this contract with particular reference to the principal person proposed by the tenderer to liaise with FCH JU in the performance of the contract.

8. Award Criteria and Award of the Contract

The ranking of the proposals that passed the exclusion and selection stages will be based on the quality/price ratio where quality and price will have a 60/40 weighting. The following formula shall be used:

$$\text{Score for proposal X} = \frac{\text{Cheapest price}}{\text{Price of candidate X}} \times 40 + \frac{\text{Q candidate}}{\text{Q of best candidate}} \times 60$$

The technical evaluation of tenders will be evaluated on the basis of the following award criteria The tenderers shall provide in their proposal the information necessary to assess such criteria.

	Criteria	Points
1	<p>General understanding of the project,</p> <p>The proposal:</p> <ul style="list-style-type: none"> • Shows how providing the analysis required will help to serve the objective of the FCH JU and its stakeholders. • Already shows analysis and provides first insights • Adds own aspects/views - have put in unexpected elements that are meaningful to achieve success 	33
2	<p>Quality of the proposed services</p> <ul style="list-style-type: none"> • Quality of proposed methodology for conducting the work, and to ensure impartiality in the analysis • Quality of the identification of the sources of information (documents and people) 	33

	<ul style="list-style-type: none"> • Time line and resource allocation is realistic and at the right level of details 	
3	Expertise of the team <ul style="list-style-type: none"> • Involvement of one or more of the most senior level staff • Involvement of specialists in key areas: electrolysers, fuel cells and hydrogen technologies • Demonstrated capability to interview companies, institutes and public authorities 	34
	Total	/100