

Tender Specifications: Study on hydrogen from renewable resources in the EU

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' (NEW-IG), and the 'Research Grouping' (N.ERGHY). 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, 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 started a Joint Technology Initiative (JTI) within the Seventh Framework Programme 2007 – 2013 (FP7) with a total budget of approx. EUR 1 billion, with an EU contribution of approx. € 0.5 billion.

In the frame of the Horizon 2020 research and Innovation framework programme The existence and the mandate of the FCH JU have been extended with an additional budget of 1.35 Billion out of which 665 million of EU contribution for the period 2014-2020.

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.

1.2 Context

One of the objectives of the FCH JU 2.0 is to promote the production of hydrogen from renewable energy sources (green hydrogen for short) and to increase its conversion efficiency while reducing operating and capital costs, leading to competitive cost of hydrogen in the energy, transport or industrial gas markets.

Technologies to convert renewable energy into hydrogen include water electrolysis, biomass conversion, thermochemical cycles and direct conversion of solar energy to hydrogen. In 2013 a study on water electrolysis was performed to guide the development of the FCH JU 2.0 program in this area *Development of Water Electrolysis in the European Union*. A complementary study for other technologies is envisaged to assess the use of a wide energy resource base for production of renewable hydrogen and to guide the FCH JU 2.0 program to develop the more promising routes.

Three value chain examples have been identified for this study based on installation production capacity:

1. Hydrogen production for local applications (0.2 to 4tpd)

In this chain the energy source is transported to the hydrogen demand area and hydrogen is produced in its vicinity so that hydrogen distribution is unnecessary. Examples are production at hydrogen retail stations, bus depots and other hydrogen consumers of this size.

2. Semi-central hydrogen production (4 to 20tpd)

These semi-central facilities serve a number of customers in the immediate area. An example could be a biogas producer converting biogas to hydrogen serving several hydrogen stations or a local industry via short pipelines.

3. Central hydrogen production (>20tpd)

This is the direct equivalent of existing large hydrogen plants, whereby the hydrogen is distributed to the customer by pipeline or compressed hydrogen truck and used for energy storage or other bulk applications.

The results of the study are intended to be used to assess the technologies that may be supported by the FCH JU 2.0 and to clarify the development needs that would make these technologies economically viable. For each of these cases commercial implementation between 2020 and 2030 is sought.

2. Requested services

2.1 Objectives

The results of this study are meant to be a basis for discussion between stakeholders of the FCH JU 2.0 (i.e. members of the European Commission, Industry grouping and Research Grouping) regarding which topics / hydrogen technologies are best suited to contribute to the relevant EU policies.

The study will

- Identify technologies that could competitively be used to produce hydrogen from renewable energy sources and are within the boundaries set by the Multi Annual Work Plan.
- Compare these technologies on economic competitiveness, efficiency and environmental impact (greenhouse gas emissions, land usage, etc.) with large scale steam reforming of natural gas as well as water electrolysis.
- For the proposed technologies make reference to the energy efficiency of the full energy chains and their relevance to EU policies.
- Identify technology gaps and define the improvements needed for the different technologies to achieve competitiveness
- Propose priorities for topics of the future calls for proposals of the FCH JU 2.0

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

2.2 Tasks

1. Define an initial list of potentially relevant technologies and perform a preliminary assessment of their economic competitiveness over a timeframe from now until 2030

It is mandatory that this initial list includes the following technologies:

- biomass gasification with emphasis on hydrogen production
- raw biogas reforming
- thermochemical water splitting
- photo-catalysis and other photochemical processes
- fermentation

Technologies to be added to the above should currently have a Technology Readiness Level (TRL) > 3.

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, national hydrogen organisations and public literature covering the global state of the art.

2. Detailed analysis of selected technologies

A joint meeting of the consultant and the stakeholders of the FCH JU will be held at this stage to discuss the results of the initial assessment in order to decide which technologies to include in the detailed analysis. The number of technologies depends on the initial results, but is likely to be in the range of 4 to 6.

The consultant should propose and agree with the stakeholders the assumptions to use for the analysis, including feedstock cost, cost of transport to the production site and cost to distribute hydrogen to the consumer, making reference to the energy efficiency and coherence with the relevant EU policies.

3. Suggestions for techno-economic targets for the FCH JU program for 2017; 2020 & 2023 for the relevant production technologies and their deployment

The targets should be derived from the three value chains cases. A distinction should be made between targets for technologies that enable commercial roll-out from or before 2020 and targets for technologies and can offer improvements after this time.

4. Recommendation of priority areas for RD&D under the FCH JU from 2016 to 2020, including a list of topics that can serve as basis of calls for proposals.

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

Approval of the final 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. Excluded from the scope are further feedstock production and delivery as well as hydrogen distribution, except as part of the value chain analysis.

2.3 Focus of the work

The work will focus on the three value chain examples which have been described in section 1. The initial assessment of economic competitiveness should include the whole value chain using reasonable assumptions for feedstock cost and other parameters. In order to assess the viability of a technology an expectation of long-term feedstock availability will be given by the consultant. These assumptions will be clearly communicated. Excluded from potentially relevant technologies for this study are

- hydrogen production from non-renewable feedstock
- technologies that do not produce hydrogen as the main product
- technologies that are currently below TRL 3
- water electrolysis, except as a benchmark for other options

The analysis will focus on efficiency, environmental impact (greenhouse gas emission reduction potential, land use) as well as economics and include an assessment of state-of-the-art of the production technology as well as the potential for improvement and the main areas of development.

Optimal markets for each technology should be identified (also geographically) together with an assessment of the potential for scaling up of the solution.

The applicant is invited to indicate in the proposal the source of information he plans to resort to.

2.4 Deliverables

1. A document outlining the results of the initial analysis of potential technologies (Task 1)
 - a. a matrix of green hydrogen pathways for the three value chains
 - b. a techno-economic assessment of these pathways to such a level of detail that a stakeholder group, in collaboration with the consultant, can decide on which pathways could be relevant to meet FCH JU goals
 - c. the results of a consultation with the stakeholder group detailing which pathways to include in the next phase of the study
2. A document giving
 - a. a detailed assessment of the selected green hydrogen production pathways regarding economics with an indication of efficiency and greenhouse gas emissions reduction potential, for the three value chains
 - b. an analysis of the remaining challenges of the renewable energy to hydrogen pathways and the future outlook as well as a gap analysis
 - c. an overview of which technologies are most likely to contribute significantly to increasing the share of hydrogen production with low greenhouse gas emissions, making reference to the coherence of the solutions with the overall EU energy policy context, including alternative uses of the feedstock
 - d. proposals for the development needs of these technologies in the timeframe 2016-2023, as a result of the gap analysis, including proposals to modifications to the list of topics

that is currently under definition. (it will be provided to the selected contractor during the study, i.e. when it is approved).

The documents will be combined into a single report and published by the FCH JU.

2.5 Definition of success

The study will have to meet the following success criteria:

- EC, industry and research institutes that have been contacted 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 2016 to 2020
- It should give a high level overview of the state of the selected technologies and their potential progress until 2020 and 2030, their competitiveness and potential contribution in the relevant EU policy context, thereby enabling 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 and its members.

A presentation of interim results at the end of Task 1 and prior to Task 2 is requested.

2.8 Estimated budget

The maximum budget for the study is 130 000 Euro.

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 1st December 2014.

It is expected that the evaluation will take place in December and that the contract will start at the end of December or beginning of January.

The contractor shall submit draft reports by 15 April 2015 and the final reports of its study by 15 May 2015.

5. Volume of the contract and Prices

The maximum amount for this study including all the deliverables as mentioned under 2.8 is €130.000.

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	General understanding of the project, The proposal: <ul style="list-style-type: none">• Shows how the proposed analysis provides relevant deliverables in the context of this study.• Shows good understanding of the EU policy context in the relevant fields of energy and transport.• Already shows analysis and provides first insights• Adds own aspects/views - have put in unexpected elements that are meaningful to achieve success	35
2	Quality of the proposed services <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)• Time line and resource allocation is realistic and at the right level of details	35

3	Expertise of the team <ul style="list-style-type: none"> • Involvement of specialists and one or more of the most senior level staff • The offer and past assignments demonstrate a capability to interview companies, institutes and public authorities and to produce strategy reports on innovative energy technologies 	1/3 of max
	Total	Max =100

Appendix 1: Multi Annual Work Plan

Appendix 4: Electrolyser study