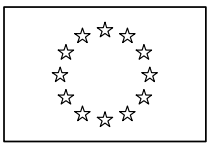

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Accompanying document to the

Proposal for a

COUNCIL REGULATION

setting up the Fuel Cells and Hydrogen Joint Undertaking

SUMMARY OF THE IMPACT ASSESSMENT

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EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT

Introduction

This document compares the potential impact of policy options including a JTI for fuel cell and hydrogen RTD&D actions under FP7.

The European Commission is proposing a JTI for fuel cells and hydrogen. It would carry out pre-competitive RTD&D, based on the Implementation Plan developed by the Hydrogen and Fuel Cells Technology Platform (HFP) through a Joint Undertaking on the basis of EC Treaty Article 171. The JTI would strengthen the European Research Area by gathering together stakeholders from energy and transport, public institutions, regulators and user groups in a joint effort to develop fuel cell and hydrogen technologies.

Consultation

In the preparation of its proposals for setting up JTIs, the Commission took into account the views of stakeholders from research and industry. The European Parliament in May 2007 called upon the EU Institutions to improve energy efficiency and support a higher market penetration for clean and renewable energies through the use of hydrogen fuel cell storage technologies for portable, stationary, and transport applications. The Commission also consulted the HFP which produced a Strategic Research Agenda, Deployment Strategy, and an Implementation Plan 2006, which is the main reference document. The HFP Member States Mirror Group was also consulted. The consultation process involved several hundred stakeholders and a public internet consultation. The Commission also organised four major conference events and regional workshops. An inter-service steering group reviewed the Impact Assessment. A Peer Review Group of four internationally-acknowledged experts helped finalise the Impact Assessment.

Fuel cells and hydrogen

Fuel cells are very quiet, highly efficient, energy converters capable of delivering substantial cumulative greenhouse gases (GHG) and pollutant reductions. They convert fuel and oxygen directly to electricity, heat and water and contribute to energy security as they can operate on hydrogen, natural gas, ethanol or methanol. They can have a major impact in applications including portable devices and CHP, as well as transport which is currently 98% dependent on oil. However, fuel cells are as yet too expensive and their long-term durability and reliability must still be proven. Hydrogen can also be used as a means of storing energy - excess RES electricity can produce hydrogen by electrolysis, facilitating its integration into the energy market.

Problem definition

Although significant EU public funds have already been directed to research, and fuel cells and hydrogen are already included in FP7, the technologies are unlikely to be commercially available as quickly as is desirable, and the EU risks falling further behind global competitors. Contributing factors include:

- the research is often so complex that no organisation can perform it alone;

- lack of a long-term budget plan and strategy to encourage industry and research to commit more resources;

- the sub-optimal application of funds leaving a fragmented research coverage;

- insufficient funds for an integrated programme of RTD&D;

- the European fuel cell sector is dispersed across different countries and types of organisations, restricting exchange of knowledge and experience;

- technical breakthroughs needed to improve costs, performance, materials, reliability and durability.

Fuel cell and hydrogen technologies face barriers to entry related to large economic investments locked into industries under threat from a change to the energy mix. Market entry is hampered by the lack of a pricing mechanism to internalise externalities; the long-term investment needed for a new generation of products and infrastructure; and the difficulties of establishing common regulations, codes and standards to facilitate global market development. An integrated strategy is required to maximise the benefits of transition technologies with fuel cells using natural gas, biogas, methanol and ethanol, if possible combined with carbon capture and storage (CCS) and exploiting strategic niche markets.

Major competitors are pressing ahead with ambitious programmes of integrated research and development to bring products to market and establish standards which latecomers will have to follow. It is estimated that the EU is 5 years behind Japan and North America on the demonstration of FC vehicles. The US and Japanese programmes are managed in close co-operation with the respective industries. The DoE has the 'Hydrogen Posture Plan' while the METI in Japan provides support for basic research. Both US and Japanese programmes have well-developed technology validation processes which are absent from the dispersed EU research environment.

Market failure

R&D knowledge eventually becomes shared among many actors and for the market to fund its acquisition the developers must see a possibility of a financial return. This market failure is exacerbated in the FC and H_2 case by the long time to market, which weakens the ability of companies to secure returns on their investment. Public support is needed to stimulate the acquisition of knowledge in these circumstances and to foster the necessary long-term vision and coordination. The pre-normative research to be conducted by the JTI may also be seen as a correction of the public goods market failure that hinders cooperation between companies on pre-normative work in a competitive structure. Technological lock-in can arise from market dominance, which is a market failure in this sector with its many vested interests in technologies that may be threatened by fuel cells and hydrogen.

Subsidiarity

The subsidiarity principle applies since the proposal does not fall under the exclusive competence of the EC. The scale of the challenge exceeds the capacity of any one MS. Coordination of RTD efforts at EU level stands a better chance of success, given the nature of the infrastructure and technologies to be developed and the need for a sufficient mass of

resources. The proposal should encourage the MS to pursue national initiatives in the spirit of reinforcing the ERA and leveraging their own programmes by combining efforts.

Objectives

The overall objective is to stimulate an integrated RTD&D effort in fuel cells and hydrogen to provide for:

- security of energy supply;
- new, cleaner forms of energy to mitigate against greenhouse gases and air pollution;
- energy efficiency and saving;
- sustainable development and sustainable transport;
- and industrial competitiveness.

The specific objectives are:

- to enable the market breakthrough of fuel cell and hydrogen technologies and realise substantial public benefits;
- to place the EU at the forefront of fuel cell and hydrogen technologies worldwide;
- to give confidence to industry, public and private investors, decision-makers and other stakeholders to embark on a long-term programme;
- to leverage further RTD investment;
- to build the ERA through close cooperation with research carried out at national and regional levels - whilst respecting subsidiarity;
- to integrate RTD&D and focus on achieving long-term targets for cost, performance and durability and overcome critical technology bottlenecks;
- to s timulate innovation and the emergence of new value chains including SMEs;
- to facilitate basic research in industry, universities and research centres;
- to encourage the participation of the new Member States and candidate countries;
- to perform relevant socio-techno-economic research;
- to perform research to support regulations and standards to eliminate barriers to entry and support inter-operability and export markets whilst ensuring safe operation and not inhibiting innovation.
- to provide reliable information to the public on hydrogen safety, and the benefits to the environment, security of supply, energy costs, and employment.

Policy options

The 'no EU action' option to discontinue RTD funding at European level, leaving only national and regional programmes is discounted, given that RTD into fuel cells and hydrogen is included in FP7 as an integral part of the effort to develop key technologies for future sustainable energy and transport systems.

The other options are:

Inter-governmental programme of research established under Article 169

An inter-governmental approach can tackle dispersion and fragmentation and promote cohesion between researchers. The Commission consulted stakeholders on the possibility of initiating cooperation under Article 169, but this was not their preferred option because of slower decision-making and annual budgetary formalities in each MS. MS may also request a "just return" on their investments and the "bottom up" process would make it difficult to implement an industry-led strategy. The long-term strategy for fuel cells and hydrogen calls for a pan-EU approach, to which this kind of action is not well suited. Lack of industrial stakeholder support for an inter-governmental approach precludes its further consideration.

Business-as-usual (B-A-U): FP7 plus national and regional effort, supported by a Technology Platform

This option has served the community well for more than 20 years. The FP is well-established and understood by industry and researchers and its worth has been proven; it is efficient and well-managed with clear objectives and expected impacts; a traditional emphasis on scientific quality and innovation; tried and tested financing structures and rules for participation; a mature approach to technical and financial auditing; open and transparent procedures and a respected peer review process. However, effort is fragmented across different themes with difficulties of coordination. A variation on the option would be to bring together all the FC and H_2 RTD under a single directorate or agency, but industry would no longer be in the lead, additionality would not be assured and EC administrative costs would not be shared 50/50 with industry.

Establish a JTI as a Joint Undertaking under Article 171

After extensive consultation, this approach emerged as the preferred option, though it is not without drawbacks. Industry prefers an action with a strategically-managed route from research through development and demonstration to market deployment, and a pre-defined budget allows industry to make long-term investment plans. This would encourage industry to engage in longer-term projects with basic research organisations. Industry, in consultation with researchers and the EC, would take the lead role in defining programme priorities. The Joint Undertaking would mobilise in a single legal entity all the public and private funds and would be a public-private partnership based on the principles of the European Communities Financial Regulations. The founding members would be the EC and an 'Industry Grouping' who would contribute equally to the budget, with the EC share coming from the FP7 Energy, Transport, Materials, and Environment Themes.

The JTI would implement a programme of pre-competitive RTD&D including improvement of fuel cell materials; balance of plant; environmental impact; hydrogen ICE integration; hydrogen storage and grid development; drive train integration and production engineering;

renewable hydrogen; electrolysis; and integration with CCS. The HFP Implementation Plan puts forward four priority Innovation and Deployment Actions:

- Fuel Cells for early markets
- Fuel Cells for Combined Heat and Power (CHP)
- Sustainable hydrogen production and supply
- Hydrogen vehicles and refuelling infrastructure

These would be complemented by a comprehensive programme of technology validation, life cycle analysis, pre-normative research in support of the development of standards, and integrated technical, social and economic assessments. There would be close cooperation with other initiatives such as Intelligent Energy for Europe, EIB financing of sustainable energy and low carbon solutions in developing countries, and the European Institute of Technology, as well as with national and regional-level actions.

Governance

The Joint Undertaking would have a Governing Board and an Executive Director assisted by a Programme Office. The Governing Board would be composed of six members from the Industry Grouping and six from the EC. The research community may be represented in the Board in the future. The Programme Office would be responsible for issuing calls for proposals, knowledge management and education, public outreach and dissemination activities. A MS Group and a Scientific Committee would oversee the JTI and ensure co-ordination with other EC activities and national and regional actions. The EC would maintain a right of veto as to the use of its contribution to the Joint Undertaking.

Additionality

At the HFP General Assembly in October 2006, 48 industrial stakeholders issued a joint declaration stating their readiness to invest 5,000 M€ in hydrogen and fuel cell technologies over the next ten years. In their Declaration of Commitment of 18th June 2007, the members of the Industry Grouping undertook to make their best efforts to achieve the goal of at least 3,200 M€ of private investment during FP7, compared to 2,600 M€ without the JTI, an additionality of 600 M€. A confidential survey of industrial stakeholders estimated that the JTI would accelerate market breakthrough by between 2 and 5 years. The JTI would also have a crowding-in effect on national, regional and private investment, encouraging multi-nationals to maintain RTD efforts in the EU and promote inward investment.

Analysis of impacts

Major advantages would come from bringing all the RTD&D effort under a common programme management, ensuring a consistent approach. Calls for proposals can be matched with the pace of development in the specific sectors and currently successful research can be incorporated into the next phase of demonstration. Demonstrations can be planned for subsequent exploitation and results can be fed back to research. Major 'Lighthouse Projects' can apply for Risk-Sharing Finance Facility (RSFF) loans. However, there are risks of a loss of transparency and of conflicts of interest for the industrial participants when making funding choices between near-market demonstration and long-term research.

Comparing the options

It is assumed that the budget devoted from FP7 will be similar, whichever option is chosen. The key difference is that the JTI budget would be pre-defined and under the control of the Joint Undertaking. Choosing the JTI option would show decisiveness and determination to take fuel cells and hydrogen seriously, giving confidence to researchers and industry and encouraging private investment.

The stable funding regime, critical mass, and a focused, target-driven multi-annual research programme is more attractive to industry and researchers. The two-factor learning effect is unique to the JTI: knowledge gained from deployment is fed back to research and new research is fast-forwarded to demonstration. The additionality effect would provide significantly higher funds and lead to faster development, faster time to market and lower costs. Efficient governance would direct operations across the spectrum from fundamental research to demonstration. The JTI should also enhance opportunities for international collaboration by acting as a European focal point. EC administrative costs would be reduced by being shared 50/50 with industry.

The JTI has a number of clear advantages over the FP7 alternative:

- time to market shorter by between 2 and 5 years - the importance of being first in a new market cannot be over-emphasised, cumulative investment is lower, the break-even point is brought forward, and it strengthens the competitive position of the early market entrants including SMEs;

- long-term commitment and a clear-cut budget encourage confidence in public and private investors;

- additionality: the co-financing principle will leverage at least 600 M€ more than Business-as-Usual, corresponding to almost two and a half times as much private research investment;

- making correspondingly earlier gains on improving energy efficiency and security of supply and reducing greenhouse gases and pollution.

Monitoring and evaluation

This impact assessment has addressed Article 21(1) of the Implementing Rules of the Community Financial Regulation, providing an ex-ante evaluation for the FCH JTI of cost-effectiveness, risks and monitoring.

Performance indicators will be established to follow the progress of the JTI and measure the impact on EU competitiveness and research. The indicators should be assessed against the baseline from the years prior to the JTI to assess additionality. The Commission will present to the Council an annual implementation report on progress and finances. A series of open peer review conferences could be held to exchange information and coordinate activities between the JTI and other actions. The Executive Director will monitor and take action to maintain the 50/50 public and private funding.

At mid-term, independent experts will evaluate the progress of the JTI and recommend any necessary re-adjustment of the programme and if applicable, consider an exit strategy. The Commission will communicate the conclusions to the Council. At the end of 2017, the Commission will conduct a final evaluation and present the results to the European Parliament and Council.