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# Europe's quest for hydrogen

Europe is ready to pursue its first major energy grail: the hydrogen society. With the decision to launch a Joint Technology Initiative (JTI) on hydrogen and fuel cells comes a public commitment by EU ministers to allocate €470 million over six years towards hydrogen research. Industry will contribute at least the same amount.

| by *Hughes Belin*

This major research project is piloted by the European Commission, which is confident that private funding will soon start pouring in and ultimately exceed public funding. The aim is to start the commercialisation of the most advanced products by 2013. A legal entity, the Fuel Cell and Hydrogen (FCH) Joint Undertaking, was created to head the JTI.

It is the first time that the European Union has been involved in organising a project of this scale in the energy sector. The long term ITER (international thermonuclear fusion reactor) project, another of the EU's energy grails, is integrated into a 'monster' international project. The hydrogen project is purely European – and it is very much dispersed. 'You have in Europe certain supply

chains that don't talk to each other, there is no horizontality. Hence a JTI to enable better communication', explains André Martin, co-ordinator of the implementation of the JTI from the industry side.

## Gaining momentum |

'Without commercially viable fuel cell products, there will be no hydrogen demand,' predicts Gijs van Breda Vriesman, chairman of the JTI's Industry Grouping. The JTI is intended to help such products become available. At the moment 'fuel cells are too expensive and their long-term durability and reliability must still be proven,' according to the EU Commission's Impact Assessment of the JTI.

There are still tough obstacles to overcome: complex research that cannot be performed by a single organisation; the lack of a long-term budget plan to encourage industry to commit more resources; the sub-optimal application of funds resulting in fragmented research coverage; insufficient funds for an integrated research and development (R&D) programme; a sector that is too diverse thus restricting the sharing of knowledge; and huge technical challenges. If the JTI manages to overcome the majority of these obstacles, the expected result will be the crossing of the final hurdle and achieving the technical breakthroughs needed to improve costs, performance, materials, reliability and durability. The EU is deemed to lie roughly five years behind the US and Japan in the field of hydrogen and fuel cell research. These two countries have more focused research management programmes, which are more difficult to implement in the EU environment. The US and Japanese programmes are managed in close cooperation with their respective industries. The US Department of Energy has the Hydrogen Posture Plan while the METI in Japan provides support for basic research. Both the US and Japanese programmes have well-developed technology validation processes that are absent from the dispersed EU research environment.

EU funding for fuel cell and hydrogen research has seen constant increases over the EU's successive R&D Framework Programmes: from €8 million under its second Framework Programme (FP2: 1986-1990) to €145 million under FP5 (1999-2002) and €320 million under FP6 (2003-2007).

The advantage of placing hydrogen R&D under the banner of a JTI is that it guarantees funding stability. Until now, EU funded research in any domain formed just part of a chapter of its Framework Programme on R&D. Public funding was therefore susceptible to fluctuations from year to year in function of the political priorities of the day. But this time the budget is fixed for a period of seven years and is dedicated entirely to the hydrogen and fuel cell domain. Moreover, industry has significant input in determining the JTI's research priorities thereby creating an environment that lends itself to taking greater risks in the medium term, which is essential to achieve the necessary technological breakthroughs. 'We have removed some of the risk for industry,' say European officials, 'by leading the way for companies still hesitant about investing in a high potential yet high risk domain.' As further indication of the mounting momentum in this area, the number of small and medium-sized enterprises (SME's) wanting to be a part of it has increased.

### Priorities |

Current research into hydrogen and fuel cells is highly diverse, not only geographically but also in terms of the variety of companies (small and large, public and private), and the numerous different projects. More than 400 organisations are documented working in this field in Europe, varying in size and focus from micro-sized companies to university department teams or research centre institutes to large divisions in multinationals. The JTI intends to create order out of all this while still taking into account the variety of factors involved. This is the aspect that

has been the subject of greatest concern and reflection among European decision makers who wish to avoid the creation of a big bureaucratic organisation.

The JTI has as its objective the delivery of robust hydrogen and fuel cell technologies ready for commercial take-off in 2015, with a view to large-scale mass market rollout by 2020. The JTI will allocate one third of its budget to transportation and infrastructure. Some 70% of this will be allocated to real-use, large-scale fleet demonstrations of next-generation fuel cell hybrid vehicles (buses, cars, vans) and refuelling stations across Europe.

Another third of the JTI's budget will be allocated to research and demonstration. The last third will be spent on early markets and hydrogen production and distribution. Demonstrations of near-to-market products will concern back up power, portable power generation, uninterrupted power supply and industrial vehicles, such as forklifts, which now run on batteries. Sustainable hydrogen production, storage and distribution will be also explored. In total, just under 60 major actions are foreseen in the work programme.

### Quick-start |

So far, the creation of the JTI and its FCH Joint Undertaking is going as planned, say EU Commission experts. A first call for proposals worth €28 million will be launched in the autumn and will serve as a test for all procedures. The next call for proposals worth €90 million will follow towards the end of the year.

All parties involved are confident that commitment from industry will not only match that of the EU but far exceed it. Public money is mainly intended to provide leverage.

This was confirmed by the Hydrogen and Fuel Cell European Technology Platform (HFP) General Assembly in October 2006, when some 48 industrial stakeholders issued a joint declaration stating their readiness to invest €5 billion in hydrogen and fuel cell technologies over the next ten years. In their Declaration of Commitment dated June 18, 2007, the members of the Industry Grouping undertook to do all they could to achieve the target of at least €3.2 billion in private investment during 2007-2013 compared to €2.6 billion without the JTI. A survey of industrial stakeholders estimated that the JTI would accelerate market breakthrough by two to five years. 'In all we are still optimistic that we have enough power to reach our objective,' an Industry Grouping spokesman told EER.

The initial strategic research agenda of the hydrogen and fuel cell industry said €7.4 billion was needed if the EU wanted to make a difference. This wish-list has now become a streamlined and focused plan to match the €1 billion budget of the JTI, which reflects the most critical subjects. However, more than €6 billion are still needed for achieving a hydrogen economy in Europe. 'Bridging this large gap is critical to the execution of the Plan,' says Paul Lucchese, who is expected to become the representative for the Research Grouping within JTI's board. If industry and EU officials are quite confident that the JTI's budget will be



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completed, industry's secret wish – no one will talk freely about it – is to attract more public financing from governments, regions and municipalities.

### Regions |

The European plan is complementary to the various and sometimes sizable national programmes that already exist. Germany has the largest programme but there are also very promising developments in Italy and other European member states that need to be factored in, some of which are in line with the European industry's priorities. 'The more that happens, the better the outcome will be,' says the Industry Grouping's spokesman.

The regions also play an important role. On April 14 this year, approximately 22 regions launched the European Regions and Municipalities Partnership on Hydrogen and Fuel Cells (HyRamp). They will be ready with up to €150 million for research into hydrogen and fuel cells. The secretariat of this new partnership will be assumed by the European Hydrogen Association for the first six months while the organisational structure is put in place and concrete collaboration established with the JTI.

Some European towns, such as London and Hamburg, are very interested because the use of hydrogen will reduce local pollution. The Industry Grouping therefore expects to cooperate closely with the regions. It is currently involved in setting up a joint project team that will develop a structure to facilitate interaction. There will be large scale demonstration projects initiated by the JTI. 'Cities or regions are welcome to participate if their agenda meets with our Multiannual Implementation Plan,' says the Industry Grouping.

The EU's Joint Research Centre (JRC) may also participate, where relevant, by means of direct actions in the JTI. The JRC has excellent expertise in the fields of fuel cells and hydrogen, and therefore may be able to contribute to joint technology initiatives over and above the EU's contribution of €470 million. It may also be able to provide input in the field of performance testing, where it has the reputation of being impartial.

Further details on the content of the JTI program and structure are expected to be revealed at the official launch during the General Stakeholders Assembly in Brussels on October 14 and 15 2008. ■



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### Industry participation

The European Industry Grouping of the Joint Technology Initiative on Fuel Cells and Hydrogen, called the New Energy World Industry Grouping (NEW-IG), is a voluntary non-profit association with 64 members. It is open to all industrial companies with fuel cell and hydrogen R&D activities in Europe. Right now they represent 80% of the biggest companies in the hydrogen and fuel cell area, including the major oil companies (Shell, Total and BP), the major car manufacturers (DaimlerChrysler, Rolls Royce, BMW, Boeing, Volvo, Peugeot-Citroën, Renault, Volkswagen and Fiat) and some industrial and chemical companies (Siemens, Basf, Boeing and EADS). Eon is the only major utility, and then only through its Swedish subsidiary. NEW-IG represents industry's interests within the JTI. While there has been a lot of discussion on the potential distortions in the balance between small and medium-sized companies and large ones, the NEW-IG is currently satisfied with the existing balance. Roughly one third of the Industry Grouping's members are SMEs, although they account for 50% of the board seats.