EHA contribution to the Consultation on the Energy Strategy for Europe EU 2011-2020

The European Hydrogen Association, EHA, representing 19 national associations and the main hydrogen infrastructure development companies, promoting the use of hydrogen as a clean energy carrier used in fuel cells, welcomes the opportunity to contribute to the consultation on the new Energy Strategy for Europe 2011-2020.

Since the EHA set up office in Brussels in 2006 it has been committed to support the EU's efforts to develop a "comprehensive energy policy". As indicated in the EHA Strategy paper "Infrastructure 21, the Role of Hydrogen in Addressing the Challenges in the new Global Energy System"[1], that we presented to Commissioner Guenther Oettinger on May 5, the EHA firmly believes that hydrogen as a clean energy carrier used in fuel cells will play a crucial role in achieving EU's goal of a "safe, secure, sustainable and affordable energy".

The EHA fully supports the importance of completing the *internal energy market*, *achieving energy savings* and *promoting low-carbon innovation* in reaching the EU's objectives by 2050. The key EU dossiers on these three topics, however, lack a comprehensive reference to the role of hydrogen next to the other energy carrier, electricity. Implementing these directives and regulations will therefore do little to further advance the market for hydrogen and fuel cells in the near term. The EHA would therefore appreciate more consideration in future EU energy policy for the role of hydrogen in low-carbon energy and transport systems.

With regard to interconnected networks as well as large scale integration of intermittent renewable resources for example, both will have to deal with grid imbalances and will need reliable energy storage solutions that hydrogen would be able to provide: EU support for smart grid development and large off shore wind parks should take innovative storage solutions like hydrogen into account to accelerate the uptake of intelligent network systems and renewable energy.

As for the need to implement energy efficient technologies, hydrogen produced by the reforming of natural gas and used in fuel cells to produce electricity and heat, is more energy efficient than burning natural gas in a gas turbine. Furthermore many of Europe's most innovative SME's are involved in developing components or complete fuel cell and hydrogen systems, making Europe a market leader in this field.

Promoting low-carbon solutions needs to include information on what type of energy technology can be best used instead of another type of technology in a certain location. Local decision makers need to be made more aware of the best choices for their energy-mix in relation to their local (renewable) supply and demand situation.

This EHA's contribution to the consultation on the Europe Strategy for Energy 2011- 2020 seeks to highlight the role of hydrogen in fuel cell applications with regards to the key issues mentioned in the Stock Taking Document in order to ensure that the use of hydrogen will be included in a comprehensive and concrete manner in future EU Energy policy.

[1] EHA Infrastructure 21 Strategy Paper

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Modern Integrated Grids

As mentioned in the EHA Infrastructure 21 paper, compared with the conventional fossil fuel pipeline network, existing electricity grids and power transmission lines have a small energy transport capacity. To facilitate EU's decarbonization objectives, future electricity grids and large HVDC power lines (today 3-6 GW with 500-800 kV DC) must be installed at a much larger scale than today, otherwise they will not be able to provide the same energy transport capacity as large oil pipelines (~75 GWh/h) or gas pipelines (~40 GWh/h) (see table 1 below). Different to the transmission of electricity, hydrogen pipelines offer a much higher power transmission capacity (~30 GWh/h). A future energy system based on renewable electricity faces therefore big challenges: to expand existing power transmission infrastructure on the one hand, and to reduce power demand on the other hand in order to arrive at an economic optimum.

Table 1

Energy transportation infrastructure (typcial sizes installed)	Energy transmission capacity
Oil pipeline (1 million barrel per day)	73 GWh/h (thermal)
Natural gas pipeline (30 billion Nm^3/yr)	38 GWh/h (thermal)
High voltage direct current transmission lines (HVDC) (53 TWh/y)	6 GWh/h (electric)
Hydrogen pipeline (with the diameter of a natural gas pipeline) (79 billion Nm^3/yr)	27 GWh/h (thermal)
Hard coal transport per ship from South Africa to Germany (4 TWh/yr)	0.5 GWh/h (thermal)

Table: Options for energy transport (LBST)

In order to build a pan-European integrated and modern grid, energy decision makers in ***all*** EU Member States, will need to be made aware of the consequences of the integration of innovative energy technologies, as identified in the EU Strategic Energy Technology Plan (SET Plan). The current Technology Platforms, Joint Undertakings and European Industrial Initiatives however lack sufficient participation of key stakeholders in EU's New Member States. The SETIS information portal that was set up under the SET Plan is a good step in the right direction but more pro- active engagement efforts in these countries will be needed to ensure rapid integration of new technologies in all of Europe: energy cannot become a topic for only "first tier" and "second tier" EU Member States.

Effective investment frameworks will have to leverage EU, national, regional as well as private financing for innovative energy solutions. Current financing programmes are focusing on short term return on investments, which for innovative technologies as hydrogen and fuel cells, which are entering the market in the next 10- 15 years, will not be sufficient.

The growth of renewable electricity use will also demand new storage capacities. In contrast to electricity, hydrogen is safely and efficiently stored in large quantities. Very few options exist that can compete with the long-term storage capacity (beyond 48 hours) possible with underground cavern hydrogen storage. Hydrogen stored in large storage systems can be re-electrified or delivered via pipeline or as liquefied hydrogen to automotive end-users. Thus, hydrogen is an excellent component of future smart energy and transport grids.

Making progress towards a low-carbon energy system

Both hydrogen and electricity, as clean energy carriers, can be produced from a broad variety of energy feedstock, and therefore mitigate the upcoming resource problem of today's petroleum-dominated society. Furthermore, hydrogen can be converted to and from electricity at acceptable efficiency, allowing for cross-linking of the two energy vectors. Renewable electricity will be distributed over existing or reinforced electric power lines. Hydrogen can be produced from renewable electricity at any stage and scale; from large-scale central production with connected underground storage to small-scale, on-demand production at refuelling stations.

Over the last decade many EU partnerships of regional and municipal authorities have been created for emission reduction and clean technology integration. In 2008, with the support of the EU Commission, the European Regions and Municipalities Partnership for hydrogen and fuel cells, HyRaMP, (www.hy-ramp.eu) was established, to facilitate the development of the first markets for hydrogen and fuel cell applications by hosting and co-funding big demonstration projects and setting up joint procurement and local supply and maintenance chains. HyRaMP is now representing more than 30 regions and its secretariat is hosted by the EHA office in Brussels. The first experiences indicate that concrete action is needed in the following areas:

1. In-depth reviews of current and potential research and developments budgets at local level to leverage EU, national and local funding;
2. Increased efforts to synchronize multi level budget cycles and topics;
3. Development of comprehensive joint procurement schemes at National and International level that facilitate access of local actors to global markets;
4. Adaptation and harmonisation of local authorisation requirements;
5. Identification of key local stakeholders of new industrial value chains;
6. Integrated approach to environmental and economical sustainable development of electric transport at local level with regards to ensure the efficient use of primary energy to power battery vehicles or produce hydrogen for use in fuel cell vehicles.

A whole generation, under until recently, favorable, economic conditions (low interest rates) has been taught to use energy efficiently, to modest effect. Therefore market-based instruments remain crucial to give the right price signals and incentives for energy savings, smart use of energy and fuel switching, through the Emissions Trading System (ETS), energy taxation and phasing-out of fossil fuel subsidies.

As these market based instruments will only in the long term contribute to the hydrogen market uptake, more immediate instruments are needed. As mentioned above, the development of comprehensive joint procurement schemes at national and international level that facilitate access of local actors to global markets should be accelerated. For example to develop a long term investment programme for the integration of fuel cell buses, that are close to commercialization would benefit from transregional procurement to reduce the cost of the buses. Models for this type of pre-commercial procurement do not exist, while financial experts at financing institutions are unfamiliar with the technology and hesitate to invest large sums that are necessary in the build up phase.

A strong and coordinated "clean and innovative" external energy policy

The EU external energy policy will be seriously affected in the not so far future by emerging issues as raw material and conventional fuel availability and the need to address the rise in greenhouse gas emission in emerging economies. The EHA welcomes the EU recent Raw Material Initiative and EU's engagement in tackling material and resource scarcity by broadening the market for European technologies that use less and recycable materials, while reducing carbon footprints, like fuel cells.

The UN Climate Change Conference in Copenhagen has demonstrated the importance of the quick deployment of new technologies to reduce emissions in developed and even more in developing countries. China and India are increasingly stepping up their efforts in the development and deployment of sustainable energy technologies.

Europe, next to the US and Japan, is market leader in hydrogen and fuel cell technology. Europe's SME's, especially in the field of hydrogen and fuel cells have demonstrated their extraordinary ability to develop new products and their great resilience, even in these times of financial instability. The new industrial sectors that the European Joint Undertakings and Industrial Initiatives (EII's) in the field of energy seek to build, will need EU's pro-active assistance to ensure that these technologies will be part of the global technology cooperation funding structures that are included in the Copenhagen Climate Accord.

New energy technology companies will greatly benefit from industrial collaboration with emerging economies and from incentive schemes that ensure that these products can be deployed in areas where they will have the biggest impact. The EU could take the lead in establishing a "World Energy Technology Cooperation Organization" as an instrument to accompany the world's transition to a low-carbon energy and transport system, while securing market opportunities for clean energy companies in developed and developing countries to take full advantage of their leap-frog potential.

Protecting the EU citizens means facilitating excess to clean energy solutions

Many EU Barometer surveys have indicated a potential positive engagement of energy consumers in paying extra for the use of clean energy solutions. As the EU's single market efforts with regards to energy have mainly dealt with conventional electricity and gas infrastructures, it has not yet provided a transparent market for energy customers interested in reducing their carbon footprint. The decarbonisation of EU's energy system will need facilitated access to the grid of innovative clean technologies to build a clear, clean and competitive market, so that educated consumers can make the right choices.

The EU needs to therefore stimulate more effectively the lowering of regulatory barriers and harmonizing of local authorisation procedures to allow access of clean technologies to the grid. In addition the impact on the deployment of different clean energy and transport technologies of EU proposals for new regulation, as well as the review of current EU legislation, needs to be studied in order to avoid negative implications that can be avoided in an early stage.

Respectfully submitted,
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