Contribution of the Fuel Cells and Hydrogen sector to the European consultation on "A 2030 framework for climate and energy policies"

Introduction: The role of fuel cells and hydrogen in Europe 2030

The European fuel cells and hydrogen (FCH) sector is pleased to take part in this stakeholder consultation with a contribution developed jointly by the Industry Grouping (NEW-IG), the Research Grouping (N.ERGHY) and the Programme Office (PO) of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU). The FCH JU is a public-private partnership which aims at developing a portfolio of clean energy and transport solutions for Europe based on the FCH technologies. More information about the FCH JU is available in the annex to this contribution.

The sector is convinced that new technologies are essential for Europe's future. Fuel cells and hydrogen can help Europe achieve the EU's strategic objectives in priority areas such as sustainability, competitiveness and security of supply. Concretely: in transport, deployment of FCH technologies will provide zero-emission well-to-wheel pathways, enabling Europe to cut transport emissions by 60% by 2050, as foreseen in the White Paper on Transport, whilst reducing oil imports. In addition, hydrogen, as an energy carrier, provides a key link between energy production and transport, helping achieve EU "20-20-20" targets by contributing towards a 20% share of energy from renewables overall (10% in the transport sector) by 2020 and around 30% by 2030 (Energy Roadmap 2050), while addressing issues of intermittent renewable energy supply. More broadly, hydrogen-based large-scale energy storage will contribute not only to decarbonisation, but also to Europe's energy independence and security. Finally, successful FCH commercialization will give impetus to several industry sectors in Europe with a direct positive impact on investment and growth. For reference, according to the FCH Industry Review 2010, the global fuel cell industry could create up to 700,000 green manufacturing jobs over the next decade. Tapping into this potential will strengthen Europe's position on the global scene.

Questions 4.1 General

Which lessons from the 2020 framework and the present state of the EU energy system are most important when designing policies for 2030?

The following lessons should be taken into account:

Clarity and predictability

Timely agreement on a clear and predictable framework is necessary to create and maintain regulatory certainty and stability for investment. This is especially important for R&D and deployment of new technologies. Stable and long-term instruments supporting the necessary investments are required to introduce new technologies into the market. Public private partnerships and joint technology initiatives are excellent tools to foster stability and enable long-term priority setting.

Flexibility vs. fragmentation

2030 targets should be consistent across the EU, with close coordination and alignment between European and national targets. For example, renewable energy development in every country should receive appropriate incentives at the national level aligned with the overall European efforts. Without a common European framework, diverging policy priorities and uncoordinated incentive schemes will lead to fragmentation of the market and prevent opportunities for the economy as well as the environment. On the other hand, national targets should reflect local specificities such as the energy mix, economic situation, geographical conditions etc. While the joint approach should be European, it should give flexibility to individual Member States on how to achieve agreed common targets (e.g.

choice of technology). Finally, the excellence and innovation potential in less-performing regions should be unlocked by creating and implementing an integrated pan-European RTD and market strategy.

Innovation leadership at mass-market levels

The European energy policy should reflect the changing global context. To maintain a global leading position, Europe needs to be at the forefront of development and deployment of low carbon technologies. The future targets should recognise evolution of new technologies over time, their maturity and market readiness. It is only through the transition to mass-markets that the full benefits of innovative technologies are achieved. This transition will require additional efforts in which successful innovations are transferred to industrial companies able to participate in the new value chains and the large, existing manufacturers modify practice to cope with novel markets and new industrial relations. The on-going transition from fossil to renewable energy sources should be continued, to insure independence from imported energy carriers. Stable electricity grids should ensure supply of renewable energy and mobile electricity vectors such as hydrogen.

Implementation

To ensure successful implementation, targets must be supported by concrete tools (e.g. regulatory, financial, risk sharing). On the policy level, public-private partnerships (e.g. FCH JU), the SET-Plan (energy storage and electro-mobility), the Clean Power for Transport Package (CPTP) and the Connecting Europe Facility (CEF) are very relevant instruments. To further support proper implementation, targets should be as precise and clearly defined as possible, and cover all key aspects of the policy (Presently, improvements in energy efficiency have been systematically lagging behind overall targets.) Targets that are not legally binding tend to be less effective and reduce the chances that they be met, thus, mandatory targets should be implemented when possible. The following areas will be essential for future priority-setting: i) the effect of large scale deployment of renewables on the transmission and distribution grids and the situation of cross-border cooperation of the EU Member States; ii) the coherence between energy efficiency measures in different energy-consuming sectors (buildings vs. transport) and the identified energy technologies in addressing this challenge.

Engagement of all stakeholders

It is necessary to fortify trust-based partnerships between governments and private players and encourage participation particularly among SMEs, creating scope for more creative relationships along the value chain. For some promising low carbon technologies, including FCH, the scale and scope of the R&D agenda across the spectrum of applications goes beyond the capacity of single companies or public research institutions both in terms of financial commitment and resources. A joint action is essential.

Questions 4.2 Targets

Which targets for 2030 would be most effective in driving the objectives of climate and energy policy? At what level should they apply (EU, Member States, or sectoral), and to what extent should they be legally binding?

Rather than forecasting based on the current situation, trends and the 2020 targets, the most effective targets for the 2030 timeframe would be generated by adapting a back-casting process. In a back-casting process one describes the 2050 situation in detail, and based on that, derives the steps to be in place by 2040 and 2030 to reach the 2050 targets.

Any future targets should be focused on one primary pathway: reduction in consuming fossil energy carriers. This should be driven by sectors, as there are some in which fossil fuels cannot be easily replaced. The efforts of research and industrial players should be directed at reducing production cost of innovative technologies, including scale effect. To name a few concrete targets that could be developed for 2030: 1) a % reduction of CO2 emissions by country and sector, 2) a revision of CO2 emission trading system 3) a % production of renewable energy in stationary energy, possibly for

every company unit depending on size and geography and 4) an additional target of % of renewable energy by sectors (especially applied to transport), a % reduction of energy intensity (in residential sector) and a % of increased power storage capacity target.

In the process of developing a more robust European climate and energy policy, It must be highlighted that substantial energy storage capacity is needed, and that smart grids and increased transmission capacity does not solve the intermittency challenges faced when the share of renewable energy sources is increasing. Acknowledging that electricity will be increasingly important and that electricity is inherently difficult to store, the need of an adequate large-scale energy storage medium is evident. Hydrogen may to a large extent fill this need, as it is compatible with low emissions and support increased utilisation and the integration of intermittent renewable energy into the existing energy system.

Have there been inconsistences in the current 2020 targets and if so how can the coherence of potential 2030 targets be better ensured?

The current targets are reasoned and understandable. A further step in the direction to reach the already-announced 2050 targets seems to be appropriate. A portfolio of pathways to achieve efficiency targets, with examples of concrete stakeholder inputs, should be formulated at EU level. Inconsistencies in targets do not seem to pose a major challenge in the 2020 timeframe. However, the incomplete nature of the current targets, neglecting competitiveness and security of supply, is a major concern. Specific targets for competitiveness (market shares) and security of supply (import share) could be added to the new 2030 timeframe. The reasoning behind these targets must be better explained to society.

In addition, targets for energy savings should be made legally binding in all Member States under the 2030 timeframe, supplemented by special measures to ensure competitiveness for energy-intensive industries which can demonstrate that their products counteract carbon leakage.

Moreover, the increasing coupling of the transport sector and the energy sectors production should be reflected in the new EU policies, linked to the use of waste biomass for biofuel production, and the use of electricity and hydrogen in electric vehicles, acknowledging that these sectors will compete of limited energy sources.

More attention should be paid to activities accompanying and facilitating the establishment of new technologies, such as socio-economic, environmental and energy systems analysis; regulations; codes and standards; manufacturing methods; public awareness and acceptance, as is the case in the FCH JU, which contains a supportive pillar on “cross-cutting issues” as part of its structure.

The collaboration between research and industry should be strong, with continuous exchange and a collaborative search for long-term improvements and solutions. The results of research driven by industry needs should feed into improvements for industrial technologies or processes. The Final Report of High-Level Expert Group on KETs from June 2011 (see graph below) illustrates a solid stand of Europe in research; the core of the problem however lies in European inability to integrate the research results into design process of commercial products. Europe must overcome the “death valley” between research development and market commercialisation.

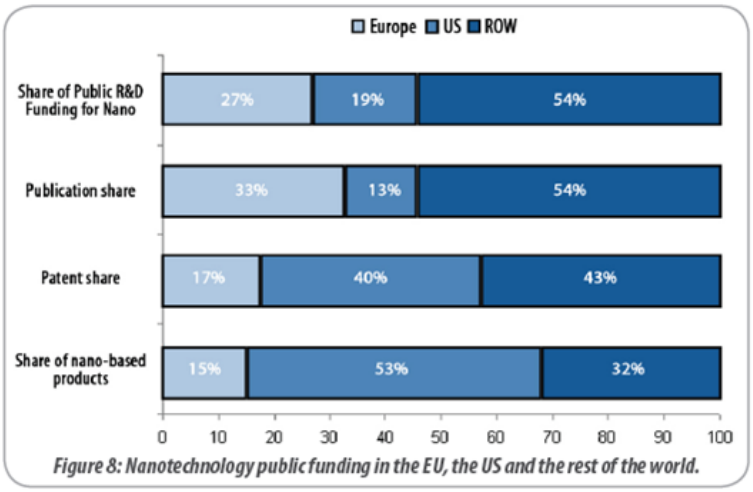

Figure 8: Nanotechnology public funding in the EU, the US and the rest of the world.

Are targets for sub-sectors such as transport, agriculture, industry appropriate and, if so, which ones? For example, is a renewables target necessary for transport, given the targets for CO2 reductions for passenger cars and light commercial vehicles?

Targets in sub-sectors based on cost-benefit analysis are necessary for the equal distribution of the efforts by sectors. For example, efficiency in industry is, at present, comparatively high. But this is not the case for the transport sector where specific action will be needed. It has also been demonstrated in several systems analysis scenarios that different sectors are only able to contribute to a certain extent to the overall goals, depending on necessities and mechanisms. Land and water transportation is no longer dependent on fossil fuels, whereas this is implausible, even until 2050, for air transportation, and especially for some industries such as the chemical and metallurgical sectors.

For the transport sector, linear projections of the current achievements in emission reductions for passenger cars indicate that the average vehicle will emit 106 g CO2 per km in 2020, while the EU's target is 95 g/km. Knowing that it will become ever more demanding to cut emissions from conventional ICE-based drive trains, specific incentives for market introduction of ultra-low emission vehicles (e.g. fuel cell electric vehicles) should be implemented. Moreover, it is evident from analysis of the composition of the European passenger vehicle fleet that both battery electric and fuel cell electric vehicles are needed to reduce the emissions to targeted levels. Corresponding public support for charging and refuelling infrastructure therefore be encouraged in all Member States.

A renewables integration target is required for road transport in addition to the CO2 reduction targets for passenger cars and light commercial vehicles. Although the vehicle in itself is low emission (tank to wheel), it is not necessarily a sustainable solution if the emissions are moved to where the fuel is produced. In the 2030 timeframe, the renewable target for transport should be increased significantly, to reflect the evolution in electric propulsion technologies made over the last decade, as well as technology feasibility. While biofuels can provide for a limited share of renewables in transportation, other low emission propulsion technologies (hybrids, plug-in hybrids, battery electric vehicles (BEVs) and hydrogen fuel cell electric vehicles (FCEVs)) will enable a substantial reduction in GHG emissions from transport. However, a pre-requisite for low emission transportation in a well–to-wheel perspective is the de-carbonisation of stationary energy generation providing electricity for plug-in hybrids and BEVs as well as for hydrogen production.

How can targets reflect better the economic viability and the changing degree of maturity of technologies in the 2030 framework?

As stated above, the technical maturity and economic viability of new technologies develops quickly. It is essential that these considerations are considered in long-term policy planning through

mechanisms such as regular reviews to ensure that Europe does not lag behind or base its policies on out-dated information. More broadly, the European Union should play a central role when it comes to dissemination of information on feasible business cases and models related to new technologies, to ensure awareness and support of Member States and society.

Since both battery electric and fuel cell electric vehicles are required to meet long-term GHG emission targets, both these technologies should be specifically supported through R&D instruments as well as market deployment measures. Technology neutrality may delay further development and deployment of new technologies, increasing the risk of not reaching targets and compromising the competitiveness of the European industry globally. To identify the most promising energy carriers, two parameters should be considered: the achievable energy efficiency and the potential for energy generation.

How should progress be assessed for other aspects of EU energy policy, such as security of supply, which may not be captured by the headline targets?

The security of supply and energy independence deserves a special focus in European and Member States energy strategies. As stated in our reply to Question 4.2.2, we recommend that specific targets are set for competitiveness and security of supply. Progress with respect to competitiveness should be assessed by identifying the market share of European-made products in specific areas. Similarly, security of supply may be assessed by closely following the how the share of imported energy declines.

Questions 4.3 Instruments

Are changes necessary to other policy instruments and how they interact with one another, including between the EU and national levels?

As described in Question 4.1, the right balance must be found between national flexibility and European harmonisation. Coordination and combination of existing tools at the national and European level is another key aspect, which needs to be more practically developed. Particular attention should be also paid to the development of policy instruments on cross-border energy-related issues, as too should alignment of standards and safety considerations.

How should specific measures at the EU and national level best be defined to optimise cost-efficiency of meeting climate and energy objectives?

As stated above, combination of funds (private and public across levels and sectors) should be considered, especially for addressing the deployment of innovative technologies until they become cost attractive. Projects already supported at the EU level (by a combination of various tools such as Horizon 2020 and structural funds) should benefit from additional support at national/regional level to pool resources and secure engagement. Moreover, transfer of know-how should be envisaged from advanced Member States in terms of development of new energy technologies. Collaboration in research should be streamlined, while demonstration should be based on a joint and coordinated EU roll-out plan rather than fragmented country-specific plans.

How can fragmentation of the internal energy market best be avoided particularly in relation to the need to encourage and mobilise investment?

A similar approach should be used by the different Member States to stimulate and mobilise investment. Sharing and multiplying good practices is essential as has been proven in the “H2 Mobility” deployment initiatives for FCEVs and the related infrastructure in Germany, UK, Scandinavia and other countries. Public-Private Partnerships could be encouraged at the national level, based on examples of European JTIs. These national PPPs should have a strong relationship with the related European JTIs in aligning strategies, navigating opportunities and pooling resources. This may leverage additional private and public support, which may be easier to achieve at the national and

regional level than at the EU level. Moreover, it may help multinational companies to adapt their strategies of investment to new technologies.

Which measures could be envisaged to make further energy savings most cost effectively?

The European energy efficiency policy should be reinforced beyond 2020 to shape energy demand, reduce energy imports, mitigate pollution and contribute to overcoming the challenge of energy affordability for households and businesses. Energy efficiency policies have a central role in the sustainability aspect of energy use and in bringing a higher share of renewables into the power mix via minimised grid development costs and the reduction of congestion and generation costs.

How can EU research and innovation policies best support the achievement of the 2030 framework?

The new framework should build upon the technical-economic potential of energy savings, on renewable potential, and on the contribution of all sectors of the European economy in a bottom-up approach, as certain sectors are better placed than others to contribute to the targets. Some innovative technologies such as fuel cells could benefit from targeted support to compensate for the issues remaining in the electricity and gas markets. For example, the support in the form of state aid, grants, feed in premium/tariff, etc. will trigger the deployment, and building of, new CHPs and the replacement of poorly performing boilers/power plants by new ones. Before deciding on any research or innovation priorities, each technological path should be assessed against its cost-effectiveness as well as its bankability and acceptability (improvement of the SET-Plan in this aspect would be beneficial).

Questions 4.4 Competitiveness and security of supply

Which elements of the framework for climate and energy policies could be strengthened to better promote job creation, growth and competitiveness?

It is imperative that Europe leads the development of new technologies in order to maintain its competitive position. In the transport sector for example, the European automotive industry employs 2.2 million people directly and 10 million jobs indirectly. The White Paper on Transport 2011 rightly points out that the race for sustainable mobility is a global one. Delayed action and limited introduction of innovative technologies could condemn the EU transport industry to irreversible decline. Europe is aware of the need to be a technology leader in order to maintain its global competitive position. The technological shift towards a low carbon economy offers the opportunity to bring Europe back to the forefront of technological development in sectors that are decisive for sustainable economic growth and employment.

Europe's political vision for a low carbon society must be supported by a clear financial engagement in favour of clean technologies including Fuel Cells and Hydrogen. Technologies deployed in the next 20 to 40 years will be the result of policy and funding decisions taken today. 'Action now' is required to provide a clear and strong signal that European policy makers are serious about their ambitions. Postponing hard choices to beyond 2020 or even 2030 will undermine credibility and predictability that users, manufacturers, technology providers or investors need.

Clean technologies are not likely to play a role in future energy and transport systems without decisive and favourable policy support and incentives designed to overcome the valley of death. Even though the role of the industry sector needs to grow with market introduction schemes, all steps continue to require a concerted approach, shared costs and risks mechanisms with European national and local authorities, and the introduction of support measures to create consumer acceptance and investor security.

Concretely, growing the European fuel cells and hydrogen sector will provide clear opportunities for a high quality European workforce, thus preventing a brain-drain to other more innovative regions.

Transforming the energy and transport sectors and gaining global industrial leadership will require a marked effort by all of the involved stakeholders. This does not only require substantial investment but also close cooperation between the public and the private sectors along the whole innovation chain.

Europe is still considered a technology leader in certain FCH application areas but other regions are developing quickly as a result of public intervention and support. Impressive technological progress has been made by European companies, especially in the transport sector, also due to good support from projects developed jointly under the European R&D framework programme. However, current funding levels and financial mechanisms will need to be significantly increased if Europe's ambitions are to be met in 2020. Decisive action is needed now to prevent Europe falling behind other regions such as North America, Korea, Japan or China.

What evidence is there for carbon leakage under the current framework and can this be quantified? How could this problem be addressed in the 2030 framework?

No response provided.

What are the specific drivers in observed trends in energy costs and to what extent can the EU influence them?

One of the EU's challenges is the fast growing share of renewables and their integration into the energy supply system. To facilitate this change from demand-oriented towards supply-oriented production from wind and solar, storage options will be required to balance the system. Hydrogen can be safely stored in gaseous, liquid form or in solid state materials, all in industrial and domestic environments. Unlike energy storage capacity in batteries, the storage capacity of hydrogen is large, offering stored energy up to the terawatt hour level which remains available for extended periods of time. Therefore, development of hydrogen technologies offers a significant opportunity for the European industry and could play a major role in the formation of a more flexible and dynamic energy infrastructure. Developing and introducing a portfolio of new solutions to the market will offer new possibilities to choose the most efficient way forward in terms of societal benefits and price. Close coordination between public and private stakeholders (e.g. in a Joint Technology Initiative such as the Fuel Cells and Hydrogen Joint Undertaking) is needed to maximise cost efficiency and accelerate the technological shift.

How should uncertainty about efforts and the level of commitments that other developed countries and economically important developing nations will make in the on-going international negotiations be taken into account?

As described above, the EU should fully exploit its competitive edge by investing in innovative technologies and their application across borders whilst not yet cost-competitive.

How to increase regulatory certainty for business while building in flexibility to adapt to changing circumstances (e.g. progress in international climate negotiations and changes in energy markets)?

Any future targets should recognise the evolution of new technologies over time and take into account updates on maturity and viability of these technologies, including progress achieved in other geographies. These assumptions supported with agreed regular reviews of technological progressed should be documented in mid-term regulatory frameworks.

How can the EU increase the innovation capacity of manufacturing industry? Is there a role for the revenues from the auctioning of allowances?

No response provided.

How can the EU best exploit the development of indigenous conventional and unconventional energy sources within the EU to contribute to reduced energy prices and import dependency?

No response provided.

How can the EU best improve security of energy supply internally by ensuring the full and effective functioning of the internal energy market (e.g. through the development of necessary interconnections), and externally by diversifying energy supply routes?

No response provided.

Questions 4.5 Capacity and distributional aspects

How should the new framework ensure an equitable distribution of effort among Member States? What concrete steps can be taken to reflect their different abilities to implement climate and energy measures.

Individual Member States should play a more active role in defining their own contribution to the joint effort of realizing the climate and energy related-EU targets. Currently, energy policy is, to a large extent developed and implemented in Member States, primarily based on economic assessments. From a European perspective, this neither fosters cross-border interaction nor the exploitation of synergies which a common European energy policy may offer. In any future legislative proposal (a sufficient mechanism should be in place for a dynamic link between the economic activity of countries and sectors - especially the level of activity of manufacturing and processing plants - and the ability of the economic agents to receive project financing. Ultimately, any resulting framework at EU and national levels must be stable once in place for the energy operators.

What mechanisms can be envisaged to promote cooperation and a fair effort sharing between Member States whilst seeking the most cost-effective delivery of new climate and energy objectives?

To enable investment, adequate financing mechanisms must be developed and made available to share the risk, while bridging the gap between research and commercial deployment. In particular for initial high risk investments, access to affordable funding is essential. Furthermore, temporary state aid-rule exemptions should be considered as well as a range of other direct or indirect financial and non-budgetary mechanisms including tax or demand-side incentives or public procurement such as for local fleets of fuel cells buses. In addition to the various Member States roles suggested above, an area which requires more attention from the EU is the contribution of local energy infrastructures - including power and heat production - to the three pillars of any EU policy: security of supply, affordability and sustainability. The rolling-out of energy efficient measures has a significant potential for net job creation - from the manufacturing of equipment down to the servicing of installations such as Fuel Cells CHP, which clearly are an option for considerably improving energy efficiency. In addition, energy savings contribute to reducing the costs of decarbonisation by facilitating renewable energy uptake and making long term GHG targets easier and more cost-effective for Member States.

Are new financing instruments or arrangements required to support the new 2030 framework?

New sector-based support mechanisms - both financial and non-budgetary - should be explored, and current mechanisms should be assessed and updated. Combining different programmes from the European Investment Bank or Regional funds should be made easier, as should the pooling of other EU and national support programmes. Furthermore, adequate mechanisms should be developed to attract a wider pool of private investors/investment funds, such as an EU Investment Fund, insurance-based solutions, reimbursable advances and state aid, as well as other competition or state aid-rule exemptions for a certain period of time. These would, in particular, support infrastructure investments inherent to clean technology deployment. In addition to existing EU instruments, funding tools and

streams must be made available to stakeholders in order to trigger energy efficiency improvements at local level (see also comments on instruments above).

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Annex 1: About the Fuel Cells and Hydrogen Joint Undertaking (FCH JU)

With a total funding capacity of nearly € 1 billion in 2008 - 2013, based on the principle of 50/50 cost-sharing between the European Union and the private sector, the Fuel Cells and Hydrogen Joint Undertaking belongs to the most prominent group of supporters of fuel cells and hydrogen in Europe.

To date, more than 130 projects and over 700 industry and research organisations have won support under the annual, competitive calls for proposals issued by the Joint Undertaking. Both the format and the post-2013 budget of the programme are currently being defined to ensure a robust European cooperation scheme for the FCH technologies under Horizon 2020.

The FCH JU is composed of three partners: The European Union (represented by the European Commission), an Industry Grouping (NEW-IG) and a Research Grouping (N.ERGHY). All partners can be contacted using the following details:

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