EUROPEAN COMMISSION
RESEARCH DIRECTORATE-GENERAL

Directorate J - Energy
Energy production and distribution systems

Structured Format for Comments on the Preliminary Draft Vision Document of the High Level Group on Hydrogen and Fuel Cells

Please insert any comments that you may have into the marked sections below (*please be brief and note that it is not necessarily expected that you comment on every section*) and return the form by e-mail (preferably) to: thanh-nhon.thai@cec.eu.int or, if this is not possible, by fax to : Mr T-Nhon Thai on +32 2 29 64288. If you have any other relevant documentation that you wish to submit, then please do so.

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Chapter 1 – Vision

Do you have any comments on the overall vision presented?

☞ The European Wind Energy Association (EWEA) welcomes the opportunity to comment on the draft vision of the "High Level Group on hydrogen and Fuel cell Technologies".

We enthusiastically support the core vision of achieving a “viable sustainable energy and transport system for Europe” and welcome President Prodi’s vision of “a government-business-civil society partnership to help facilitate the transition to renewable sources of energy for the extraction of hydrogen”

In general, we believe that the draft does not address key issues, mainly related to the environmental and greenhouse impacts of a switch to hydrogen as a clean energy carrier, and puts too little emphasis on supply and generation components.

The draft vision report states that "The social and political will to improve our global environment and the need to secure a diverse and sustainable energy supply are the major driving forces behind the vision" (131-133). Therefore the need to address the environmental and greenhouse effects of a switch to hydrogen are fundamental. The report emphasises the clean nature of the energy carrier (hydrogen) and the energy converter (fuel cells), however the production techniques of hydrogen need greater focus.

The report more or less assumes that hydrogen is inherently clean without examining the total hydrogen cycle, and that vast amounts of renewable energy sources automatically will be available to produce it. There is little focus on the relative greenhouse carbon benefits of hydrogen and bio-energy options and the upstream production is widely neglected. The clean credentials of hydrogen are eliminated if its production is from polluting sources. Hydrogen can only be as clean as the technologies used to generate the hydrogen. Just as energy does not become less polluting by being carried as electricity, hydrogen cannot claim to improve the environmental impact or sustainability of the sources that produce the hydrogen. Just as the issue of emissions and other pollutants of energy production are at the heart of discussion when it comes to electricity the distinction of what constitutes “renewable and sustainable hydrogen” is a central issue.

EWEA recommends that the vision report takes on a full "well-to wheel" approach by including the hydrogen production technologies and their environmental and carbon effects in its vision. Thisprovides a sound basis for the overall goal to "improve our global environment and (..) secure a diverse and sustainable energy supply" (131-133)

The report concludes that developing hydrogen and fuel cell technologies in itself will automatically increase the renewable energy supply. There is no evidence to support this view either from current market data, recent trends, or the current projections for renewable energy over the next two decades.

Hydrogen and fuel cells in themselves will not "unlock a diverse range of energy sources" (71), solve current "concerns over energy supply and energy security, air quality, and global warming" (72-73), or make "ferries (..) hotels and hire[d] cars run on (..) fuel, produced entirely from renewable sources" (78-80).

Furthermore, it should take into consideration that a premature push for hydrogen could have a serious environmental downside by redirecting focus as well as public and private research funds away from the development of the renewable energy technologies that are a precondition for the realisation of the vision.

The draft vision uses a backwards argument that “Hydrogen is crucial to this process [a de-carbonised energy system] as, together with electricity, it provides a bridge from today’s largely fossil-based energy sources to tomorrow’s sustainable sources”. It is the other way around. Renewable energy sources do not need hydrogen to develop in the short to medium-term. It is hydrogen that is dependant on the availability of large amounts of renewable energy sources – much more than the 12 % included in the Renewables Directive - if hydrogen and fuel cells are to have the desired positive impact on the environment and global sustainability.

Therefore, the vision should be expanded to take into account how Europe can secure its abundant renewable energy resources, and how the development of the technologies necessary to exploit them on a large scale can be accelerated. The environmental case for developing hydrogen and fuel cell technologies is limited if it happens ahead of the availability

of large-scale renewable energy inputs and the vision should reflect that. This is especially true given that today 98% of hydrogen is generated from fossil fuel sources.

Thus the development of renewable energy sources is an essential pre-requisite for the introduction of the hydrogen age in Europe. The EWEA's blueprint scenario "Wind Force 12" (available at www.ewea.org) outlines that, even under a conservative scenario, 100,000 MW of wind power capacity could be built in Europe by 2010, and 230,000MW by 2020. At the first step, meeting these targets - which are conservative industry scenarios - will hasten the introduction of the hydrogen economy across Europe.

Chapter 2 – The energy challenge

Do you have any comments on the analysis of the challenges?

☞ The vision argues (259-262) that hydrogen "opens access to new and renewable energy sources".

Rather, it is the other way around: Renewable energy sources will enable – and is a precondition for - the credible deployment of "renewable hydrogen". Of the 5,871 MW of wind power installed throughout Europe last year, more or less none of this was built as a direct result of hydrogen technology

Without large-scale renewable energy production – far larger than the Community's current renewable energy commitment of 12 % by 2010 - Europe runs the risk of discrediting hydrogen, preventing the development of more beneficial technologies, and increasing the environmental impact through the use of fossil fuel derived hydrogen.

Until we reach a level of surplus renewable electricity, cheaper and higher emission reductions can be achieved by renewable electricity sources through the displacing of electricity from fossil fuel power stations, than through the production of hydrogen from renewable energy sources. In 2002, the EWEA launched its third version of the wind power feasibility study Wind Force 12 . It shows that there are no technical barriers for wind power alone to meet 12 % of global electricity needs by 2020 (12.5 % of European electricity demand by 2020). In a foreword to "Wind Force 12" Sir Mark Moody-Stuart, Co-Chair G8 Renewable Energy Task Force, writes:

"The report rightly addresses the limitations imposed for electricity grids by a fluctuating supply. As we develop other energy storage and transport mechanisms, perhaps through some of the exciting current developments in hydrogen and fuel cells, these limitations will be gradually removed. They are not however critical up to the levels envisaged in this report."

The policy challenges to meet a bigger target as in Wind Force 12 are not conditional on the future fortunes of the hydrogen technology, yet meeting and exceeding these targets will then hasten the introduction of the hydrogen era.

It is generally acknowledged in our industry that around 20% of electricity can be provided from wind power alone before having to tackle complex grid management and load issues. Coupled with other renewables, the view that hydrogen is a necessary and vital precursor required to tackle the issue of renewables intermittency is a fallacy, and this is not an issue until we reach such levels of wind power penetration on electricity grids, as well as other renewables contributions. EWEA agrees with the draft vision that "it is surely time now to start long and detailed planning for this future, avoiding false starts and economic disruption, by gradually introducing new sources of affordable clean energy, along with more efficient energy

converters" (250-253). However, long-term detailed planning should not ignore short to medium-term possibilities that have substantially larger environmental benefits and are available today with relatively modest political and regulatory intervention, much lower economic costs, and comparatively simple technical advances compared to the development of hydrogen and fuel cells.

A precondition and a necessary first step towards "an emissions-free, sustainable energy future" (281) is the removal of existing barriers currently restricting the large-scale development of renewable energy technologies e.g. unfavourable grid codes, barriers to grid access as well as a regulatory and infrastructure framework that put renewable energy technologies at a competitive disadvantage with conventional power sources and distorts competition. We agree with the report that with regard to the 22% renewable electricity target for 2010 "progress in this area needs to be accelerated".(234)

The framework for a transmission and distribution system for large-scale renewable energy is already in place but needs to be managed and extended, e.g. grids for large-scale offshore wind farms in the North Sea, the Baltic Sea, and the Mediterranean. The challenge of accommodating existing grids to distributed generation and large-scale renewable energy deployment is large, but a drop in the ocean compared to the economic implications and structural changes needed to build a hydrogen infrastructure from scratch. Therefore the EWEA recommends that the vision in the short to medium-term emphasises the "de-carbonised Energy trans-European Network" (866-867) infrastructure for production mentioned in Chapter 3. Otherwise future investments in a "trans-European hydrogen network" (116) cannot be justified.

There exist possibilities available today for substantial cuts in emissions and fast track development of renewable technologies at a large scale. By ignoring this potential, both early action benefits and the long-term credibility and environmental integrity of the future hydrogen system (284) is put at risk. Reality is that technologies with vastly unused potentials, e.g. large-scale wind power, are already available today that can address each of the concerns: energy security, environmental integrity and economic competitiveness (286-310) without compromising the others and at the same time secure the development of true "renewable hydrogen" in the future.

Chapter 3 – Technologies

Do you have any comments on the analysis of the technologies presented?

☞ The vision fails to make the critical connection to the production of hydrogen. This is vital, for reasons already mentioned in the previous sections. A full "well-to wheel" approach should be undertaken, including the hydrogen production side of the cycle.

Chapter 4 – What can Europe do?

Do you have any comments on the analysis and recommendations put forward, especially regarding the Strategic Research Agenda?

☞ EWEA strongly agrees that a Strategic Research Agenda and EU-coordination are needed, yet the scope of the vision needs to be broadened to include renewable energy supply. It should be "linked with a comprehensive programme of socio-economic research, directing at providing policy-makers with cost-benefit analyses and modelling tools to support rational decision making" (577-580). However, the scope of the Strategic Research Agenda is too narrow and lacks the "well-to-wheel" approach discussed previously. Broadening the scope to include upstream production and securing adequate renewable energy supplies will enable a solid foundation for socio-economic research and cost-benefit analyses

The report correctly highlights that "Europe has access to vast renewables energy resources that could be harnessed" (256) . The priority agenda item for political and research recommendations is to ensure that these resources are harnessed.. In the short to medium-term we propose that a "Strategic Research Agenda for the development and implementation of large-scale renewables" is established. Over time, this agenda should then be moving from unlocking Europe's vast renewable energy potential and large-scale renewable energy production towards some of the key elements mentioned in figure 5 (193-195) and bridging the gap between renewable energies and truly "renewable hydrogen" and fuel cell technologies. There is a central need in the vision to broaden the scope to secure the availability of renewable energies to fuel European hydrogen. Under this direction, for example, specfic proposals such as that for a "five fold increase over current spending" (1011) should be applied at first and directly to renewable energy sources.

EWEA strongly agrees with the vision's statement that: "The European Union and national governments throughout Europe should work towards realising a consistent European policy framework with a sustainable energy policy at the heart of this framework. A coherent energy policy sets the scene, but it must face squarely up to its environmental consequences" (856-859). However, this important view is not represented throughout the rest of the draft vision. Hydrogen and fuel cells do not guarantee sustainability – it is the upstream technology mix that determines the level of sustainability. When these are taken into consideration, and a framework for large-scale deployment is nurtured, Europe stands the best chance to create "a system in which the environmental cost of energy [is] fully included in the decision-making process" (859-860).

The laudable aim is to be "World's number one in 2030"(594); Europe is already number one today in wind power, for example European companies have a world-market share of more than 90%. This highlights the leadership role that wind power and other renewables can play to meeting the challenges laid out in the report.

Finally, EWEA believes that in the move towards the European hydrogen economy, wind power will be the cornerstone of such a development and the industry is ready to play an active and participatory role as the vision materialises.
Chapter 5 – Concluding remarks **Do you have any comments on the recommendations provided?**
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Do you have any other comments on the document?
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