MISSION STATEMENT ON MOBILITY

HYDROGEN TECHNOLOGIES, THE MISSING LINK TO DECARBONISING THE EUROPEAN TRANSPORT AND MOBILITY SECTORS

Introduction

Hydrogen and Fuel Cells offer zero emission solutions for transport and mobility. For many years, the European Union and some Member States decided to support research and innovation into this technology by various programs. On EU level the continuous support by the Fuel Cell and Hydrogen Joint Undertaking starting from 2008 has led to a maturity of the applications that pays off today. The results achieved show that hydrogen technologies can contribute massively to the reduction of any emissions in the mobility sector which is lagging behind when it comes to decarbonisation or to implementation of existing directives on clean air. Now is the time to continue the efforts made in RTD and to adapt the political framework and the respective regulations in order to enable the deployment of this technology.

Why Hydrogen matters?

- Hydrogen is key to reach a threelfold objective:
  - Help to reach greenhouse gas (GHG) reduction objectives and mitigate climate change by decarbonising our transport and energy systems
  - Improve air quality and dramatically reduce the health impact from hazardous emissions (zero emission of CO2 or pollutants at the point of use)
  - Secure energy supply by:
    - Substituting oil & gas imports by hydrogen produced locally from renewable energy that can be used in the mobility sector.
    - Creating additional sources of flexibility in power grids by introducing more renewable power in our grids, offsetting curtailment, and reducing fossil energy consumption thereby contributing to reaching the energy efficiency ambition of 30% by 2030.

Hydrogen is a game changer for the European industrial and energy landscape, jobs & growth:

- It will create and secure European leadership in fuel cell technology leading to more jobs. In most European countries we have state of the art research centres and many companies, from start-ups to large groups, which are able to pave the way for a robust and sustainable hydrogen industry in Europe
- It will reduce the €1bn per day\(^1\) spent on energy imports.

What is our vision for mobility?

- The EU and its Member States have launched an ambitious decarbonisation strategy until 2050. Given the share of greenhouse gas emissions coming from the transport sector\(^2\), the „energy transition“ has to coincide with a „mobility transition“. The transport sector has reached a level of technical readiness (TRL) and is committed to succeed in meeting the EU’s aggressive goals.

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1 “Questions and answers on security of energy supply in the EU”, European Commission memo, Brussels, 28 May 2014
2 31% in 2011 according to the IEA.
With 25% of the GHG emissions attributable to transport, and the requirement to reduce them by 95% by 2050, there is no other way than to opt for massive electrification. The binary question is not battery or fuel cells but rather fossil fuels or renewables. Electrification of transport, spurred by introduction of renewables, will include both battery electric vehicles and fuel cell vehicles which complement each other.

Both hydrogen and battery technologies have their place in the future of mobility based on decarbonised and electrified transport sector due to their respective distinct advantages. It is important to ensure a level playing field for both technologies. A thorough life-cycle analysis needs to be complemented by a realistic strategy for the underlying infrastructure for charging of batteries on the one hand and of hydrogen refuelling stations on the other.

Without efficient electric power drive systems such as fuel cells the long-term climate goals cannot be achieved. Fuel cell vehicles offer emission-free driving without changing personal habits. It is our role and responsibility together with the European governments to highlight and enhance the latest developments in fuel-cell technology and their applications in mobility at end-users level.

Hydrogen powered fuel cell cars, buses, forklifts and submarines are a reality today. We expect trains and trucks becoming viable in next five years, with potential use of technology in maritime, aeronautical and logistical applications currently being tested.

We are promoting the usage of Green Hydrogen in the production process of conventional fuels. This helps to reduce CO₂ emissions already today by substituting hydrogen from fossil sources.

If Europe wants to maintain its innovative and technological leadership on hydrogen / fuel cell technologies an enabling regulatory framework and political environment is required. Turning low carbon mobility into reality will require a strategy combining education, infrastructure and incentives which can only be secured through strong cooperation between the public authorities and the private sector.

Hydrogen offers the pathway to decarbonisation and electrification of mobility within the current and future operational mobility goals.

1. Hydrogen fuel cells electrical vehicles offer distinct advantages, while helping to reduce emissions and noise significantly without any restrictions in terms of range and with high flexibility:

- Private cars: almost all car makers are offering or intend to offer one or more models with fuel cell technology, in the near future. Furthermore, since sports utility and sport activity vehicles (SUV’s and SAV’s) are an ever increasing market segment, their performance and range need electricity on board. Fuel cell electric cars available on the EU market today can be refuelled in approximately 3 min and offer an effective driving range of about 400-500 km. The user experience is very close to traditional ICE cars when the refuelling infrastructure is present. From 2015 onwards fuel cell cars have become a reality and will accelerate the development of a hydrogen technologies ecosystem and the respective markets. This is accompanied by the first production facilities for electronic components, systems and vehicles in Europe in volume production. From 2020, fuel cell cars will be available on the market at competitive prices.

- Urban buses: since 2009, about 90 heavy duty fuel cell buses have been deployed. Further tenders for an additional 140 buses are being drafted with a total of 600 fuel cell buses expected by 2020 on the EU Member States roads. The initial cost of 1.5 million euros for a fuel cell bus has been decreased within four years and a number of approx. 100 FC buses to 650,000 euros per bus in the field of city buses. The scaling effect was induced by several programs and calls of the FCH JU, which accompanied this process by actively promoting buyer consortia at the municipal level, which induced the bus manufacturers to discount cost based on identified market volume potential.

- Delivery trucks and regional trains are showing new and promising potential because they offer zero emission and low noise in populated urban areas, including during night hours.

3 The term “Green Hydrogen” is used inclusively for all ways to produce low carbon hydrogen. We suggest developing a certification system for all these ways to produce hydrogen. Such a certification system could be designed alongside the recommendations from the project CertiHy.
- Hydrogen could also provide solutions to the aviation sector: New concepts of producing renewable jet fuel using renewable electricity via the Power-to-Liquids (PtL) pathway. The PtL pathway combines industrial process steps to produce sustainable jet fuel from large resources of renewable energy, such as solar and wind. Thus, it provides a credible perspective to produce large quantities of sustainable drop-in jet fuel. In case of renewable electricity and CO₂ provision, PtL fuels achieve very low levels of greenhouse gas emissions. Furthermore, PtL fuels are already approved for use in civil aviation and compared to biofuels they show very low water demand and land use.
- Other transport applications, including but not limited to boats, bikes, forklifts etc. are also evolving depending on their market readiness and the economics.

2. There is no chicken and egg dilemma: infrastructure deployment has to go along with deployment of vehicles
- A successful decarbonisation largely depends on the construction of the necessary infrastructure for refuelling hydrogen or battery charging. A prerequisite for its realisation is the combination of existing programmes (such as TEN-T and TEN-E corridors) and available or new finance/guarantee tools.
- The recent activities and studies in the field of electrification show shortfalls for the power grid if it comes to a unilateral infrastructure (only battery or only H2 filling stations). We therefore call for a mixed infrastructure of both the electricity and the gas network (sector coupling). The mobility transition based on electrification can only be successful when coherent and consistent.
- We are convinced that European automotive industry is a key player with global leadership. The continuation of this leadership role can only be ensured by a timely focus on the expected technological changes. Japan, Korea and China have already clearly marked their intentions and have put action plans in place to meet international competition in this field. With a combination of European emerging companies and large well established companies in the hydrogen technologies sector, fuel cells for automotive applications could be predominantly produced in Europe. The manufacturing industries and assembly of cars, trucks and buses are expected to benefit from deployment of fuel cell vehicles. The transition from combustion engines to fuel cell engines will help maintain the industrial organisation and the European jobs in the automotive sector.

3. Demonstration programs in real life conditions and innovative go to market strategies are the key to develop a large H2mobility market
- Programmes at European and national level are essential to cover the delta of innovation costs. The fuel cell bus example shows that a mere 100 buses reduce the production price by almost 60%. The upcoming extension of the programme is expected to result in additional cost reductions. Cost reductions for innovative hydrogen technologies can be achieved by targeted government funding.
- We need a similar process for the regional train sector, where the first prototypes powered by fuel cells are being introduced.
- We are organising the immediate development of captive fleets close to the refuelling stations to kick-start the demand for hydrogen and the respective build-up of refuelling infrastructure. Car sharing, taxi fleets and public utility vehicles are very good and tangible examples of the deployment of large numbers of fuel cell cars. Through targeted calls of the FCH JU and subsequent funding from other EU programs in the field of regional policy or transport support, and by a strategic co-financing by the European Investment Bank (EIB) a substantial increase of scale can be achieved in order to see corresponding price reductions in the mobility sector. Fleet fuelling stations – e.g. for bus or taxi fleets - should be made available to the public from the beginning. A clear political commitment to build up this infrastructure is indispensable.
- When producing hydrogen from Power–to-Gas, it will also provide flexibility to the electricity grid through sector coupling and it will kick-start the development of a new Power-to-Gas industry through costs digressions and technology improvements. This can be achieved by treating Green Hydrogen as biofuel

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Power-to-Gas (also power-to-gas) (often abbreviated P2G) is a technology that converts electrical power to a gas fuel. One key technology to achieve this is water electrolysis. In this way surplus electricity can be used. The hydrogen produced can then be used directly (H2 mobility, refinery processes, other industries) or be stored, methanised or re-electrified.
also when it is used in refinery processes. When using hydrogen produced from bio methane, i.e. from wastes, it will boost the circular economy by giving other market opportunities to biogas.

What is Hydrogen Europe asking for?

• The contribution of electric and fuel cells vehicles to decarbonisation in all modes of transport can only be deployed if an appropriate infrastructure for electric vehicles with batteries and fuel cells is established. We therefore call for the rapid expansion of hydrogen refuelling stations, intelligently combined with the vehicle production. All industrials involved in hydrogen share the same beliefs:

  - Public authorities commitment will be a game-changer provided that:
    ✓ It enforces compliance and infringes non-compliance with the Air Quality Directive.
    ✓ As part of the Renewable Energy Directive revision, it develops ambitious instruments and targets to support the uptake of renewable fuels such as hydrogen as an alternative fuel for transport.
    ✓ It implements similar actions to target the production of cleaner fuels to achieve the emission reduction target for the transport sector as well as long term, lower cost energy storage solution to leverage the share of renewables.

  - Public authorities, including public procurement authorities, need to acknowledge the contribution of hydrogen by:
    ✓ Establishing a level playing field between alternative fuels by adopting a clear framework
    ✓ Supporting end-users by compensating the higher costs of cleaner technologies through customer incentives.
    ✓ European national, regional and local authorities to invest in clean technologies
    ✓ Promoting fuel cell vehicles as part of public procurement process in all modes (road and rail) within the Clean Vehicle Directive revision.

  - A level playing field for hydrogen and other biofuels (1st and 2nd generation) within the frameworks of FQD and RED is required by the industry. These can kick-start deployment, notably for the Power-to-Gas industry, and help to develop a Green Hydrogen infrastructure for the future.

  - Implementation of the „Air Quality Directive” will have strong effect on the electrification of transport. It will stimulate the establishment of hubs where loads of heavy duty vehicles (temporarily run on diesel) would be transferred to light duty battery electric and fuel cell vehicles. These “hubs” are at the same time important elements of the infrastructure of hydrogen refuelling stations. The simple implementation of existing law will promote the introduction of innovative technologies, but demands active commitment of politics and administration.

  - An appropriate framework to invest in the hydrogen refuelling infrastructure is mandatory:
    ✓ The infrastructure needs to be set up before vehicles are commercially sold. Therefore, the product of new investments will be underused at the beginning and generate a loss. Moreover, a lack of infrastructure generates uncertainty on the penetration rate of vehicles.
    ✓ As a consequence, industry investment is subject to (1) mechanisms enabling to frontload future profits in the first years by compensating first mover disadvantage into first mover advantage and (2) risk-sharing mechanisms.

  - Also for rail transport, we want clear policy objectives. For example, Schleswig-Holstein has stated that by 2025 they want to achieve complete electrification of rail transport. That means that rail networks without catenary will be changed from diesel to hydrogen. Clear targets combined with corresponding tenders are key for uptake of zero emission technologies.

  - We will actively support public campaigns to inform the public about the safety aspects of clean mobility. Here communication activities could help as well as days of action or adjustments corresponding curricula.
• We urge to proceed to a cost / benefit assessment for the construction of infrastructure for electric and fuel cell vehicles in real-compared to the cost of fossil fuels. Also all aspects of public health (i.e. the effect of hazardous emissions and noise) should be included