

Battery and Hydrogen Electric vehicles for zero emission transport

Executive Summary

This common statement paper between EGVI (European Green Vehicles Initiative Association) and Hydrogen Europe aims at clarifying the complementarities and differences between the technological areas covered by the two initiatives. Wherever possible, information exchange between the two organisations should be reinforced in order to accelerate the decarbonization of road transport.

Targeting improvement of air quality and the overall decarbonisation in the EU require the electrification of transport in its various applications. This electrification can be achieved through a number of powertrain solutions: BEV (Battery Electric Vehicles), PHEV (Plug-in Hybrid Electric Vehicles) or FCEV (Fuel Cell Electric Vehicles). These three architectures have large complementarities in their components, such as power and control electronics, electric motors and batteries. Despite this complementarity each electric powertrain type must be optimized for its specific use case that depend on the specific market, the range per day, the transport application and the available infrastructure, respectively. For example, for long distance and for heavy-duty road applications PHEV and FCEV are more favorable, whereas BEV, although also suitable for longer distances given the fast charging infrastructure, can be ideally deployed within the urban environment. It means also that these powertrain architectures are rather complementary and none can cover the complete universe of all possible use cases.

These powertrain architectures and their components require significant cost reduction in order to achieve large market penetration and interesting business cases for both OEMs and the end customer, thus creating a virtuous cycle in the adoption phase: higher volumes imply lower costs, which in turn imply faster adoption and thus higher volumes. These cost reductions will only be possible within a supportive funding environment with a continuous and consequent focus on technology research and innovation. The total cost equation must include the environmental impacts, including recycling.

In order to achieve a broad adoption by the end customer the appropriate infrastructure for both powertrains needs to be in place. The deployment of electric charging stations and hydrogen refueling stations should be planned to be complementary and synergetic, thus optimizing the investment and allocation of resources.

With a clear focus on the environment, and to achieve the overall CO₂-reduction targets for the EU, the electrification of the entire transport sector has to be accompanied with a distinct focus on the renewable production of electric power and green hydrogen.

The recommendations to the European Commission are

- To strengthen the support for electrified powertrain R&D
- To emphasize the infrastructure deployment
- To support the decarbonisation of the energy chain

in order to achieve the overall environmental targets of the EU.

How to make the fight against climate change and economic growth mutually supportive?

Alongside the current strategies for better urban planning and active transportation systems, the quest for zero emission transportation means inevitably the transition from fossil fuel powered vehicles towards electric vehicles. As these are completely free of any local greenhouse gas emission as well as being low noise, the “electro-mobility” will be the main part of the disruptive change of the entire transport system to support a clean, smart and environmental friendly society.

Battery Electric Vehicles (BEV), Fuel Cell Electric Vehicles (FCEV) that run on hydrogen, and hybrid combinations thereof are complementary technologies that decarbonize fully the transport system and are suited to serve different segments and customers. Both technologies ideally complement each other. Customers will decide based on individual preferences and usages with respect to the access to charging and fueling infrastructure and based on the Total Cost of Ownership (TCO).

With a strong industrial presence and blooming societal changes, Europe will benefit from electro-mobility solutions

The European automotive sector and its supplier basis are currently developing electric vehicles and their components. Most manufacturers have models already available in the market. The competitiveness of the transport sector depends on the capacity to innovate. Battery or hydrogen electric buses, cars, scooters and bicycles, are no longer the anecdotic fraction of the vehicles in circulation. In one extreme case, Norway, in 2016, 1 out of 4 newly purchased cars was electric thanks to fiscal and practical incentives. Electric cars or scooters pooling solutions are a reality in many European towns, including Brussels.

London, Paris and other major cities have set-up discouraging taxes to avoid the circulation of the most polluting vehicles in their center. This fact in combination with the growing demand in urban areas for shared mobility services without the disadvantages of the ownership of a vehicle can be an accelerator of the transition to clean vehicles, with the precondition that the necessary infrastructure is in place.

As a proximate potential future knocking on our doors, the use of battery or hydrogen electric vehicles to store electricity surpluses from renewable energy sources (e.g. through large scale wind park energy electrolysis and storage in the form of hydrogen) could revolutionize the energy system and create new visions of transport.

Hydrogen and battery: twice as much efficient to tackle common costs challenge

Currently there are barriers to the widespread use of electric vehicles. One principal reason is their purchase costs, which are much higher than for conventional vehicles. The acquisition of three diesel buses, or two battery electric buses or one fuel cells electric bus represents today an equivalent budget. Often immediate financial consideration prevails for the buying decisions whereas in many cases the global TCO of these zero emission vehicles is very close to existing conventional solutions, depending on regional variations.

Continuous research on the use of critical raw materials and the durability of both, the battery and the fuel cells systems is aiming to achieve the required critical cost reduction. This continuity is crucial since these are fast changing technologies prone to disruption. Beyond cost reduction, there are further critical challenges:

- the decarbonisation of the energy source to produce the electricity or the hydrogen,
- the development and deployment of infrastructure to refuel/recharge the vehicles,
- the existence of a competitive and broad EU supply chain of key components for both BEV/PHEV and FCEV powertrains.

Recommendations

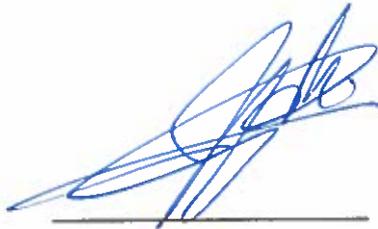
Both battery and hydrogen electric communities encourage the EU institutions to strengthen the support of R&D on system and component level of all electrified powertrains (BEV, PHEV and FCEV). In particular, the continuous and projectable long-term support is needed to ensure the improvements along the entire value chain. This would allow to achieve the EU cost reduction targets, to foster the competitiveness of EU manufacturers and its EU-related supply chain with respect to their overall status in the worldwide business and to create valuable jobs in these key technologies.

Secondly both, battery and hydrogen electric mobility requires the continuous and consequent support for the development and deployment of the refueling and recharging infrastructure, since they are complementary and synergetic, thus assuring customer acceptance and buy-in of the new technology.

Finally both communities recommend to the EU institutions to support in equal measure the decarbonisation of the energy chain from source to dispenser (for electric power and for hydrogen), assuring consequent environmental and societal impact.

The forthcoming FP9 for research and innovation is an ideal instrument to achieve all these goals.

Signed in Brussels on 22nd September 2017,



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