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Fuel Cell: Building up activation energy

Fuel Cell: Building up activation energy. Any new groundbreaking technology follows the Arrhenius law: you need a certain activation energy before a reaction starts. That is why the EU, five carmakers and tens of partners bundle their forces to get the ‘hydrogenation’ going.

Fuel cell vehicles (FCEVs) have a lot going for them. They are basically electric cars with an integrated power plant that runs on pressurised hydrogen. This allows them to drive longer distances (500 km) than plug-in electric vehicles, with no tailpipe emissions but clean water. Refuelling takes just a couple of minutes. As they do not emit any CO 2 or harmful gases, FCEVs are granted fiscal benefits.

However, there are a few major drawbacks. As the high R&D costs can only be carried by a few thousand vehicles today, FCEVs are twice as expensive as their conventionally powered peers. Moreover, there are hardly any hydrogen refuelling stations, because there are hardly any FCEVs, and vice versa. Europe has no more than 90 fuelling points, a third of which are located in Germany.
Europe’s helping hand: HyFIVE and H2ME

To help adopt hydrogen-powered e-mobility as a way to reduce emissions, the European Union, together with 15 partners, created the Hydrogen for Innovative Vehicles (HyFIVE) demonstration project. Five carmakers – BMW, Daimler, Honda, Hyundai and Toyota – deploy 185 fuel-cell vehicles to prospective drivers in Austria, Denmark, Germany, Italy, Sweden and the UK. The project will also create clusters of refuelling station networks to provide refuelling choice and convenience to early users of FCEVs.

Equally pushing hydrogen-based mobility is the H2ME initiative (Hydrogen Mobility Europe), bringing together 37 partners from across Europe. It aims at the deployment and operation of 1,400 fuel cell vehicles and the addition of 29 extra hydrogen-refuelling stations (HRS) to the European network by 2020. It is supported by the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) with funding from the European Union Horizon 2020 programme. And at the latest World Economic Forum in Davos, the CEOs and chairpersons of 13 leading energy, transport and industry companies have formed a 'Hydrogen Council', to promote hydrogen as an important long-term contributor to the energy transition.
The market today
The only two vehicles commercially available on the market today are the Hyundai ix35 FCEV and the Toyota Mirai. The Korean carmaker was the world’s first to manufacture hydrogen-fuelled cars in series production. Its ix35 FCEV is available in 13 European countries through 30 dealers and is said to offer everyday usability

thanks to its 594 km range and SUV features. Customers have the choice between outright purchase and operating lease.

Last summer, the car sharing service BeeZero, a subsidiary of Linde AG, took delivery of over 50 Hyundai ix35 fuel cell cars. The car sharing concept is run on a zone-based model and available in Munich's city centre in Germany as well as four surrounding neighbourhoods. The cars can be booked online or via a smartphone app.

Contrary to the Hyundai ix35 FCEV, the Toyota Mirai is a separate model built to the purpose, allowing for a clever packaging of components (hydrogen tanks, fuel cell, battery, electric engine). In Europe, the number of available Mirais will be limited to 100 for 2017, most of which go to Germany and the UK. They are only available as part of a 5 year/120,000 km operating lease contract.
New: Mercedes GLC F-Cell and Honda Clarity

This year, Mercedes will be introducing its own interpretation of the fuel cell, packaged in the popular GLC body. It is the first FCEV that features an additional lithium ion battery which can be charged externally. Indeed, the GLC F-Cell combines the advantages of a fuel cell with those of a plug-in electric vehicle, offering a combined range of 500 km. The compact hydrogen propulsion system fits entirely under the bonnet, while the H 2 tanks rest underneath the back seat.

Second newcomer in Europe for 2017 is the Honda Clarity, a large futuristic looking saloon seating five adults. Like in the Mercedes, the drive system is entirely housed in the engine compartment, leaving plenty of room on the inside. Honda promises a realistic range of 598 km. For now, the Clarity will only be used as demonstrator vehicle in London and Copenhagen within the HyFIVE project. When and at what price it will be sold to end customers in Europe is still unknown.

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