

HYDROGEN EUROPE – TECH [Overview]

Hydrogen Safety

Hydrogen safety and public perception

For over 40 years, industry has used hydrogen in vast quantities as an industrial chemical (50 million T/year[1]) and fuel for space exploration. During that time, industry has developed an infrastructure to produce, store, transport and utilize hydrogen safely.

In many cases, hydrogen is safer than the fuel we currently use to power our cars. Carbon-based fuels tend to spread as liquids. When it burns, conventional fuel produces hot ash, creating radiant heat. This isn't the case with hydrogen. In its pure form, hydrogen burns no carbon and produces no hot ash and very little radiant heat.

Hydrogen is being used for a long time already and has been produced, stored and transported all across Europe for decades. Several thousand customer sites are supplied with bottled hydrogen and thousands semi-trailers deliver several 100s million cubic meters a year with an accident rate that is no different from that of any other gas transported. Unfortunately, there are still misperceptions that spring from the absence of knowledge that hydrogen is already on the market and a promising energy carrier that could help decarbonize industry and transport.

Safety of hydrogen vs other fuels

We gathered some information compiled by experts comparing hydrogen to other fuels.

Refueling stations

More than a century of gasoline reliance has bred a natural public familiarity and comfort with this fuel. Yet gasoline is far more flammable and dangerous than hydrogen fuel.

When petrol or diesel fuels leak, these fuels pool close to the ground, increasing ignition likelihood. When ignition does occur, it can result in a dangerous and long-lasting fire. Between 2004 and 2008, 1 in every 13 conventional service stations experienced a fire[2].

In contrast, between 2007 and 2010, the US Department of Energy has only recorded one hydrogen fuelling station incident resulting in an ignition (the Emeryville incident) and no injuries or fatalities have been recorded.

If a leak in a hydrogen tank or fuel cell were to occur, the gas disperses rapidly, rising upwards at a speed of 72 km/hr, minimizing the likelihood for ignition. In the event that hydrogen does ignite, hydrogen flames generate a low radiant heat due to the absence of carbon and the fire will quickly burn out.[3]

Vehicles

Concerning vehicles, for the first time since its creation in 1997, the Euro NCAP independent organism tested a FCEV, using the same crash-tests than for the thermic vehicles. The new Hyundai NEXO got the maximum rating of 5 stars (2018)[4].

Further sources

You can find further information here:

- [The International Association for Hydrogen Safety](#)

- [Hydrogen compared to other fuels](#)
- [Hydrogen vs fossil fuel safety](#)
- [European Hydrogen Safety Panel](#)
- [Just how safe are hydrogen cars?](#)
- [Hydrogen Energy – The firefighters of Manche transported by hydrogen \(in FR\)](#)

Safety standards and what more can be done

Concerning refueling stations, there is a standard widely used at global level ([norm ISO 19880](#)) that recommends the minimum design characteristics for safety and, where appropriate, for performance of public and non-public fuelling stations that dispense gaseous hydrogen to light duty land vehicles (e.g. Fuel Cell Electric Vehicles). Source:

Hydrogen is a hazardous substance. Gasoline, diesel and natural gas, are too. When handled correctly, however, hydrogen is just as safe as the other mentioned fuels, but less toxic, and an indispensable component in achieving our climate goals (storage for renewable electricity and fuel for emission-free long-distance vehicles). Now, the hydrogen sector needs to work even harder on its – already high – safety standards.

Once more details will be available on the cause of the specific incident in Norway, further investigations will be made to improve the safety measures currently applied. Despite the unfortunate incident, this is an opportunity to learn and further improve the safety measures to apply.

Lastly, there is also [HyResponse](#), a project – funded by the Fuel Cells and Joint Undertaking ([FCH JU](#)) – which aims to establish the world's first comprehensive training programme for first responders to facilitate safer deployment of FCH systems and infrastructure. The sector takes this very seriously, so much so, that also in this year's FCH JU Annual Work Plan there is a call for the continuation of such project and funds have been foreseen for further training or responders[5].

[1] https://epub.wupperinst.org/frontdoor/deliver/index/docId/6786/file/6786_Hydrogen_Study.pdf

[2] <http://www.fuelcelltoday.com/analysis/analyst-views/2012/12-07-18-perceptions-of-hydrogen-fuelling-safety>

[3] <https://blog.ballard.com/hydrogen-fuel-safety>

[4] <https://www.euroncap.com/en/results/hyundai/nexo/33731>

[5] https://www.fch.europa.eu/sites/default/files/FCH%20%20JE%20Annual%20Work%20Plan%20and%20Budget%202019_EU%20logo%20%28ID%205196342%29.pdf pg 59