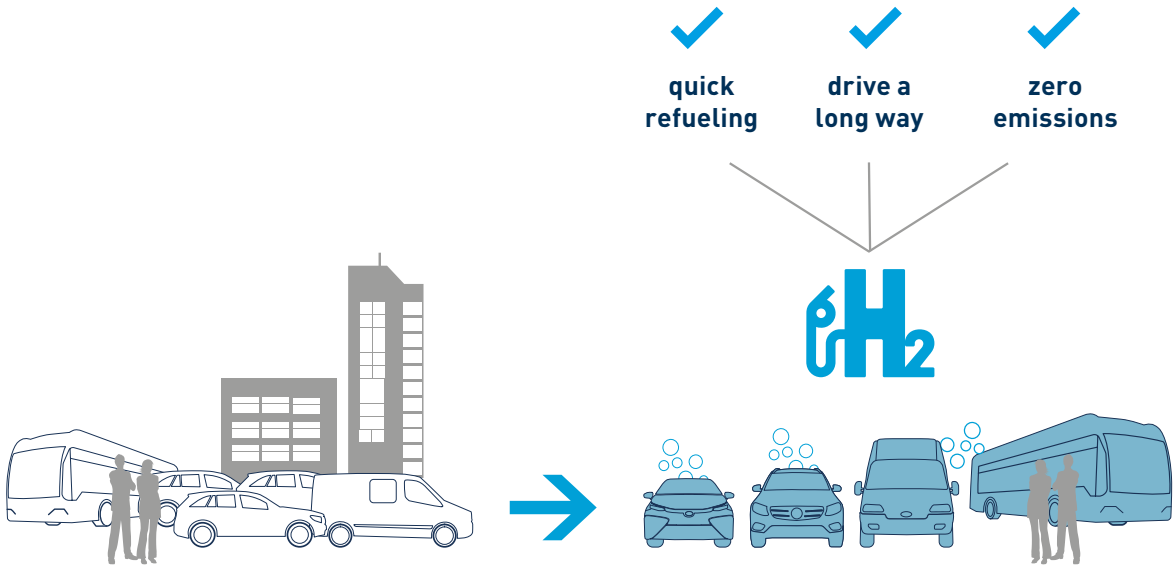
HYDROGEN TAKES US FURTHER

→ CURRENT MODELS

→ HYDROGEN – THE ALL-ROUNDER

→ EXPANSION OF THE INFRASTRUCTURE

FUEL OF THE FUTURE



Modern fleet management: today, climate protection is a necessity and an important image driver. Costs, usage and comfort should remain comparable to the current norm.

Hydrogen cars fit the bill:
refuel in 3 minutes for a range of 500 -750 km, with zero emissions and at comparable costs - hydrogen is electric mobility, unlimited.

CURRENT MODELS

MERCEDES-BENZ
GLC F-CELL

TOYOTA
MIRAI

HYUNDAI
NEXO

HYUNDAI
IX35

HONDA
CLARITY FUEL CELL

RENAULT
KANGOO ZE H_2

MERCEDES-BENZ
GLC F-CELL

Watch the video on www.h2.live

Doubly clean: a unique hybrid combination. The Mercedes-Benz GLC F-CELL is twice as electrifying because it combines fuel-cell and battery technology in a purely electric plug-in hybrid with zero local emissions.

More information about the vehicle, dealers and possible test drives via: kontakt@h2-mobility.de

FROM AUTUMN 2018

MERCEDES-BENZ
GLC F-CELL

The GLC F-CELL is the world's first fuel-cell-powered electric vehicle to use a lithium-ion battery as an additional energy source that can be charged externally, using plug-in technology. Engineers have developed a new, space-saving fuel-cell system that is around 30% more compact than before and can be housed entirely in the engine compartment.

Its long range, short refuelling time, output of 147 kW (200 HP), and latest-generation assistance systems with powertrain-specific features demonstrate that the GLC F-CELL is an electric vehicle suitable for everyday use. Compared to the B-Class F-Cell, which has been in operation since 2010, the entire drive system offers around 40% more power. Two carbon-fibre-encased tanks built into the vehicle floor hold 4.4 kg of hydrogen. Along with the drive motor, a 13.8 kWh lithium-ion battery is housed in the rear. The 7.2 kW on-board chargers allow it to be charged from a standard household power socket, a wall box, or a public charging station.

Fuel cell vehicle with lithium-ion battery
H_2 range in hybrid mode (NEDC)**: 437 km
Battery-powered range in battery mode (NEDC): 49 km
Electric motor: 147 kW (200 HP)
Tank capacity: 4.4 kg
Lithium-ion battery (gross): 13.8 kWh
Fuel consumption (H_2): 0.97 kg/100 km (NEDC)*
CO_2 emissions (combined): 0 g/km
Model: SUV
Available: from autumn 2018 as a full-service rental model
Energy recuperation during deceleration and braking

* The stated consumption and CO_2 emission values were determined according to the prescribed WLTP measuring method and converted into NEDC values.

** Measurement in the presence of the TÜV

TOYOTA
MIRAI

Watch the video on www.h2.live

MIRAI means 'the future'. Fuel-cell technology is Toyota's answer to the long-term demand for alternative drives. With the MIRAI, Toyota is taking the high road to clean and sustainable mobility.

More information about the vehicle, dealers and possible test drives via: kontakt@h2-mobility.de

TOYOTA MIRAI

Toyota has made an extraordinarily clear commitment to hydrogen mobility; back in 2015, it became the first carmaker to launch a large-scale production hydrogen saloon in the German market. Even from a distance, you can tell that this is a special car: the side view is designed to be reminiscent of a drop of water.

At the heart of the Toyota MIRAI is the world's most efficient fuel cell – the result of more than 20 years of research and development. These fuel-cell stacks are the first to use fine-meshed 3D channels that guarantee uniform power generation on the cell surfaces, and thus ensure maximum efficiency and performance at a compact size. The carbon fibre-reinforced plastic tanks store the hydrogen at a pressure of 700 bar.

The MIRAI is powered by a 114 kW/155 HP electric motor. Its high-performance fuel cell is supported with a battery that also stores the braking energy. With a tank capacity of 5 kg, it achieves a range of 500 km. The fuelling process takes about 3 minutes. Fuel consumption is 0.76 kg H_2/100 km with 0 g/km CO_2 emissions.

Fuel-cell vehicle
Range (NEDC): 500 km
Electric motor: 114 kW (155 HP)
Tank capacity: 5 kg
Fuel consumption (H_2) (combined): 0.76 kg/100 km (NEDC)*
CO_2 emissions (combined): 0 g/km
List price: € 78,600
CO_2 emissions (combined): 0 g/km
Model: Saloon
Energy recuperation during deceleration and braking

* The stated consumption and CO_2 emission values were determined according to the prescribed WLTP measuring method and converted into NEDC values.

HYUNDAI
NEXO

Watch the video on www.h2.live

FUV – Future Utility Vehicle. The Hyundai NEXO's highly efficient drive combines CO_2-free hydrogen technology with the robustness and dynamics of an SUV.

More information about the vehicle, dealers and possible test drives via: kontakt@h2-mobility.de

FROM AUGUST 2018

HYUNDAI NEXO

With a range of 756 kilometres, a performance similar to that of conventional combustion engines and zero emissions the NEXO is an SUV with all the usual comfort but without the usual guilty conscience.

The vehicle has a confident appearance: with a continuous LED arc, the cascade grille typical for Hyundai, and retractable door handles. It is powered by a 120 kW (163 hp), 395 Nm torque electric motor. The motor receives its power from the fuel cell, assisted by a small battery. Its maximum speed is 179 km/h.

The three equally sized carbon tanks mounted under the boot floor and the rear seat hold a total of 6.33 kg of hydrogen. This means that the NEXO has the largest tank of all available fuel-cell passenger cars and, thanks to an optimised drive train, the longest range as well: 756 km.

Fuel-cell vehicle
Tank capacity: 6.33 kg
Electric motor: 120 kW (163 HP)
Tank capacity: 6.33 kg
Fuel consumption (H_2) (combined): 0.84 kg/100 km (NEDC)*
CO_2 emissions (combined): 0 g/km
List price: € 69,000
Environmental bonus: € 4,000
Model: SUV
Energy recuperation during deceleration and braking

* The stated consumption and CO_2 emission values were determined according to the prescribed WLTP measuring method and converted into NEDC values.

HYUNDAI
IX35

Watch the video on www.h2.live

The world's first clean SUV. The Hyundai NEXO's predecessor is available solely on the used car market – but at good prices!

More information about the vehicle, dealers and possible test drives via: kontakt@h2-mobility.de

ONLY AVAILABLE USED

HYUNDAI IX35

Hyundai's vision of a safe, efficient future already went into serial production in 2013, with the ix35 Fuel Cell. It earned Hyundai the 'Car of the Future' Award at the 2013 Brussels Motor Show.

The Hyundai ix35 Fuel Cell unites apparent contradictions: the dynamic handling that is typical for SUVs, with ecological sense and sensibility. Like all fuel-cell vehicles, the Hyundai ix35 Fuel Cell produces no local emissions. Its electric motor generates a power output of 100 kW (136 HP).

The hydrogen tanks in the ix35 Fuel Cell hold 5.64 kg. This gives the ix35 Fuel Cell a range of up to 594 km per tank (NEDC).

Fuel-cell vehicle
Range (NEDC): 594 km
Electric motor: 100 kW (136 HP)
Tank capacity: 5,64 kg
Fuel consumption (H_2) (combined): 1.0 kg/100 km (NEDC)*
CO_2 emissions (combined): 0 g/km
List price: € 65,450
Model: SUV
Energy recuperation during deceleration and braking

* The stated consumption and CO_2 emission values were determined according to the prescribed WLTP measuring method and converted into NEDC values.

ONLY AVAILABLE IN JAPAN AND CALIFORNIA

HONDA
CLARITY FUEL CELL

Watch the video on www.h2.live

Mute - thanks to double-glazed windows and various insulations, the interior of the Clarity is particularly quiet.

More information about the vehicle, dealers and possible test drives via: kontakt@h2-mobility.de

HONDA
CLARITY FUEL CELL

Honda did pioneering work in hydrogen technology with the Clarity – and is already producing the second generation of its Clarity Fuel Cell saloon. Its predecessor, the FCX Clarity, made its market debut in 2008; the new Clarity launched in 2016.

All of its drive components fit under the bonnet: the fuel cell, the electric compressor, the electric motor with the reduction gear unit, and the power electronics. The dimensions of the complete drive are comparable to a 3.5-litre V6 petrol engine.

The Honda Clarity's system capacity is 130 kW (176 hp). With its high torque of 300 Nm, it accelerates to 100 km/h in 0 to 9 seconds and has a top speed of 165 km/h.

Two H_2 pressure tanks (700 bar) behind and under the rear seats hold 5.0 kg hydrogen for a range of 589 km.

ONLY AVAILABLE IN JAPAN AND CALIFORNIA

Fuel-cell vehicle

Range (NEDC): 650 km

Electric motor: 130 kW (176 HP)

Tank capacity: 5.0 kg

Fuel consumption (H_2) (combined): 0.7 kg/100 km (NEDC)

CO_2 emissions (combined): 0 g/km

Model: Saloon

Energy recuperation during deceleration and braking

RENAULT
KANGOO ZE H_2

The extended-range electric van. Symbio FCell has been serial-producing the Kangoo ZE H_2, based on the Renault Kangoo Maxi, since 2014.

More information about the vehicle, dealers and possible test drives via: kontakt@h2-mobility.de

RENAULT
KANGOO ZE H_2

100% electric, a range of almost 500 km, always ready to go – that's the Kangoo ZE H_2 Grand Volume with 2 front seats and maximum loading space despite a spacious driver's cabin. The electric van uses a fuel cell as a range extender.

The 4.5 m^3 loading area offers a generous volume for goods and merchandise on the same floorspace as a standard pallet. The 440 kg payload provides sufficient leeway. In addition, various options are available for optimising cargo transport. The van's asymmetrical rear doors and sliding doors on the side can be opened to 180°. This facilitates easy loading and unloading, as does the low loading threshold of just 57 cm.

The Kangoo ZE H_2 is available with different options depending on their availability in a given country, and can be individually adapted on the basis of the Kangoo Maxi ZE panel van.

Fuel cell vehicle with lithium-ion battery
H_2 range in hybrid mode (NEDC): 230 km battery-powered range in battery mode (NEDC): 270 km Total range: 500 km
Electric motor: 44 kW
Lithium-ion battery: 33 kWh
Tank capacity: 1.78/2.09 kg
Fuel consumption (H_2) (combined): 0.87 kg H_2/100 km (NEDC)*
CO_2 emissions (combined): 0 g/km
List price 700 bar: € 58,250
Model: Van
Energy recuperation during deceleration and braking

* The stated consumption and CO_2 emission values were determined according to the prescribed WLTP measuring method and converted into NEDC values.

COMMERCIAL VEHICLES

PUBLIC TRANSPORT BUSES

Fuel-cell buses have ranges of 300 - 450 km and offer similar flexibility in daily operation as diesel buses. Newer fuel-cell buses consume only 8 to 9 kg per 100 km, resulting in an energy efficiency advantage of around 40% compared to diesel buses. [8]

→ In operation in Cologne, Hamburg, Stuttgart, Karlsruhe and Düsseldorf

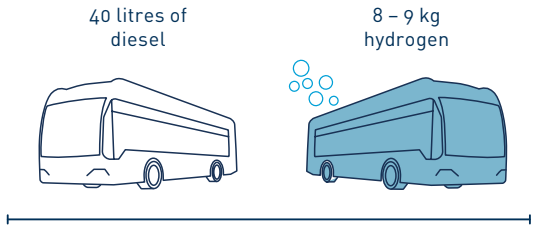
→ Manufacturers: Van Hool, Solaris Urbino electric, Evobus/Mercedes Benz Citaro FuelCELL-Hybrid

INDUSTRIAL VEHICLES /FORKLIFT TRUCKS

Fuel-cell-powered industrial vehicles are particularly suitable for indoor operation because they emit no local pollutants and are very quiet. Maintenance and repair costs are lower than for conventional vehicles. They permit largely uninterrupted operation and are therefore suitable for multi-shift fleet operation in materials handling. [9]

COMMERCIAL VEHICLES

The body manufacturer FAUN has developed a fuel-cell drive for the loading system of refuse collection vehicles in cooperation with the city cleaning of Berlin. The result: less noise and up to 30% lower diesel consumption. [10]



Hydrogen buses consume 8 to 9 kg H_2 per 100 km - this results in an energy saving efficiency advantage of 40% over diesel buses.[11]

8. Shell Hydrogen Study, p. 43 (→ PDF)
9. Shell Hydrogen Study, p. 42 (→ PDF)
10. Rotopress refuse vehicle project NOW (→ WEB)
11. Shell Hydrogen Study, p. 43 (→ PDF)

DRIVE, REFUEL, KEEP DRIVING
AS EASY AS ALWAYS

HYDROGEN IS LIKE PETROL, ONLY GREENER

Mobility makes our world go round. And our businesses. But ambitious CO_2 fleet targets, climate protection targets or entry restrictions are changing the framework conditions and thus the requirements. Those who want comparable costs and high utility with the usual convenience are banking on hydrogen.

Hydrogen cars deliver the goods: they are powered by a quiet, powerful electric motor and produce no climate-damaging or toxic emissions. If the hydrogen was produced from renewable energies, it is a truly zero-emissions vehicle. Drivers enjoy the same level of comfort as convenience: refuelling takes no longer than with conventional vehicles, the range of the vehicles is similarly large, and overall costs are also comparable. **In a nutshell: hydrogen e-mobility without constraints.**

HYDROGEN TAKES US FURTHER

IT'S ALL GOOD...

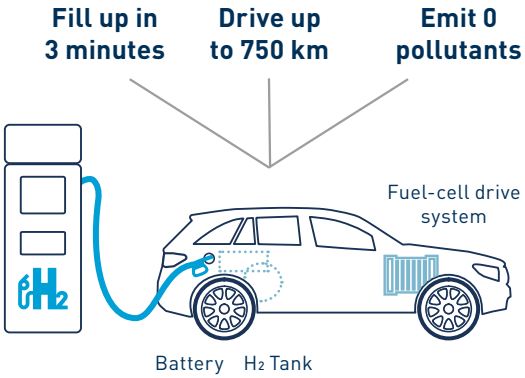
A fuel-cell car has all the advantages of an electric vehicle – it is quiet and emission-free – while also offering the advantages of conventional passenger cars: short refuelling times and a long range.

FILL UP AS USUAL

Hydrogen is refuelled like petrol. Open the fuel filler flap, attach the nozzle, and you're done. The only appreciable difference is its physical state. Hydrogen is not liquid, but gaseous. Due to the high level of compression, an average refuelling only takes 3 minutes.

SAFE

Hydrogen-powered vehicles are as safe as conventional means of transport. This has been demonstrated in various crash tests and test series run by independent testing services such as TÜV, and more than 100,000 refuelling operations. The fuel level, pressure and temperature are automatically communicated and managed via an intelligent infrared interface.



A hydrogen/fuel-cell vehicle (Fuel Cell Electrical Vehicle - FCEV) is an electric car

NO MATTER
WHERE TO,
NO MATTER
HOW FAR

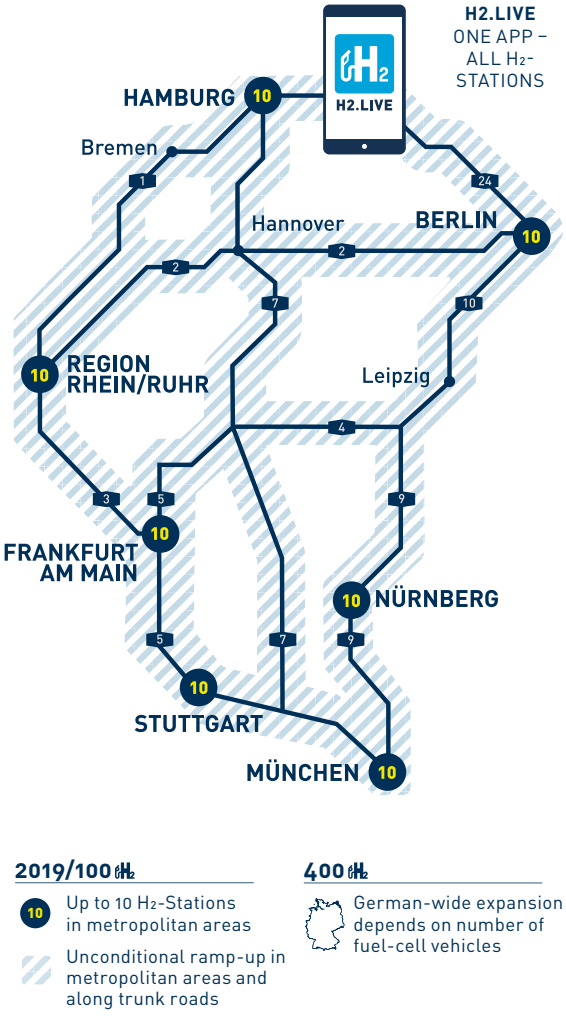
EXPANSION OF THE INFRASTRUCTURE

H_2 MOBILITY Deutschland GmbH & Co. KG, with its shareholders Air Liquide, Daimler, Linde, OMV, Shell and TOTAL, will build and operate 100 hydrogen stations in seven German metropolitan areas (Hamburg, Berlin, Rhine-Ruhr, Frankfurt, Nuremberg, Stuttgart and Munich) and along the connecting arterial roads and motorways as a basic supply network by 2019.

If the introduction of hydrogen as a fuel is successful and the number of fuel-cell cars increases, the consortium will expand the network to 400 hydrogen stations.

UPDATES

Watch how the hydrogen filling station network is growing live with the H2.LIVE app or online www.h2.live.



HYDROGEN – THE ALL-ROUNDER

CONCENTRATED ENERGY

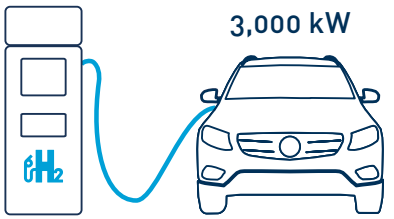
Hydrogen is a true 'power pack'. 1 kg of hydrogen contains about three times the energy in 1 kg of petroleum.

Vehicles usually carry 5 kg of hydrogen which is stored in pressurised tanks at 700 bar.

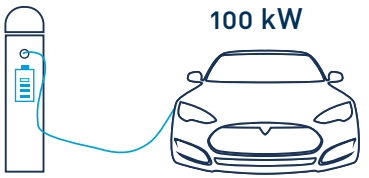
The fuel cell is efficient at around 60% (by comparison, the efficiency of internal combustion engines is between 20% and 40%).

Due to the high energy density and compression, fuel-cell vehicles achieve ranges of up to 750 km, depending on driving style.

When refuelling with hydrogen, the energy flows 30 times faster than with a quick-charge station.



Mercedes GLC F-Cell

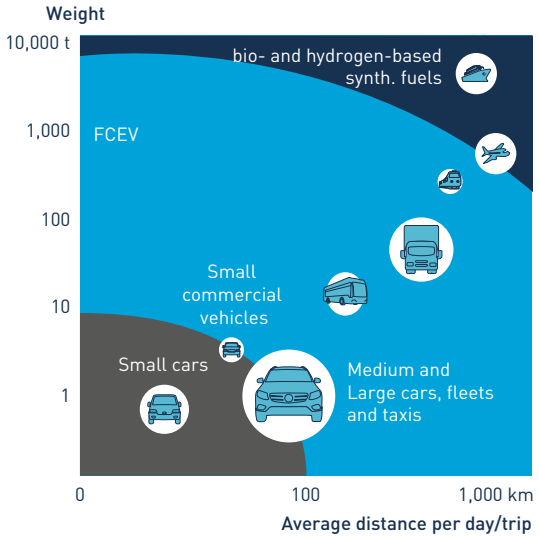


Tesla Model S

HEAVY DUTY

Hydrogen can be used to power not only cars, but also heavy means of transport with long ranges, such as buses and trucks… even trains and aircraft.

In short: as demands on payload, range and time increase, the use of hydrogen as a zero-emissions solution is making more and more sense.



Hydrogen Council, p. 8 (→ PDF)

TAKE A DEEP BREATH...

THE FUTURE UP AHEAD, WATER VAPOUR OUT THE BACK

CLIMATE NEUTRAL

How is hydrogen produced? Modern electrolysers use electricity from renewable sources to climate-neutrally split water into its chemical components of hydrogen (H_2) and oxygen (O_2). This makes green electricity storable and able to be used as a fuel in vehicles. The greenhouse gas balance of hydrogen as a by-product of the chemical industry (from natural gas) is also lower than that of Euro 95 fuels.

SUSTAINABLE

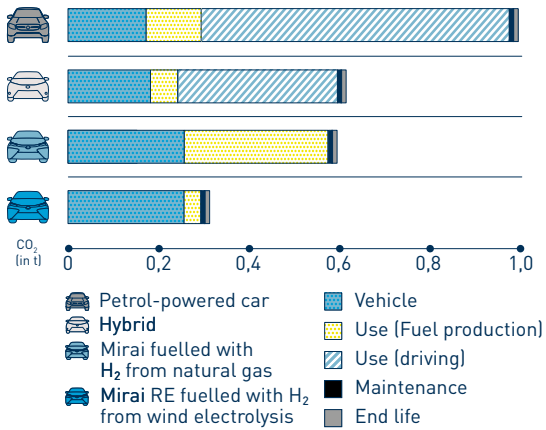
Hydrogen is recognised by the EU as an alternative fuel - sustainable, clean and climate-friendly. [2]

ENVIRONMENTAL FOOTPRINT

From a lifecycle perspective, after driving just 15,000 kilometres, a hydrogen car is already eco-friendlier than any conventional vehicle. [3]

After 60,000 kilometres, hydrogen also beats the battery in Germany's current electricity mix. [4]

CARBON FOOTPRINT



Hydrogen helps to reduce CO_2 emissions. If it is obtained from excess wind power, emissions over the entire lifecycle are reduced to a quarter of those of a petrol engine.

Life Cycle Assessment Report Toyota 2015, p.11 (→ PDF)

2. EU Directive 2014/94/EU (→ WEB)
3. Life Cycle Assessment Report Toyota 2015, p.11 (→ PDF)
4. Final report on the practical suitability of electric vehicles NOW, p. 37 (→ PDF)

CLEAN PAYS OFF

SUBSIDIES (May 2018)

Buying hydrogen cars offers several advantages: for individual electric vehicles (BEV and FCEV) of up to €60,000, a purchase bonus of €4,000 applies. The Federal Ministry of Transport and Digital Infrastructure (BMVI) also subsidises hydrogen cars with up to 40% of the additional purchase costs compared to a comparable conventional model. [5]

Hydrogen cars are exempt from motor vehicle tax for 10 years. [6]

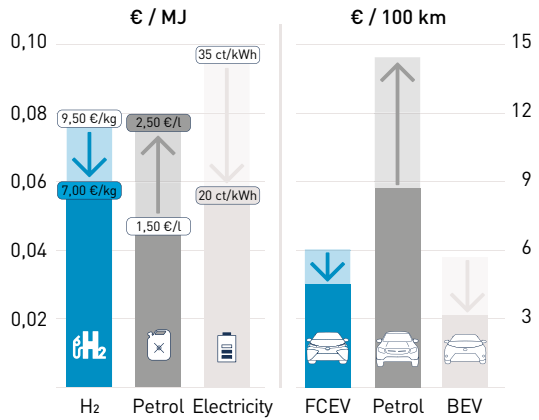
OPERATING COSTS

There also cost advantages when it comes to operating costs over the service life: low maintenance, no moving parts, and no more oil changes.

OUTLOOK

Thanks to subsidies and low running costs, hydrogen cars do not currently cost much more than conventional cars. Forecasts show that from 2020, the costs of hydrogen, battery, and conventional cars will approach the same level even without subsidies.

A vehicle's running costs depend not only on fuel prices (in euros per litre, kilogramme, kilowatt hour – or, as a common denominator, in megajoules) (Fig. left column), but also to a large extent on efficiency. Both fuel cell electric vehicles (FCEV) and battery electric vehicles (BEV) are more efficient than petrol-powered cars and therefore consume less fuel for the same distance (right-hand column in the diagram). Given European fuel and energy prices, the energy costs per 100 km are correspondingly lower. The arrows show the expected price development to 2020+.



Shell Hydrogen Study, p. 49 (→ PDF)

5. Current information on the Funding Guideline (→ WEB)
6. Tax incentives for all-electric vehicles (→ WEB)
7. Shell Hydrogen Study, p. 51 (→ PDF)

H2.LIVE

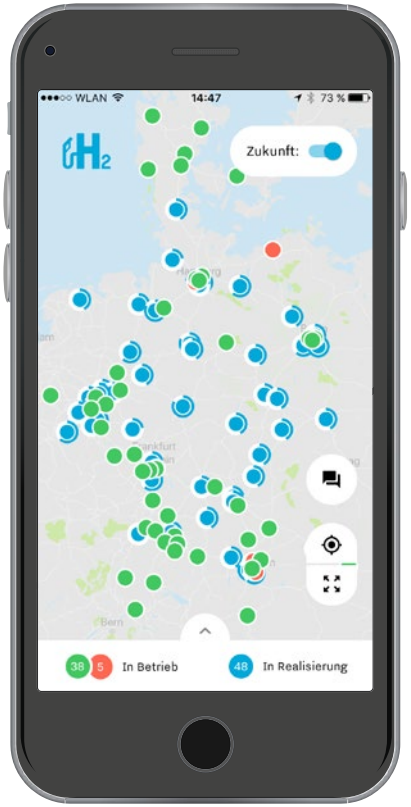
H2.LIVE
Takes me further

Download on the App Store

GET IT ON Google Play

The app provides real-time status reports on all public hydrogen refuelling stations in Germany. Live. Reliable. And always up to date. Find out where the next station is located and their opening times. Use the app to guide you there. Be one of the first to find out where new stations are planned and when they will be opening. More information is also available online at **www.h2.live**

If you have any questions about the hydrogen infrastructure,
feel free to contact us!



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www.h2.live

The companies behind H2 MOBILITY are Air Liquide, Daimler, Linde, OMV, Shell und TOTAL. They are pooling their expertise to drive forward the development of the hydrogen infrastructure – 100 stations are to be established by 2019. H2 MOBILITY is a member of the Clean Energy Partnership (CEP) with the aim of supporting research and development of the hydrogen industry.

www.h2.live