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European Hydrogen Road Tour 2012

Hydrogen – Here Today, Everywhere Tomorrow



European Hydrogen Road Tour 2012

Major car manufacturers have devoted a significant amount of resources towards developing hydrogen powered Fuel Cell Electric Vehicles (FCEVs) that will be mass produced from 2015. That is why we take cars from four companies – Daimler, Honda, Hyundai and Toyota – along the European Hydrogen Road Tour 2012.

In many of the cities we visit it is the first time the general public has an opportunity to test drive these cars with only water coming out of the exhaust.

A fuel cell is a device which can be used to efficiently transform the hydrogen's chemical energy into electricity and heat. Even better, the only emission is pure water. The efficiency of a fuel cell car is double as high as the one of a conventional gasoline vehicle, which compensates for loss of energy when producing hydrogen.

FCEVs are on a par with today's cars but with much less noise and emissions. Provided the energy in the hydrogen production is renewable, the environmental impact is low.

Our ambition is to accelerate the growth of hydrogen infrastructure so the FCEVs you can see here today, will be seen everywhere tomorrow.

We are part of a bigger picture

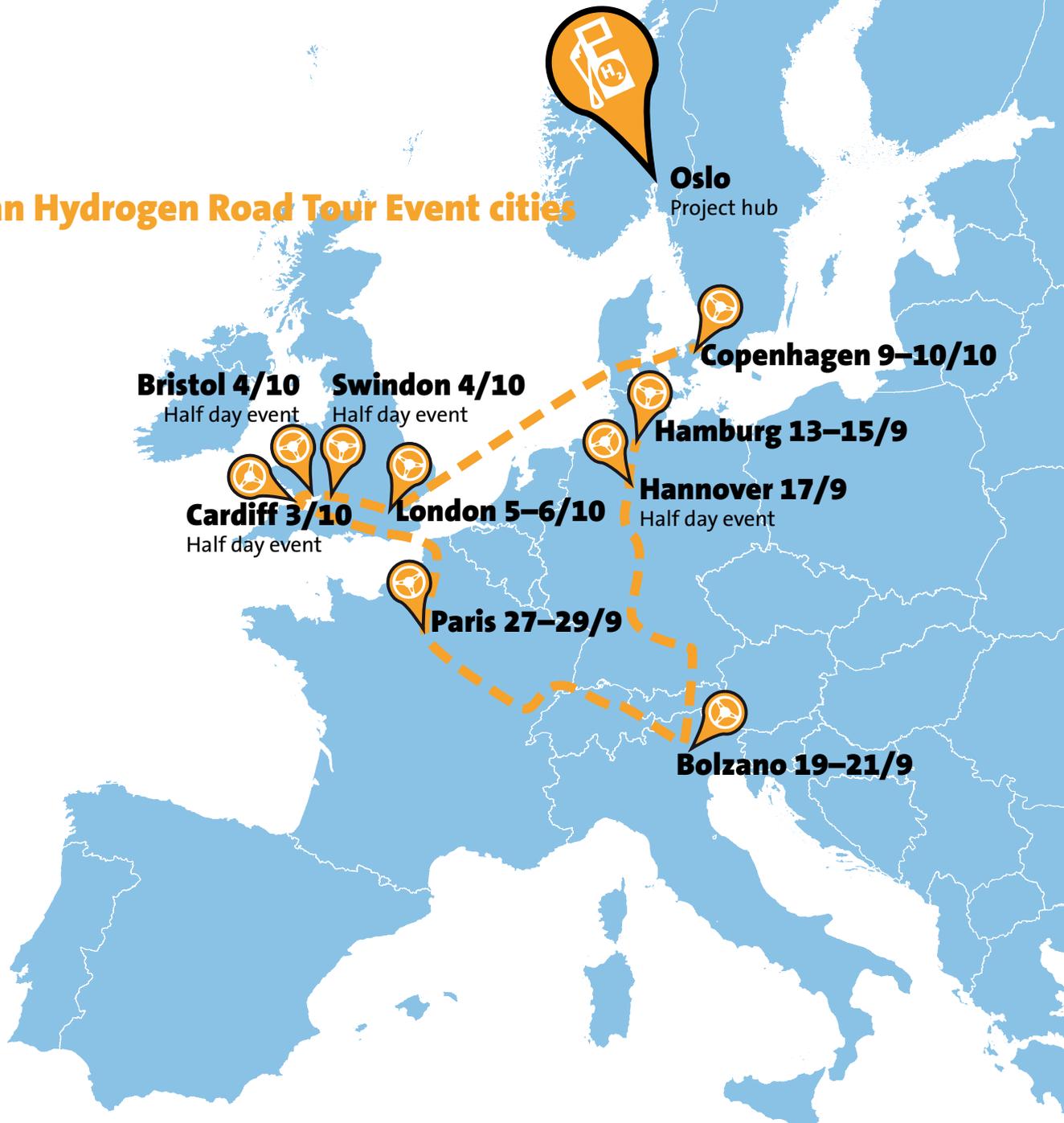
The European Hydrogen Road Tour 2012 is part of a project called H2moves Scandinavia. The project is the first European Lighthouse Project for hydrogen, funded by the European Fuel Cells and Hydrogen Joint Undertaking programme, launched by the European Commission and European industry. Main focus of the joint undertaking is to increase the impact of industrial level activities in Europe in this field and to address three major European policy targets:

- Energy diversity
- Mitigation of greenhouse gases
- Increase the share of renewable energies

In a nutshell

- Events in nine cities.
- High availability of the cars to the general public, politicians and media.
- Cars from Daimler, Honda, Hyundai and Toyota.
- Refuelling at a movable station and existing stations along the route.

European Hydrogen Road Tour Event cities





D 820

H₂

Hydrogen

Hydrogen is the lightest and most abundant chemical element. It is also an energy carrier like electricity. This means that hydrogen is not a primary energy source in itself but can be used to store, transport or supply energy. Hydrogen has astonishing flexibility and it can be produced out of any form of energy source.

Today, the primary source of hydrogen production is from natural gas, but in the future production from renewable energy sources; solar, wind, biogas and biomass will be much more common. The choice of energy source depends on the circumstances of each case, like environmental concerns and the availability of local resources.

Hydrogen is often generated as a by-product within the chemical industry. This could function as a source of hydrogen, before large-scale production from renewable sources can be achieved.

Car fuel from water, is it possible?

A major pathway to produce hydrogen in the future is electrolysis, which is achieved by decomposing water into hydrogen and oxygen. This is done with the help of renewable electricity. At the moment this is a relatively expensive method to produce hydrogen, and approximately 30–40 percent of the energy is lost through the electrolytic process. However, the efficiency is expected to improve and in the long run electrolysis is considered to be the most sustainable method for producing hydrogen from renewable resources.

Hydrogen's energy density per unit mass is high, but low per unit volume. Under standard temperature and pressure hydrogen is a gas. This means that hydrogen can be difficult to store and transport efficiently. The most common methods of storing hydrogen are either to compress it and store under pressure, or alternatively to store it in a liquid state, which it reaches at -253°C .

Benefits with hydrogen powered Fuel Cell Electric Vehicles

- Low noise
- No local emissions
- Range up to 650 km
- Great acceleration
- Great comfort
- Fun to drive
- Fast refuelling (3–4 minutes)
- Hydrogen is as safe as other fuels



A dark red Honda FCX Clarity is shown from a side-rear perspective, driving on a paved road that curves to the right. The background features a landscape with green hills, several large trees, and a wind turbine on the left side under a cloudy sky.

Honda FCX Clarity

Honda believes that fuel cell electric vehicles are the ultimate environmental mobility solution. Honda became the world's first carmaker to put a fuel cell car on the road with regular customers, delivering the Honda FCX to fleet users in the United States and Japan in 2002. In 2007 Honda announced its all-new fuel cell vehicle, the FCX Clarity, and lease sales started in 2008 in the USA and in Japan. Honda is continuing the technological advancement of the FCX Clarity as well as our hydrogen re-fuelling systems.

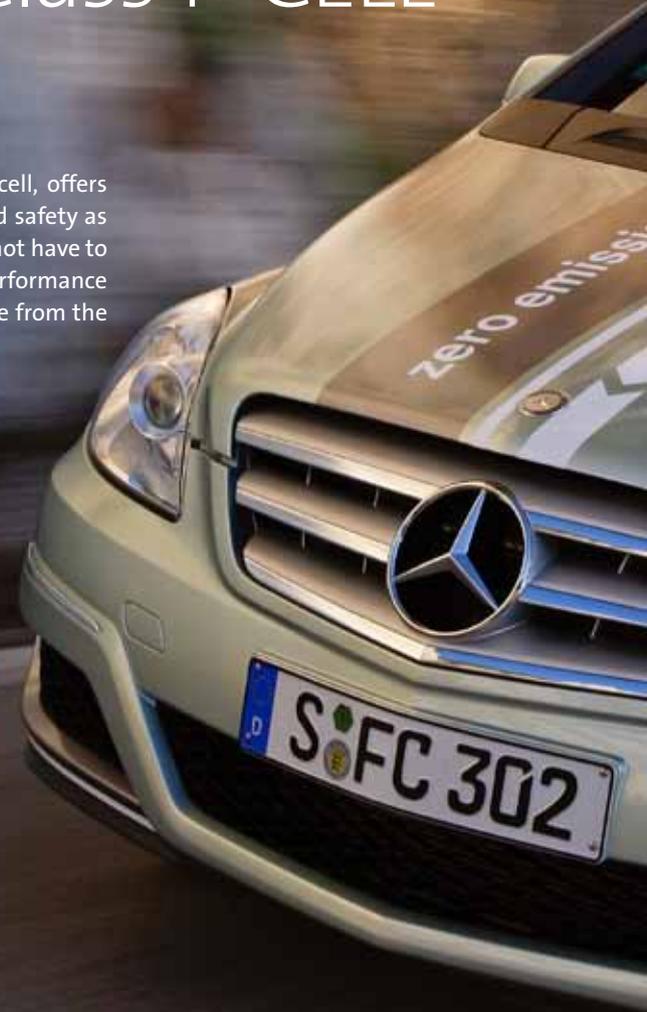
A perfect demonstration of Honda's commitment to developing zero-emissions vehicles, the FCX Clarity produces electricity onboard by combining hydrogen with oxygen in Honda's innovative V Flow fuel cell stack with water as its only emission. The V Flow fuel cell platform in the FCX Clarity consists of a compact, high-efficiency fuel cell stack arranged in an innovative centre-tunnel layout.

- Range: 460 km (NEDC)
- H₂ capacity: 4.1 kg
- Tank pressure: 35 MPa

Mercedes-Benz B-Class F-CELL

The Mercedes-Benz B-Class F-CELL, an electric drive vehicle with fuel cell, offers everything that people expect from a Mercedes-Benz: High comfort and safety as well as no reduction in interior space and boot capacity. Customers will not have to sacrifice any driving pleasure either – the electric motor has a peak performance of 100 kW/136 hp and a maximum torque of 290 Nm, which is available from the first rotation.

- Range: 380 km (NEDC)
- H2 capacity: 3.7 kg
- Tank pressure: 70 MPa





on

290km

100kW/134PS

F-CELL

BlueEFFICIENCY

Toyota FCHV-adv

Revealed in 2008, the Toyota FCHV-adv is the latest evolution of Toyota Fuel Cell Hybrid Vehicle. It is equipped with a 90-kilowatt fuel cell system coupled with a Nickel-metal hydride. It can start and operate in cold regions at temperatures as low as -30°C . Furthermore, equipping the vehicle with Toyota-developed 70 Mpa high-pressure hydrogen tanks makes it possible to travel approximately 650 km on a single fuelling — a driving range equivalent to any conventional engined vehicle.

- Range: 650 km (NEDC)
- Fuel capacity : 6 kg
- Tank pressure: 70 MPa





TOYOTA
FCHV-adv

700km

Pen
800 & 80

Hyundai ix35 FCEV

Hyundai's third-generation FCEV is equipped with a 100-kilowatt fuel cell system and two hydrogen storage tanks (70 Mpa). The SUV can travel 525 kilometres on a single charge. The range is equal to gasoline powered cars. It can start in temperatures as low as -25°C .

- Range: 525 km (NEDC)
- H₂ capacity: 5.6 kg
- Tank pressure: 70 MPa





blue drive

FCEV

Fuel Cell Electric Vehicle



Hydrogen



H2 Logic movable hydrogen refuelling station at the Arctic Driving Centre in Finland, 150 meters north of the polar circle.





Fabian Stang, Lord Mayor of Oslo, Unni Steinsmo, CEO SINTEF, and Jacob Krogsgaard, Director H2 Logic, at the inauguration of the Gaustad station.

H2 Logic Hydrogen stations

Within the H2moves Scandinavia project, H2 Logic built a “state-of-the-art” hydrogen refuelling station in Gaustad, Oslo.

The station which opened in November 2011 complies with the latest international hydrogen refuelling standards. It enables fast refuelling in about three minutes. The standard SAE J2601 ensures the safety.

It only took H2 Logic 11 days to get the station operational after shipping it from Denmark.

H2 Logic provides the project with a movable hydrogen refuelling station for the European

Hydrogen Road Tour 2012. It has been designed as a relocatable container module that will allow easy and flexible transportability.

The certified green hydrogen will be delivered by a European gas supplier.

Facts about the movable Hydrogen Refuelling Station

- Trucked-in hydrogen supply
- Hydrogen from renewable energy
- Refuelling pressure: 70 MPa
- Refuelling according to SAE J2601 (A-level)
- H2 Logic designs and installs the station

H2moves Scandinavia

Budget: circa 20 mio. Euro • Funding circa 8 mio. Euro (EC), circa 2 mio. Euro (DK, NO) Public private partnership.
FCH JU • Contract n° FCH-JU-2008-245101 Lighthouse project.

Duration: 36+ months • Start January 2010.

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Main Partners: Daimler AG, H2 Logic A/S, Hyundai Motor Europe GmbH, Ludwig-Bölkow-Systemtechnik GmbH (LBST), Hydrogen Sweden, Hydrogen Link Denmark Association, TÜV-SÜD Industry Services GmbH, SP Technical Research Institute of Sweden.

Web: www.scandinavianhydrogen.org/H2moves
www.flickr.com/H2moves_scandinavia
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H2moves Scandinavia

partners

Coordinator



Vehicles and infrastructure



HYUNDAI



Mercedes-Benz



Safety



Funded by



Communication

Hydrogen Sweden



In cooperation with

HONDA
The Power of Dreams

TOYOTA



Renewable electricity



Hydrogen production



Hydrogen station



Emission free driving

Scandinavian Hydrogen
Highway Partnership

H2moves.eu

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