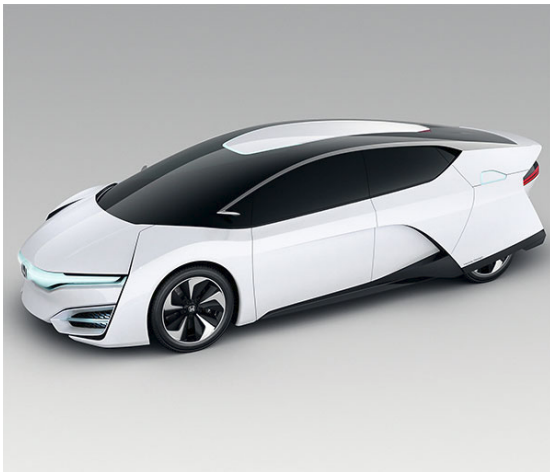


# Study questions environmental impact of fuel-cell vehicles



**Clean power?** A study claims that hydrogen fuel cell cars can be less environmentally friendly than their gasoline counterparts. (*Honda*)

Fuel-cell electric vehicles are seen by many as an environmentally friendly technology that can reduce greenhouse-gas emissions by producing no harmful emissions. But a new study has found that overall a fuel cell electric vehicle has about the same negative environmental impact as a

luxury sports car ([Energy & Environmental Science 10.1039/C5EE01082A](https://doi.org/10.1039/C5EE01082A)).

Fuel cells convert the chemical energy of hydrogen directly into electricity, producing only water as a by-product. The study, led by Dominic Notter of the Swiss Federal Laboratories for Materials Science and Technology and colleagues, assessed the environmental impact for a full life cycle of three types of vehicle: a compact gasoline-powered car; a battery electric vehicle; and a polymer electrolyte membrane fuel cell electric vehicle, or FCEV. In the study the FCEV was powered by a fuel cell that used electricity from the

European grid to produce the hydrogen via electrolysis. In the model about half of the European electricity grid came from power stations using combustible fuels such as natural gas, coal and oil that all emit carbon dioxide into the atmosphere

After 150,000 km of use for each vehicle, the gasoline car consumed an average of 6.1 litres per 100 km, while the battery-driven one consumed the equivalent of 6.4 litres per 100 km. The FCEV, however, guzzled the equivalent of 12.1 litres of gasoline per 100 km. “The FCEV powered with a European electricity mix is definitely a clear no-go strategy,” says Notter. “Transport with electric vehicles makes sense only if the vehicles are powered with electricity generated by renewable resources, such as solar, wind or water.” He adds, however, that when plenty of renewable electricity is available, FCEVs can play an important role in environmentally friendly transportation, along with battery and potentially also biogas-powered vehicles.

Notter says that FCEV technology has improved substantially in recent years, noting that the “hydrogen to power” efficiency of such vehicles has reached about 60%, which compares to the thermodynamic theoretical maximum of 83%. The two main factors limiting widespread introduction of FCEVs, he says, are the lack of hydrogen refuelling stations and the technology cost.

**Ned Stafford**