

Fuel Cell Commercialisation Drivers

Industry Drivers

A new product comes to market through a combination of technology push and demand pull. For fuel cells there are four main commercial drivers, all of which fall under demand pull. This highlights the fact that fuel cells, or to be exact, the attributes that they possess, are meeting a market need. The main drivers are:

- Climate change
- Urban pollution
- Energy security
- Limitations of existing technology

The first three are socio-economic drivers influenced by government legislation and policy whilst the fourth is consumer-led.

Government-Led Drivers

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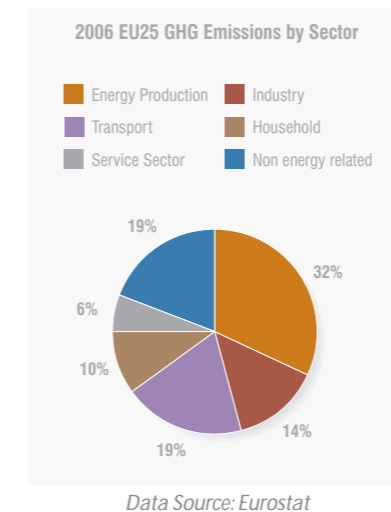
Whilst the debate on climate change has in the main moved on from whether or not it is a real phenomenon, the argument still rages on the scale of its impact, both in environmental and economic terms. The last two years have seen the release of two highly influential reports: the Stern Report, and the latest Intergovernmental Panel on Climate Change (IPCC) evaluation document. These are being used by policy makers to aid work on what can be done in the short, medium and long term. Complementary to this debate has been the discussion, and increased awareness, of energy security, the real potential for diversification of energy supplies and the need to tackle urban air pollution.

These policy techniques are aimed at encouraging into the market place a basket of new technologies such as fuel cells which have the benefit of:

- Being inherently more efficient than technologies such as the internal combustion engine;
- Allowing the development of a distributed generation network;
- Being zero, or close to zero, generators of GHGs and other air pollutants;
- Being powered by domestically produced hydrogen which can be made from a range of sources.

Climate Change

GHG emissions come from a range of sectors with current data from the European Union (EU25) showing nearly one third from the production of energy and a fifth from transport. Due to their efficiency gains and use of less carbon intensive fuel, the commercialisation of fuel cells could provide



significant cuts in GHGs emitted from energy production, buildings and transport, making them a key target for government support.

An example of this comes from Tokyo Gas, one of the companies taking part in the Japanese government's Large Scale Field Test of Residential Fuel Cells project. Early results from its LiFuel 1kW PEM fuel cell are showing a per home reduction in Carbon Dioxide (CO₂) of 37%. These units are fuelled by natural gas and are pre-commercial so we can expect further efficiency gains by the time of full commercialisation.



Poor visibility in Tiananmen Square, Beijing, July 2007
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In the transport sector, the recently updated Concawe⁽¹⁾ Well-to-Wheels study shows a potential CO₂ equivalent reduction of between 40% and 95% per light duty vehicle using hydrogen from Natural Gas (EU Mix) through central reforming or off-shore wind and electrolysis respectively.

Energy Security

The geopolitics of oil has come under intense scrutiny over the last decade. With oil prices reaching \$100 a barrel (NYMEX, 02/01/2008), an unthinkable level even three years ago, and with the costs of exploration and extraction rising, diversification of energy supplies is high on the agenda. The goal of using less oil-based fuel through greater efficiency and different energy sources is likely to drive the adoption of fuel cell technology. Whilst hydrogen, the fuel for fuel cells, does not itself exist in any natural form on Earth, it can be made from a very wide range of sources. These include wind and solar energy through the electrolysis of water, steam reforming of natural gas and the gasification of coal or biomass.

Urban Pollution

Transport is one of the most important sources of anthropogenic precursors of atmospheric urban pollution. Although some cities are tackling this issue with policies such as low emission zones, or even banning the use of the internal combustion engine in certain applications (see our special feature on China), increasing legislation is driving the development of clean vehicle technologies including battery hybrids and, in the longer term, fuel cell vehicles.

Due to their efficiency gains and use of less carbon intensive fuel, commercialisation of fuel cells could provide significant cuts in GHG emission from energy production, buildings and transport, making them a key candidate for government support

⁽¹⁾ Concawe, EUCAR and European Commission, Joint Research Centre, (2007) "Well-to-Wheels Analysis of Future Automotive Fuels and Powertrains in the European Context", available to download from <http://ies.jrc.ec.eu.int/wtw.html>