

ALTERNATIVE VEHICLE FUELS
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The British, like many other Europeans, are becoming more and more worried about their environment. Here are some of the environmental problems that they face.

As the population of large cities like London, Birmingham and Manchester continues to grow, pollution problems become worse.

The air in many towns and cities is being polluted by traffic and Industry. The number of cars and lorries is growing all the time. On the one hand, they bring mobility to millions of people, but on the other hand, they need bigger, better and more expensive roads, which often ruin the countryside. Traffic in cities is getting worse and worse. Water pollution has become a serious problem in many British rivers. People living near airports suffer from the noise of increasingly larger and more powerful jet airliners taking off and landing.

This paper reviews the environmental and market drivers and government incentives that may influence take-up of the main alternatives to conventional vehicle fuels: petrol and diesel. These are road gas fuels LPG (Liquefied petroleum gas) and CNG (Compressed Natural Gas), bio-fuels, hydrogen fuels, including methanol and fuel cells.

Transport emissions are the fastest rising cause of greenhouse gases and account for around 25% of all UK carbon dioxide emissions. Finding an alternative to conventional fuels would help the UK meet its Kyoto targets.

Country	Target emissions as percentage of 1990 emissions	Country	Target emissions as percentage of 1990 emissions
Australia	108	Liech-	92
Austria	92	Lithu-	92
Belgium	92	Lux-	92
Bulgaria	92	Mo-	92
Canada	94	Nether-	92
Croatia	95	New	100
Czech Re-	92	Nor-	101
Denmark	92	Pol-	94
Estonia	92	Por-	92
European	92	Ro-	92
Finland	92	Russian	100
France	92	Slo-	92
Germany	92	Slo-	92
Greece	92	Spai	92
Hungary	94	Swe-	92
Iceland	110	Swit-	92
Ireland	92	Ukrai	100
Italy	92	United King-	100
Japan	94	Britain and	92
Latvia	92	United States	93

Vehicles running on cleaner fuels produce fewer harmful emissions, and can offer some savings on fuel costs, compared with petrol or diesel.

In addition to cleaner, low sulphur versions of the conventional vehicle fuels petrol and diesel, the main alternatives are currently road fuel gases LPG (liquefied petroleum gas) and CNG (compressed natural gas), bio-fuels and, more distantly, hydrogen fuels, including methanol; fuel cells, and electric vehicles.

As well as EU action, the UK government has introduced a range of fiscal incentives and initiatives to encourage the reduction of harmful emissions and a wider use of alternative, cleaner fuels, as the market and technologies develop.

The competitiveness of Natural Gas Vehicles (NGVs) compared with conventional vehicles will depend on a range of factors including ease of refuelling, comparative fuel costs and duty, engine lifetimes, performance and manufacturing costs. Grants of up to 75% are available from the Energy Saving Trust, through the PowerShift programme, towards of the cost of the conversion and purchase of gas and electric vehicles.

Vehicles could use hydrogen in a variety of ways; with minor alterations all conventional internal combustion engines (ICEs) powered by petrol can be made to burn hydrogen directly. The major stumbling block is the lack of infrastructure for the storage and distribution of hydrogen. Pure methanol can potentially offer reductions in emissions of major air pollutants compared with existing diesel fuels, but it is poisonous, and in the longer term, the main benefit is likely to be as an input fuel for fuel cells.

Fuel cells convert the energy stored in a fuel (for example hydrogen) into electrical energy by a simple electrochemical reaction in which oxygen and hydrogen combine to form water. Each fuel cell type, classified according to the nature of the electrolyte, requires particular materials and fuels and is suitable for different applications. If hydrogen is derived from non-fossil sources, such as renewables, or if waste CO₂ from fossil fuel hydrogen production is sequestered, then fuel cells offer the prospect of 'zero emission' power for transport and stationary applications.

Bio-fuels (bio-ethanol, bio-diesel and bio-gas) could play a major part in achieving the UK's renewable energy targets for heat and power, with a more limited role in producing alternative vehicle fuels. An EC Action Plan, and two draft Directives published at the same time, place an obligation on Member States to comply with the introduction of bio-ethanol and bio-diesel, and allow for differentiated tax rates to operate in favour of these fuels.

Transport emissions are the third largest and fastest rising source of greenhouse gases and account for around 25% of all UK CO₂ emissions. Since 1970, total UK CO₂ emissions have fallen by 22%, with significant falls in emissions from power stations and industry, but those from road transport increased by 92%.⁴ Finding a cleaner alternative to conventional fuels would help the UK contribute to the achievement of its Kyoto targets.

Modern society is driven by its dependence on oil to fuel its transport needs. Ninety three per cent of all journeys in the UK are made by road vehicle, the overwhelming majority by car. New UK car sales have increased over the last twenty years, with over 2.2 million sales in 2001. Seventy per cent of households in the UK have regular use of a car, and there are an estimated 26.8 million regular drivers in the UK.

Despite fuel price protests, the risks to health, road congestion, and road accidents and deaths, few people will sacrifice the convenience and mobility that personal transport affords, in favour of less driving or resorting to public transport. According to the Retail Motor Industry Federation (RMIF), 75 % of motorists would not use public transport to get to work, even if travel-to-work costs were halved. More and more freight is moved by road, adding to emission problems, noise nuisance and road congestion.