

Hydrogen: The potential for a low carbon future

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Hydrogen is a long-established product in the chemical and refining industries and has the potential to play a much wider role in the global transition to a low-carbon energy system. Hydrogen has many applications, practically anything that uses energy can be powered by it. However, its usefulness is most clear-cut in the transport sector.

Because hydrogen fuel-cell electric vehicles emit only water from their tailpipes, they can keep people and goods moving while reducing carbon emissions and pollution. They are also able to cover long distances between fuel stops and refuel as quickly as petrol cars.

Hydrogen is also an option for meeting transport needs when other low-carbon alternatives are of limited use. For example, while it is inefficient for battery-powered trucks to carry goods over long distances, because of the size of the batteries required, hydrogen's high energy density is well-suited to freight transport.

However, despite hydrogen's potential for lowering emissions, its role in the global economy is unlikely to grow significantly without strong government support. Close collaboration between governments, vehicle manufacturers and energy companies is essential to develop the necessary infrastructure to make any emerging energy source a practical alternative. Hydrogen is no exception. To reach its full potential, both the new vehicles and refuelling points need to be made available at the same time.

That's why we are working as part of the H2 Mobility joint venture to develop a network of 400 hydrogen fuelling stations across Germany by 2023. This joint venture was formed to help drive hydrogen transport forward by increasing the number of fuel-cell cars available, while also providing more refuelling stations. Shell already has 11 hydrogen filling stations at its retail sites in Germany and aims to have 25 in operation by the end of this year.

In addition, Shell is part of several initiatives to encourage hydrogen use in transport in other key countries. We already have two hydrogen refuelling stations in southern California and are working with Toyota and Honda to expand the hydrogen refuelling network in Northern California. We opened our first hydrogen station in Vancouver in June 2018 and plan to open at least two more in Canada soon.

In the UK, we have been working with ITM Power to make hydrogen fuel available at three Shell retail sites in the south east of England, two of which have already opened, and we are assessing the potential for more projects in North America, Europe and Asia.

Multiple solutions

Shell sees real long-term promise in hydrogen. But we believe that a range of technologies will be needed to help reduce carbon emissions while keeping the world economy moving. It will require a variety of fuels, including petrol and diesel, depending on the needs of the traveller or the kind of freight.

Battery-electric vehicles are increasingly popular and we are working to meet the needs of drivers who own these vehicles in Europe. We expect battery-powered cars to become more competitive with combustion engines, and for their use to gain pace in parts of Europe, Asia and North America.

Last year, we began offering fast charging for battery-electric vehicles at retail sites in the UK and the Netherlands. We also acquired NewMotion, one of Europe's largest providers of electric vehicle charging points, and are working with high-powered charging network developer IONITY to offer super-fast chargers across Europe in the next few years.

While the increasing variety of hydrogen fuel-cell electric cars gives a glimpse of the future of personal mobility, it is the commercial sector that may offer the greatest opportunity to reduce vehicle emissions with hydrogen. Buses and trucks are currently a major source of emissions and their numbers will increase significantly over the next few decades as the global population and trade in goods grows. Small fleets of fuel-cell buses have been transporting people around cities scattered around the world over the last few years, and the world's first hydrogen trains will transport passengers in Germany from the end of 2021.

Shell also plans to build a dedicated hydrogen station for trucks in southern California to supply Toyota's fuel-cell truck fleet at the Port of Long Beach, one of the world's largest freight hubs.

Industrial consumers of hydrogen are also looking at its potential for reducing the environmental impact of their products. Natural gas network operators are exploring ways to blend hydrogen with natural gas, and we are building a 10-megawatt electrolyser, the largest of its kind, to produce hydrogen for our Rhineland refinery.

There is no doubt in my mind that hydrogen has exciting potential in the long-term transition to a low-carbon world. But its full benefits will only be harnessed through strong co-operation between businesses and governments around the world.

There have been false dawns for a hydrogen-fuelled future before. But, if we all work together, hydrogen's day could come soon and the world has much to gain when it does