

ENVIRONMENTAL AWARENESS

Our winter programme comprised just two meetings this year. In December, Sylvia Woodhead helped us explore the geology and ecology of Iceland through slides she took on one of her many visits to this fascinating island. Iceland is a world leader in renewable energy, deriving most of its energy from hydroelectric and geothermal sources. It's also home to the volcanic eruption which caused the evacuation of the town of Grindavik just a few days after our meeting – Sylvia was able to provide some first-hand background on this.

Thanks, Sylvia, for an entertaining and informative talk – an excellent way to round off our 2023 programme, particularly when followed by an informal group lunch at Thyme Out. Just the thing to get us in the right mood for Christmas!

Our February meeting, led by Tony Harrison, explored the complicated subject of how best to power electric vehicles (EVs). At present, the vast majority of EVs are battery-powered (BEVs). But despite being more eco-friendly than petrol or diesel cars, they're far from zero-carbon. It all depends on where they're made and where they're driven. Manufacturing a BEV uses up at least as much energy as manufacturing a comparable petrol car. So Chinese-made BEVs, whose manufacture is largely powered by coal, have a far bigger carbon footprint than French BEVs, whose manufacture uses nuclear power.

An additional problem for BEVs is that manufacturing batteries for a rapidly-growing world market requires large and increasing amounts of scarce metals such as lithium. Mining such minerals in ever-increasing quantities is seriously bad news for the environment. When coupled with increasing demand for electricity from an already overstretched grid, many commentators are beginning to wonder whether the predicted boom in EV sales in Britain is actually sustainable.

Is there an alternative? In theory, yes – hydrogen-powered fuel cells. Experimental fuel-cell electric vehicles (FCEVs) have been around for decades, and we're now seeing FCEVs from major manufacturers like Toyota and Hyundai on sale in several countries. They work by a process sometimes known as reverse electrolysis – hydrogen is combined with oxygen from the air on a catalyst-coated membrane. This produces water and electricity, which can then be used to drive a motor. So FCEVs produce no CO₂ or nitrogen oxides in their exhausts. While not completely zero-carbon (they still have to be manufactured!), their carbon footprint is as low as you're ever going to get.

So why aren't FCEVs taking over instead of BEVs? Two main reasons: cost and lack of infrastructure. They cost even more than comparable BEVs, and there's almost nowhere to refuel them (only six hydrogen refuelling stations in the whole UK at the last count). Worse still, nearly all hydrogen is currently made from fossil fuels in the first place – though the manufacturing process for so-called “blue” hydrogen does aim to capture the CO₂ generated and bury it in old oil or gas wells.

What could be a real game-changer is the recent discovery of underground reserves of natural hydrogen in several parts of the world. No-one yet knows how much of the stuff there is down there, but any significant deposits could be extracted in the same way as natural gas. But it could take decades to develop even the most promising hydrogen fields. So – is hydrogen the “fuel of the future” as some people claim? Yes, probably – but that future is almost certainly a long way away!

Many thanks, Tony, for taking us through this complex issue, and helping to show that (as with so many issues) there are no easy answers.

John Eakins