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History

A short history of Hydrogen Fuel Cells

Hydrogen offers a source of energy that is inexhaustible, environmentally safe and always available. It has the potential to be the energy of the future but the idea of using hydrogen fuel cells is not a new idea. Sir William Robert Grove, a Welsh judge, inventor and physicist, conceived the first hydrogen fuel cell in 1839. Although his invention mixed hydrogen and oxygen in the presence of an electrolyte and produced electricity and water, the same as fuel cells today, the electricity produced was not enough to be useful and so further refinement did not occur at that time.

This section will cover the development of hydrogen as an energy source but as it has been around for over 150 years and fuel cells offer a viable way towards achieving the future decarbonising targets of the world, there will be a heavy focus on recent developments.

A timeline of discoveries –

1766 – Hydrogen is discovered as an element (over 250 years ago)

1801 – Humphry Davy demonstrates the principle of what became fuel cells

1806 – The development of the first combustion engine to be powered by hydrogen and oxygen

1839 – Sir William Grove invents the 'gas battery' later known as a fuel cell

1842 – Gas voltaic batteries prove hydrogen and oxygen can produce electric current

1889 – Charles Langer and Ludwig Mond develop Grove's invention and name it a fuel cell

1955 – The Proton Exchange Membrane (PEM) fuel cell is invented

1966 – NASA first uses fuel cells in space missions (over 50 years ago)

1970s – The oil crises prompt the development of alternative energy technologies including Phosphoric acid fuel cells (PAFC)



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1980s – The US Navy uses fuel cells in submarines

1990s – Large stationary fuel cells are developed for commercial and industrial locations (around 30 years ago)

2003 – The first fuel cell airplane takes off

2004 – Hydrogen fuel cell buses begin operating in London

2007 – Portable fuel cells begin to be sold commercially

2008 – The first fuel cell car is introduced

2009 – Portable fuel cell battery chargers are sold

2015 – The first hydrogen refuelling station opens in the UK

2016 – The first fuel cell passenger plane takes off

2017 – The world’s first hydrogen trams are launched in China

2018 – Hydrogen trains begin operating in Germany and the Metropolitan police in London add hydrogen fuel cell vehicles to their fleet

2019 – A hydrogen powered drone flies for over 1 hour carrying a load of 5kg

Links to additional resources for this topic			
History Student Powerpoint	History Information for Teachers - A Brief History of Fuel Cells	Kahoot Quiz	



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History Videos

1.58 Story of Boeing's hydrogen fuel cell aircraft – English with subs



<https://youtu.be/XzeCQbIYHic>

2.37 Making sustainable flight closer to reality – English with subs



<https://youtu.be/SrTkt7Opcpl>