Conrad Purcell and Shu Shu Wong in Energy Voice: ‘Hydrogen as a Fuel – Decarbonising the UK’s Energy Sector

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Unlike hydrocarbons, which produce carbon dioxide, heat and water when combusted in the presence of oxygen, hydrogen produces only heat and water. As we seek to decarbonise the UK’s energy sector one of the paths that is being explored is the use of hydrogen within a grid connected gas fired power plant in the UK.

The hydrogen colour spectrum

Although hydrogen is one of the most abundant elements, it does not occur naturally in an isolated state. The production of hydrogen has historically been associated with substantial carbon dioxide emissions, but following the growth in renewable power generation, this has changed, leading to a classification system of hydrogen based on its method of production:

(a) Green hydrogen production emits no harmful greenhouse gases by splitting water into its molecules using an electrolyser powered with electricity from renewable sources.

(b) Blue hydrogen (or ‘low carbon hydrogen’) is produced predominantly from natural gas through a process known as steam reforming, which combines natural gas and steam. The carbon dioxide which is produced as a by-product of this process is then captured and utilised or stored.

(c) Grey hydrogen is produced from natural gas using steam methane reformation. However, the carbon dioxide that is produced as a by-product of this process is not captured and stored.

(d) Black and brown hydrogen is at the opposite end of the carbon emission spectrum to green hydrogen and is the most environmentally damaging. It is produced through the gasification of brown coal.

(e) Pink hydrogen is created through electrolysis powered by nuclear energy.

(f) Emerald hydrogen is created using a process known as methane pyrolysis to produce hydrogen and solid carbon. If the thermal process is powered using renewable energy and the carbon is permanently stored or used, emerald hydrogen may be used as a form of low carbon emission hydrogen in the future.

(g) Yellow hydrogen is produced through electrolysis using solar power.

(h) White hydrogen is a naturally occurring geological hydrogen found in underground deposits and created through fracking. However, there are currently no strategies to exploit this hydrogen.

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