Generating Hydrogen

Background

• There is little doubt that the prosperity of the 20th century was largely driven by fossil fuels. This is set to continue for the much of the 21st century although there are drivers, increasing pressure on resources, security-of-supply and environment the most prominent, that signal a transition to a less fossil intensive economy, particularly in the second half of the century.

• Such a transition is entirely consistent with the gradual decarbonisation to the energy system with the rise in gas use and the emergence of nuclear both at the expense of the carbon intensive coal and oil. Many people believe that hydrogen is the logical next major energy carrier.

• The hydrogen economy has the potential to transform the energy system and could emerge through niche markets into the mainstream over the course of the next few decades.

• Many studies forecast a steady increase in the use of hydrogen so that by 2050, this technology will power the entire transport sector and have widespread use in other sectors. However, there remain significant technological and infrastructure barriers still to be overcome.

What is it? How does it work?

• There are several methods that could be used for the production of hydrogen. At the moment 'stripping' it from fossil fuels via steam reformation is currently the only method close to being commercially viable. This, however, still produces carbon dioxide, which contributes to climate change.

• As well as steam reformation of methane there is the potential gasification of coal or oil with hydrogen separation. These methods again produce carbon dioxide.

• There is also the possibility of electrolysis of water. This method is highly electricity intensive and for climate change benefit would require nuclear or renewables to be the generation source.

• The costs of the different methods of production vary significantly. Steam reformation of methane without Carbon Capture and Storage (CCS) is by far the cheapest method. The additional costs of CCS would increase the costs significantly. For an environmental benefit to be gained CCS would have to be employed.

• Electrolysis is the most expensive hydrogen production option at this time and is highly dependent on the technology used to generate the electricity. Currently existing fossil plant without sequestration is the cheapest, with nuclear in the midrange and sequestrated fossil and renewables being the most expensive options.

• Significant technical development in electrolysis is possible which would reduce the costs. However, in the absence of significant increases in the price of gas and the need for sequestration of carbon dioxide, this approach is unlikely to compete with reforming of natural gas.

British Energy's position

• British Energy considers that for the hydrogen economy to develop in a way consistent with the objective of combating climate change, hydrogen must be produced by a low or carbon free method. As such electrolysis based on carbon free electricity is preferable to steam reformation and gasification of coal or oil.

• The high costs associated with hydrogen production and developing the infrastructure today suggests it is unlikely to help in combating climate change in the short to medium term.

• Electrolysis remains an expensive technology and further development support is required to bring costs down to a competitive level.