

## ENERGY CHANGE PAPER - HYDROGEN

The enthusiasm for hydrogen around the world is high at the moment, with a lot of new projects being developed or announced in the press regularly. The Netherlands has been a front runner in hydrogen, with various projects ongoing in the North Sea, Rotterdam and in the Northern region- the first hydrogen valley in Europe.

According to the climate agreement in the Netherlands, at least about 2 billion m<sup>3</sup> of green gas must flow through the networks by 2030. Green gas can be derived from organic materials like waste, this type of gas is also known as biogas. However, green gas can also be produced chemically through a process known as the 'Sabatier reaction', which is the chemical combination of CO<sub>2</sub> and H<sub>2</sub> to produce methane. If this CO<sub>2</sub> is obtained by carbon capture from industry or directly from air, and the hydrogen is obtained from electrolysis of water using green electricity, this methane may be described as carbon neutral or green. This synthetic production of methane is not a new technology and there are reactors for this process already in the market.

One of the major determinants of the cost of green hydrogen is the load hours of the electrolyser. This is why it is cheaper to produce green hydrogen in countries with lots of wind and solar resources like Chile, Namibia and Algeria. It is projected that by 2030, it will be possible to produce green hydrogen at €1.5-2 per kg in these countries.

A resource-rich country like Algeria can be a place to produce green methane from green hydrogen at a competitive price. The green hydrogen can be converted to synthetic natural gas and then liquified and shipped to the Netherlands. The LNG value chain is already well developed. For example, Algeria already has the infrastructure for transport and liquefaction of natural gas, therefore the capital expenditure needed to

achieve this will be minimal. Likewise, the Netherlands is also well equipped to handle the import and regasification of the green LNG on arrival in the country.

Furthermore, the LNG can be used directly by some trucks and ships to reduce emissions in the transport and shipping sectors. If this gas is supplied to industry in the Rotterdam area, the CO<sub>2</sub> released can also be further captured through the carbon capture networks like Porthos, making the whole cycle carbon negative.

The latest IPCC report gives clear evidence that all hands must be on deck to avert a looming climate disaster and the window to act is closing fast, thus all available options must be explored. Experts have predicted that there will still be need for natural gas in the energy mix in 2050, therefore it makes better sense to have more of the green version than the fossil one.

Finally, as the hydrogen backbone develops and the hydrogen value chain matures, the amount of hydrogen used for methanation can be reduced and the hydrogen produced from the plant can be imported into the Netherlands directly instead of methane. This can prevent a significant carbon lock-in of the investment.

