CO2 utilisation: Captured CO2, biomass and carbon-neutral fuels

By Rob Cockerill | 15 April 2022

One of the big topics of recent years for the gases industry and society alike has been carbon dioxide (CO2) and specifically, how we deal with it in the context of decarbonisation and sustainability.

In the last two years alone, the energy transition has gained momentum that was previously unheard of.

It's a transition of many economic and environmental drivers, from the diversification of energy supply and avoidance of dependence on fragile fossil fuel supply chains, to avoiding price spikes in traded commodities and the fundamental challenge of mitigating climate change.

How this relates to CO2 is one of the hottest topics for the industrial gases industry.

CO2 utilisation and innovation has long been a fast-emerging area. For the industry, it's not just a challenge but a major opportunity – and could significantly evolve related markets and supply chains.

Ahead of **gas**world's upcoming webinar titled *CO2: Utilisation and Innovation*, and sponsored by TOMCO Systems, we provide an early reveal of one of the talking points from the webinar and explore the potential for captured CO2 in the field of biomass and biofuels.

In an interview to be played in full during the webinar in a week's time (Friday 22nd April), Stephen B. Harrison of sbh4 consulting and the **gas**world Editorial Advisory Board discusses the role of synthetic e-fuels and CO2 utilisation related to biofuels.

Exploring the environmental impact and talk of carbon-neutral or negative carbon fuels, he describes the full lifecycle analysis of what it means to produce carbon-neutral fuels and noting

that when it comes to biomass-derived fuels, there can exist feedstock issues.

Which begs the question, can we use captured CO2 and synthetic e-fuels to support biofuels and get around any biomass feedstock issues?

“Yes, an alternative pathway to synthetic liquid hydrocarbons is through electrolysis,” Harrison enthused. “This can either be using an SOEC system with CO2 feed to yield syngas, or a conventional PEM/alkaline electrolyser to make hydrogen and then convert the hydrogen to hydrocarbons with the addition of CO2 and further processing.”

“For example, hydrogen and CO2 can be converted to methanol using a hydrogenation process over copper and zinc-oxide catalysts. Alternatively, the CO2 can be reduced to CO (carbon monoxide) to form syngas in combination with the hydrogen.”

“In the case of electrolysis,” he continued, “we must consume significant amounts of electrical power. For the process to be carbon-neutral, this must be renewable power from solar, wind or hydro schemes. Nuclear power is low-carbon, but the debate is open as to whether it is a ‘sustainable’ mode of power generation.”

DRAX power station, where potential CCS from biomass combustion is an opportunity.

DRAX: A case in point

Harrison points to the DRAX power plant project in the UK as an example of both the potential and the debate surrounding these paths to carbon neutrality.

“For the CO2 feed to the e-fuels process, implementation of BECCS on major biomass power generation facilities can provide abundant raw material,” he explains.

“For example, the DRAX power plant in the UK is their largest thermal power plant. It was previously coal-fired and has switched to burning imported wood pellets in recent years. It is still the UK’s largest single CO2 emitter, but of course it is regarded as carbon-neutral because it burns biomass.”

“On the other hand, those CO2 emissions could be sequestered or utilised for e-fuels production. Until major emitters such as this implement BECCS there will be an ongoing debate about how ‘climate friendly’ large-scale biomass to energy really is. The good news is that DRAX is planning to implement BECCS as part of the ambitious and visionary Zero Carbon Humber project.”

“So, there is a way to produce these synthetic fuels that could be carbon-neutral, or carbon negative,” he concludes, “if the CO2 used in the process has been captured from biogenic emissions (BECCS).”

Webinar – CO2: Utilisation and Innovation

For the full interview with Harrison, including discussion around how e-fuels (from captured CO2) and biofuels are positioned relative to hydrogen, don’t miss gasworld’s upcoming CO2 Utilisation and Innovation webinar, sponsored by TOMCO Systems.

The webinar goes live on Friday 22nd April, at 14:30 BST.

Join hosts Rob Cockerill and Thomas Dee, and more than 300 other industry professionals already signed up for the webinar, exclusively at www.gasworld.tv

With panellists including Jeff Holyoak, Vie-President of the Sales & Marketing Department at TOMCO Systems, and Torsten Porwol, Managing Director of CO2 Management AS, the webinar will get to grips with the market for CO2 today, the current and future utilisation opportunities, and some of the technologies that will make this new market opportunity happen.