



C-Suite Panel: Hydrogen's Role in Global Energy Transition

Insights on Green Hydrogen & Ammonia - CGHM 2023

Having spent 2 days with industry leaders at the 'Connecting Green Hydrogen MENA 2023' conference, it was interesting to explore and discuss the developments that have been made and the challenges ahead when considering how 'low carbon' Hydrogen and/or Ammonia can take their effective place in assisting in the strive for Net Zero and decarbonisation. There were some excellent speakers and panels covering all manner of subjects, but I thought it pertinent to take away and summarise 5 key topic areas which, for me, stuck in the mind.

Bankability

One of the main challenges explored was how to make the production of 'low carbon' Hydrogen across the value chain economically viable. Investment decisions have been hampered by uncertainty surrounding long-term energy pricing, and there has been an increased slowdown in projects reaching Financial Investment Decision ('FID'). To put it simply, offtake agreements stimulate security and growth, and arguably more drive from the demand side is required to inject further action. With this topic having been discussed from all sides of the table, the majority agree that it's difficult to attain FID without an attractive and long term offtake agreement in place, as without this, projects are viewed as too high risk to be bankable. One of the reasons for the recent success of the USD 8.5bn Neom Green Hydrogen Project being developed by NEOM/ACWA Power/Air Products is the 30-year offtake agreement in place, making it bankable to financing institutions.

In such a nascent market, pricing is a complex issue to tackle as it is difficult to ascertain and agree upon the vectors which determine the cost of the product and indeed, how stable this will be into the future. From a lender's perspective, it seems there is still some way to go before institutions will be comfortable around taking on merchant risk, cost-curves are yet to be established and there are still several moving parts. Equally, on the other side of the table, the process involved in going through a cycle of offtake negotiations is by no means straight forward- there are no precedents or templates to lean on, and everything needs to be developed from scratch. As it stands, there are very few institutions that could provide bankability for large scale production or a 'Giga Project'- a strong balance sheet is required as well as solid warranties in place from OEMs to at least go some way in mitigating risk. In addition, inherent lack of credentials and track record in producing and installing large, Gigawatt ('GW') scale electrolysers is also a limiting factor to many when looking at the development of projects.

Scale & Technology

Leading on from the previous topic, another challenge presented concerns the scale of projects needed and the technology required to operate at such capacities if Hydrogen is to play an effective contributing role in Net Zero achievements. Following some interesting discussions alongside information collated by the International Energy Agency ('IEA'), it is predicted that the production of up to ~150 million tonnes globally, per year, will be required to meet the clean Hydrogen demand by 2030. The recently announced NEOM Green Hydrogen Project will be powered by 4.4 GW of renewable energy, in turn producing ~250,000 tonnes per year. This example conveys the challenges ahead in terms of large capital deployment and the scaling-up required to meet projected needs, particularly as an IEA report produced at the end of 2022 revealed that if all pipeline projects were realised, this would only reach up to 24 million tonnes per year. The MENA region is at an advantage in comparison to other regions such as Europe, given the abundance of land available to create the hundreds of GWs required to produce the targeted demands for Green Hydrogen & Ammonia. Another advantage is the competitive cost of energy supply in the GCC compared with the likes of the USA and Germany, with this region having great resources to become involved throughout the value chain and be at the forefront of driving innovation and development, both developing an export market, but also utilising Hydrogen/Ammonia domestically in areas such as Green Metal production. However, another hurdle discussed centres around the availability of technology, which has become one of the most important factors in accelerating the energy transition but is certainly at the forefront when considering the nascent stage of Green Hydrogen and Ammonia development. Following the pandemic, supply chain issues have worsened the situation, but deployment, learning and research also need to increase at a pace to assist the upstream element of the process. As it stands, electrolyser technologies continue to evolve iteratively, and arguably there is a sense of holding out for the 'next best thing' to ensure greater efficiency and reduced cost of production. These advancements will come with time, but if certain targets are to be met, action needs to be taken now and decisions made on the use of current technologies to keep up the momentum.

Collaboration- Policy & Regulation

What exactly defines 'green', 'blue' or even just 'low carbon' Hydrogen/Ammonia globally? These regulations and policies are yet to be aligned internationally, and therefore provide another hurdle and delay in the implementation of projects.

Several panels explored the uncertainty facing Investors and developers around regulations in this nascent market as many governments are yet to implement specific Hydrogen trade policies - international cooperation is key to remove barriers and facilitate agreements. No doubt, the discussions so far in defining how/where Hydrogen could contribute to the wider energy strategies of countries and regions has helped showcase the potential market opportunities. However, future evolution is by no means assured in respect to technologies and agreements, and many believe governmental policies need to be implemented to mitigate some of the risks taken and to improve the economics behind these 'Green' projects.

Some have suggested the introduction of draft regulations and certifications would be a good start here, ensuring that they continue to evolve iteratively alongside the development of the market itself. The IEA continue to work with the G7 countries around a common solution, but clearly more can and needs to be done on a broader, global level. Creating a trustworthy system and framework that clarifies these inconsistencies can provide security around a credible source of product, but some also argue this can come with downsides in the short term. At present, several countries in Asia don't typically require any form of certification as to the 'colour' or 'grading' of the Hydrogen/Ammonia they receive, and this may well come at a loss to the EU and other markets if they start implementing more stringent regulations. No doubt, the influence and action of governments cooperating is key to ensuring continued growth and avoid fragmentation across global markets.

The Colour Spectrum

Further to the above and some ramifications around the supply and requirements globally concerning 'low carbon' Hydrogen/Ammonia- 'green' production is certainly the end goal over the long term, but many believe low hanging fruit shouldn't be ignored. Here we refer to the continued utilisation of 'Blue Hydrogen', widely defined as being produced from natural gas and supported by carbon capture and storage (CCUS). Of course, this method does not remove the reliance on natural gas as in the 'Green' process, but has a lower initial production cost which removes at least some of the issues in scaling up production in the short term, whilst efforts continue on the development of green hydrogen production in parallel. Hydrocarbons are a huge driver of the economies of GCC states, and whilst a challenge, it can be argued that governments need to drive policy change and find an accretive trade-off between transition and maximising the value of these resources. Saudi Arabia are already exporting blue ammonia to South Korea, and Japan are also signalling a large demand- yet neither country are concerned about the colour of the production process for the time being-they will move to 'Green' when it is more readily available. Should attention be focussed on both in harmony, at least for now?

Many also believe there is something to be said in exploring the further development and uses for Ammonia having value not only as an effective carrier, but as a fuel. Unlike Ammonia, transportation of Hydrogen remains challenging over longer distances due to it being prone to diffusing into metals, and upscaling or installing the appropriate storage tanks and facilities required is very costly, due to factors such as the much lower temperatures required. The 'cracking' of Ammonia into Hydrogen at destination seems to remain a viable option, albeit with costs considered around this process, but new applications will also continue to be defined for the use of ammonia in its own form. In addition, there are less barriers to financing where this is concerned, due to the transportation of green ammonia for use in fertilisers and other products already being commonplace.

Human Capital

One underlying question throughout all discussions was one close to home – how do you manage the challenges regarding human capital and capacity? The MENA region has continued to grow at an impressive rate, the UAE economy growing 7.6% last year and KSA 8.6%, with further ambitious goals and targets set each year. As this pertains to reaching Net Zero 2050 (or 2060 for KSA), further thought needs to turn to the attraction, development and retention of talent to navigate the ever-developing market. Quite frankly, there is not enough specific industry talent available right now, and we're only scratching the surface regarding the amount of live projects compared to the wider pipeline of opportunities. As the market becomes more mature, technologies surrounding electrolyzers, plants and wider production will evolve and improve, which will then require forward thinking in having to import new skills to compliment the implementation of the products and systems themselves.

Having witnessed productive discussions around the challenges ahead, there is no doubt that with the right collaboration, open-mindedness and knowledge sharing, Green Hydrogen/Ammonia will play an important part in the pathway to reaching Net Zero. At COP27, the UAE stated their aim to reduce emissions 49% by 2030 and 60% by 2040- confirming that development at pace and scale is required in all corners of the Energy Transition to remain in the fight.