Green hydrogen sector in limbo

30 april 2024 11:43 | ***RaboResearch*** | Research

Hyung-Ja de Zeeuw
Senior Energy Transition Specialist
Hyung-Ja.de.Zeeuw@rabobank.com

After years of growing momentum for green hydrogen, a certain fatigue seems to be kicking in. Many projects are facing delays or have been shelved. Industries are caught in limbo regarding the exact implementation of EU regulations, making them hesitant to sign long-term offtake agreements. It is gradually becoming clear that this year will be a key year for the green hydrogen industry as time is running out.

Summary

- After years of growing momentum for green hydrogen, we notice a growing sense of fatigue in the sector
- Reality seems to be sinking in, and many projects are facing delays or have been shelved
- Industries are caught in limbo regarding the exact implementation of EU regulations, which makes them hesitant to sign long-term offtake agreements
- Meanwhile, it is gradually becoming clear that this year will be a key year for the green hydrogen industry as time is running out

After years of growing momentum in the green hydrogen sector, we notice a growing sense of fatigue in the sector. After having invested serious amounts of money over the last couple of years in pre-FEED[1] and FEED studies and more, managers in boardrooms of the companies involved are running out of patience and want to see results. However, the lofty expectations and ambitious goals set for many announced projects have failed to materialize so far. In fact, quite the contrary is happening. Reality seems to be sinking in.

We have noticed that renewable hydrogen projects, also referred to as renewable fuels of non-biological origin (RFNBO), are facing delays, and several projects have been shelved or have even died a silent death. Apparently, even hundreds of billions of pledged government support is not enough to close the funding gap for a sound business case. The main reason is the uncertainty faced by hydrogen users, who are caught in limbo regarding the exact interpretation and implementation of hydrogen-related EU regulations, such as the Renewable Energy Directive (RED III). Meanwhile, it is gradually becoming clear

that 2024 will be a key year for the renewable hydrogen industry. Time is running out.

More government support than ever

According to the International Energy Agency (IEA), 41 governments have published a hydrogen strategy outlining their long-term goals and action plans for achieving them. Hydrogen strategies gain credibility when some kind of financial support is made available, underpinning the government's willingness, while the size of the pledged funds could be considered an indicator of the government's commitment. Currently, 28 governments[2] offer some sort of financial support programs, most in Europe, North America and Asia.

Some programs focus on hydrogen production and offtake, while some target more generic technology-neutral decarbonization measures that include hydrogen. Some initiatives only target renewable hydrogen, while others encompass both renewable and low-carbon hydrogen. Additionally, some funds have a more open-ended nature. This makes it difficult to pinpoint the exact amount of the available funds. However, BloombergNEF's assessment concludes that there is USD 351bn available worldwide for hydrogen initiatives in 2023. Almost half of that budget is for initiatives in the US, and 40% for initiatives in the EU. This includes funds that support the initial investment or have a more operational scope, such as a subsidized amount per unit produced, a contract for difference (CfD), or a tax credit.

However, it should be kept in mind that the EU will be one of the largest beneficiaries of these subsidies, as it will be one of the largest hydrogen importers in the world in the future, while the rest of the world will be exporting its hydrogen to the EU, South Korea and Japan. Therefore, the financial support that these non-EU countries provide to local projects will at least partially help the EU to decarbonize its economy.

The EU hydrogen strategy focuses predominantly on renewable hydrogen. In its regulation, renewable hydrogen is referred to as RFNBO. This definition may only be used when all the requirements of a RFNBO are met in order to avoid confusion about what constitutes renewable hydrogen. This is relevant because only renewable hydrogen meeting the RFNBO criteria can be counted toward the EU targets on renewable energy. This is also true for imported renewable hydrogen. As a result, EU member states will have a strong preference for imports that meet the RFNBO criteria.

Momentum is slowing, not growing

The time that a new hydrogen project was announced every week is well behind us. Despite billions in government support, the sector is struggling. About 1,400 clean hydrogen[3] projects have been announced so far worldwide. Together, they represent USD 570bn in pledged investments through 2030 and a production capacity of 45 megaton (Mt) per year, of which 32Mt is renewable hydrogen. However, only 7% in terms of volume has passed the Final Investment Decision (FID) phase. The majority of these projects are located in China. In Europe, only 4% of the announced projects has passed the FID.

The numbers become even more disappointing when looking at global deployment. Currently, only 1.1 gigawatt (GW) is deployed worldwide, significantly below the 6GW that was anticipated by the end of 2022 based on the initial announcements. To put things in perspective, the Dutch target is to have 4GW operational by 2030. Yet, there are no hydrogen projects deployed in the Netherlands today. The European Commission's REPowerEU ambition of 10Mt of local production and 10Mt of imports requires about 240GW of deployed electrolyzer capacity by 2030. Given the current state of the sector in the world, this is not even remotely within reach.

What's going on?

There are several reasons for the development delays of projects in the past years. First, the slow rollout and implementation of regulations and associated definitions has a knock-on effect on the implementation of financial support schemes, which, in turn, are a precondition to unlock bank financing. This is certainly the case in the two largest regions that provide financial support, the EU and the US.

Second, high inflation and the increased cost of capital are another very important showstopper. At the time most projects were announced, the inflation and the risk-free cost of capital were near or even below zero, compared to over 4.6% and 2.5% for the 10-year US Treasury and 10-year Bund respectively, at the time of writing. This has repercussions for the price of electrolyzers, which were expected to decrease, but increased instead. Estimates range from 40 to 60% or even more in price increases, depending on the type, origin and size of the electrolyzer. This has its repercussions for the levelized cost of hydrogen (LCOH).

A third important reason for delays is the increased cost of electricity, which has an adverse effect on the business case. Electricity is the main cost component making up 50 to 70% of 1kg renewable hydrogen. In Europe, prices of power purchase agreements (PPAs) have been on the rise. PPAs with a blend of wind

and solar almost doubled from USD 40/MWh in Q4 2020 to almost USD 80/MWh in Q4 2023. The same is true for blended PPAs in the US, where contracts rose from USD 30/MWh to almost USD 60/MWh. This has a high adverse impact on the LCOH. Additionally, the grid connection costs in some European countries, like the Netherlands are also ballooning.

Not just delays and price increases are hitting the sector. In the last months, there have also been announcements of abandoned projects. In the UK, the world's largest offshore windfarm, Dogger Bank D, initially had plans in phase four to supply renewable electricity to an onshore hydrogen plant. SSE and Equinor recently abandoned the second part of this plan, and developers will now focus solely on feeding renewable electricity into electricity grids. The same fate befell Vattenfall's HT1 project. They terminated a pilot off the coast of Scotland recently. The project was abandoned because the company's scarce resources could be deployed more efficiently elsewhere. Another example is the Power to Methanol project in Antwerp, which was cancelled due to economic viability. Here, the cancellation was linked to the lack of offtakers. No potential offtaker was willing to commit to long-term offtake contracts, one of the main conditions for a successful business case.

Not nice to have, but need to have

The higher the price of renewable hydrogen (or RFNBO), the less likely it is to become an alternative for decarbonization. There is no financial rationale to use renewable hydrogen if there is a cheaper alternative available, such as electrification or heat. As the production costs increase, fewer industries remain that will use renewable hydrogen in their production process. Only those industries that have no alternative will use renewable hydrogen going forward. In the near future, this is predominately the case in the EU, as it has ambitious RFNBO targets for certain industries and sectors. These industries and sectors will not use RFNBO because it's nice to have, but because there is no alternative. This is the case in refinery, and the production of ammonia and steel, and fossil-free jet fuel. Additionally, RFNBOs can also be used as strategic energy reserves or used for (co-)firing gas turbines for grid balancing in the EU.

Some of these uses are driven by regulatory targets for RFNBOs set by the European Commission, such as transport fuel (1% of the fuel mix by 2030), or even more specific, jet fuel (1.2% by 2030) and ammonia production (42% of total hydrogen use by the sector by 2030). These sectors must comply and have no choice but to pay the green premium for RFNBOs. Non-compliance will be met with penalties. Some sectors may use RFNBOs driven by the changes in the EU ETS, which will require more sectors to pay for their emission rights in the near future.

RFNBO stuck in limbo

Bearing this in mind, it remains a bit of a paradox why so many projects struggle to reach the FID point. While certain sectors are compelled by strict decarbonization regulations to use RFNBOs, they are nonetheless reluctant to sign offtake agreements with RFNBO producers. Even now that the costs of RFNBOs are on the rise, which is normally a good moment to lock in a certain price, most potential offtakers are unwilling to sign offtake agreements. The main reason is the high uncertainty surrounding the exact implementation of the EU regulation. For example, RED III was adopted in autumn 2023, and member states have two years to transpose EU regulation into national regulation. Until then, companies in the need-to-have sectors will remain in limbo about the exact targets and how to meet them, and are therefore reluctant to lock in long-term offtake contracts. Without such contracts, there is no business case for RFNBO producers, and without RFNBO production, the targets cannot be met.

Footnotes

[1] Preliminary Front-End Engineering Design. The initial stage of engineering design in complex engineering projects.

[2] BloombergNEF hydrogen subsidies tracker.

[3] Clean hydrogen is a generic term for both low-carbon and renewable hydrogen. Low-carbon hydrogen is normal hydrogen made from a fossil fuel, but with carbon capture and storage. This is also referred to as blue hydrogen. Renewable hydrogen is hydrogen produced using renewable electricity. This is also referred to as green hydrogen. RFNBO is renewable hydrogen that meets the strict EU conditions on its production process.

Source

https://www.rabobank.com/knowledge/d011425216-green-hydrogen-sector-in-limbo