Green hydrogen: the investment perspective



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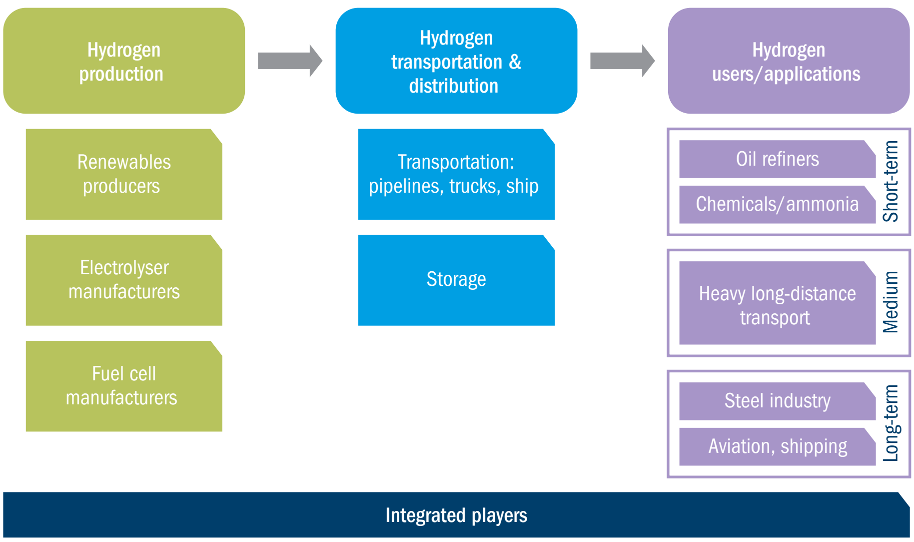
In the Q3 issue of Responsible Investment Quarterly we discussed how hydrogen remains a critical part of the decarbonisation puzzle, and the current energy crisis and abnormally high gas prices have provided a new impetus within this theme. We saw how supportive policies such as the REPower EU plan and particularly the US Inflation Reduction Act could spur significant cost reductions and accelerate investment in this market.

So where will the opportunities arise and what challenges will the market need to overcome? Green hydrogen is a theme that provides investment opportunities in the near, medium and long term. In the near term – the next three years – hydrogen production will need to ramp up greatly to enable its use by different industries. We therefore believe companies in this segment will benefit the most from policy support and investments. Once hydrogen scales up (the medium term) we expect opportunities in other parts of the value chain to materialise as investments in infrastructure increase, and then in the long term in end-user sectors (Figure 1). In this viewpoint, however, our focus is on the near term and the opportunities and challenges for utilities and industrial gas companies.

Industrial gas companies and hydrogen

The market for industrial gases such as hydrogen is dominated by three companies: Linde, Air Liquide and Air Products.[1] There is an ongoing discussion over how the hydrogen market may develop: green, blue or grey. Whatever happens, however, these three companies are likely to benefit. Their typical business models largely insulate them from market risks as they receive contracted payments regardless of whether the gas they provide is used, and the terms of these contracts insulate them from

Figure 1: near-, medium- and long-term hydrogen players



Source: Columbia Threadneedle, 2022.

input price movements. Each of them have been providing hydrogen to their customer bases for a very long time and are well-placed to influence and be knowledgeable of the regulatory landscape and technological progress.

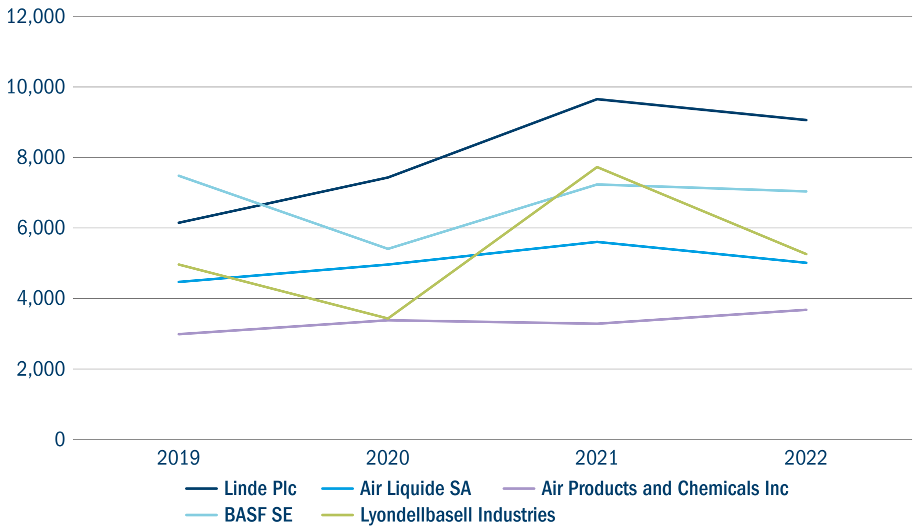
Although it is too early to tell precisely how the market for hydrogen will develop, it would be surprising if it did not grow from current levels. If it increases dramatically in scale, these operators should benefit by designing, building and operating hydrogen-producing facilities. That could be a significant growth area for a sector that is otherwise considered to be more or less tied to rates of global GDP growth. One risk would be misjudging the regulatory backdrop. However, a take-or-pay contractual structure is common in the industrial gases market, and this would likely mitigate the risk of material losses. Perhaps a more significant risk would be a lack of policy stability, making customers of Air Liquide, Linde and Air Products reluctant to commit capital, leaving the businesses reliant on other sources of growth. Overall, though, the development of the hydrogen market is a potential opportunity with little downside to the big three industrial gas producers.

Many investors and bond traders will see Linde, Air Liquide and Air Products as part of the broader chemicals industry. But the business models of the big three are more stable than that of the bulk commodity chemical companies such as Lyondell Basel and Dow Chemical. Firstly, the aforementioned take-or-pay contracts, particularly given that they tend to have some degree of pass-through of energy costs. Secondly, the industrial gas companies' products are often essential inputs that form a relatively small part of the total cost of production within a customers' manufacturing process. For non-industrial end-markets such as healthcare, for example, the gases are essential, providing a significant source of stability to the business. This difference is apparent in Figure 2 which shows the cash generated from operations.

Utilities and hydrogen

The utilities sector largely presents the production and transport of hydrogen as an opportunity and a future growth area. The regulated gas transmission and distribution utilities firms are keen to reduce the perceived risk of stranded assets as the EU gradually weans itself off natural gas, such efforts having been accelerated by the shutdown of

Figure 2: snapshot of company cash from operations, 2019-2021



Source: Company accounts and Columbia Threadneedle Investments analysis, 2022. This is a single measure of stability within the business. The units on the y-axis combine USD (LIN, APD, LYB) and Euros (BAS GR and AI FP) and are meant to compare change within firms rather than be a comparison of absolute levels. The mention of specific companies is not a recommendation to deal.

the Nord Stream pipelines. Windfarm developers are keen to establish offtake arrangements – which is an agreement between a producer and a buyer to purchase or sell some of the producer's goods – by connecting production to hydrogen electrolysers.

The European Hydrogen Backbone plan, set out by a group of gas transmission system operators (TSOs) in 2021, envisages a 53,000km infrastructure network across 31 European network operators with infrastructure in 25 countries. This requires an estimated total investment of €80-€143 billion, 60% of which will be allocated to repurposed natural gas pipelines and 40% to new pipelines. It aims to accelerate decarbonisation of the energy sector, connect supply to centres of demand and support industrial development – all while increasing energy independence and security of supply. Five corridors are emerging: Southern Europe (Tunisia, Algeria, Italy); the Iberian Corridor (Portugal, Spain, France); the North Sea; Nordics-Baltics; and an East/South-east Corridor (Central Europe to Romania, Greece, Ukraine).[2] In our view, the growth of hydrogen is dependent on a couple of trends: the direction of heating and the demand for electrolysis capacity. The latter has been compared by one TSO to a "chicken and egg" situation between industrials and gas players. In terms of cost, Bloomberg estimated in December 2022 that due to the war in Ukraine and high natural gas prices, renewable hydrogen in Europe actually cost less than natural gas. The cost of producing green hydrogen in France, Germany, Italy, Poland, Spain, Sweden and the UK currently stands at \$26.78-\$47.34 per MMBtu (million British thermal units) depending on the type of electrolyser, versus the cost of European natural gas which stands at an average of \$41.15 per MMBtu.[3]

There are numerous factors that support the growth of hydrogen in the utilities sector:

- It is cheaper and faster to retrofit existing gas pipes versus building new hydrogen-ready pipes – two to three years rather than five
- Not much modification or investment is required to carry up to 10% of volumes in hydrogen blends
- A large part of Europe's gas distribution pipeline is considered hydrogen ready, with Ireland,

Portugal and Denmark at 100%, France, Spain and Italy at 98%, and Germany at 96%

- The REPowerEU plan is focused on using renewable gas to support security of supply and is ready to subsidise the production of renewable hydrogen
- The European Commission's Third Gas Package plans to introduce hydrogen regulation from 2031. It is crucial from an investment perspective that hydrogen investments count towards the regulatory asset base and therefore earn a regulatory return on investment

There are also challenges, although not all are insurmountable:

- Green hydrogen production remains low and uncompetitive relative to natural gas and will require subsidies in the early stages
- Depends on direction of heating for households – at present, demand is likely to be driven by industrial rather than domestic users
- Fast development of expensive and energy-intensive electrolysis capacity is needed to justify significant hydrogen-related investments in gas networks
- Unbundling risks under current EU laws. These will require separate asset bases and accounting for gas, electricity or hydrogen with service revenues only used to recover capex and opex in relation to the underlying assets of the asset base
- A lot of industrial sites in Europe have only just switched from high to low calorific gas due to the switch from Dutch to Russian gas (Groningen gas field shut in 2022 due to earthquakes)
- Existing industrial consumers and power plants need to become hydrogen compatible
- New storage systems will be required, different pipe degradation processes are yet to be discovered and the impact of different energy density to be tested
- Hydrogen import targets under REePowerEU assume other countries will also fund large-scale electrolyser capacity
- The impact of chemical interactions with other organic molecules are still being tested on storage sites
- Possible higher demand for biomethane over hydrogen at the distribution level

Conclusion

The supportive policy environment, as well as better economics, should accelerate the development of the hydrogen market over the next decades. Companies that enable its production are likely to benefit the most in the near term. Thus, utilities are well exposed to capture strong renewable growth prospects, while industrial gas companies are well placed to be key enablers around the scale of the hydrogen market. They will leverage their existing expertise in the production, transportation and transmission of hydrogen – whatever colour is produced.

Energy transition engagement: Green hydrogen

Company

Linde

Sector and country

Industrial Gas, US

Why we engaged

We wanted to get better insight on Linde's views on the current power market situation and its strategy and plans towards green hydrogen.

How we engaged

A call with the CFO was organised by a Senior Fixed Income Analyst, and attended by a Responsible Investment Analyst, Fundamental Analysts and Portfolio Managers.

What we learnt

The company is committed to capital discipline and applies this approach to a selection of hydrogen projects where they expect double-digit premiums over the weighted average cost of capital. In the near term the company is focused on blue hydrogen projects in the US where it sees strong interest from industrials. Linde believes there will be regional and sectoral differences in the adoption of green hydrogen.

Outcome

The call provided valuable insight on how the company views the broad development of the hydrogen market globally and the challenges there are to overcome.

1 The mention of specific companies is not a recommendation.
2 European Hydrogen Backbone: https://www.ehb.eu/
3 Bloomberg, BNEF 16 December 2022.

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