

# Where is the Hydrogen market gone?

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*This article has been written by 2B1st Consulting fueled by the data from Project Smart Explorer. Analysis and comments reflect a vision of the Hydrogen market evolution along the last few years, tracing projects and working with many actors of this supply chain. All the figures used in this article are extracted from the database [www.projectsmaexplorer.com](http://www.projectsmaexplorer.com). The company has been tracking Energy projects for more than 15 years and Hydrogen projects since they emerged in the Process Industry, in 2019.*

The world emerged from the Covid pandemic at the end of 2020 with a will to change the energy landscape. Exit the good old oil & gas and welcome to the then called “fuel of the future” Green Hydrogen.

At the time, interest rates were at their lowest and massive amounts of public money were to be invested in order to

boost the economy. Green Hydrogen was a gold opportunity and received loads of financing. On paper, Hydrogen was seen as a fuel but also as a mean to decarbonize through its combination with CO<sub>2</sub>. A 4-years period of green hydrogen hype started which led to the apparition of all kinds of projects tagged “Hydrogen”: cars, planes, industries, bicycle, electricity storage...

A new market was born, full of opportunities but it was excessive in a sense some companies took the American motto “Fake it till you make it” a bit too much to their heart. The result : a tsunami of communication around programs and projects, but unfortunately only a few real executions of projects. The Green Hydrogen was communicating before doing.

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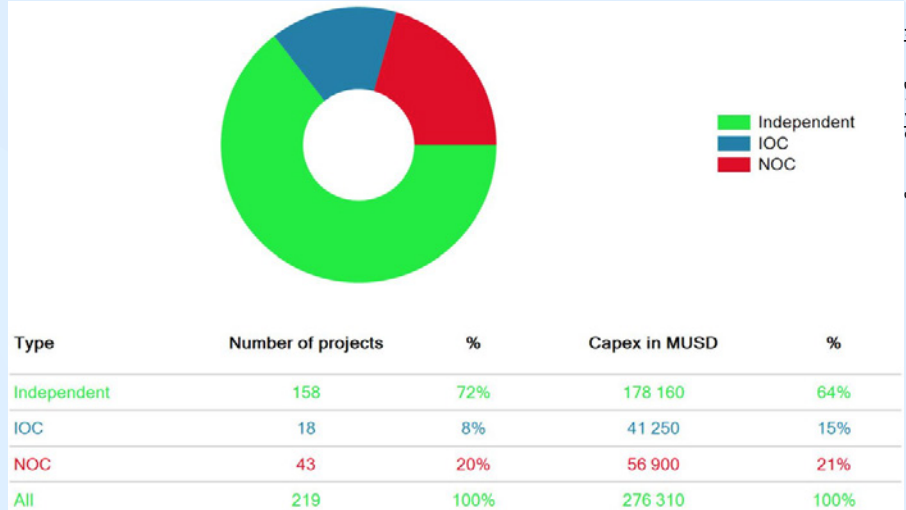
## HYDROGEN

Through our analysis of each project, we quickly realized a majority of projects were being announced without rock-solid basics: financing, permit or engineer capacity. Some projects were announced without having even identified the ground to implement the plant on.

This situation fueled a growth frustration about Green Hydrogen as volume of announcements were not materializing into business opportunity, leaving a gap between perception and reality of this market. During 2023 we calculated that only 15 % of the projects of green hydrogen were really materializing. In 2024 McKinsey came up with a global study on the ratio of Green Hydrogen projects going to FID with similar results, but with high disparity depending on the regions.

### A phase of maturity

Since mid-2024, it seems Green Hydrogen and Hydrogen itself have entered a more realistic phase. After 4 years of intense development in all directions, projects are looking for an economical maturity on top of a technical maturity. Many examples hit the



**Figure 1:** Operator type distribution for Green Hydrogen (+ derivatives) and Synthetic Fuels projects. Extract done the 31st May 2025 reflecting project opportunities for the next 3 years

headline: Airbus announced the end of their Hydrogen plane, McPhy Energy going bankrupt, Hydrogen cars to be replaced by electric, and production projects facing technical complexities in their ramp-up toward the GigaWatt electrolyzer.

In 2025, the market of Hydrogen is maturing in some ways. In one hand, mobility does not seem to be happening in the close future. On the other hand, the commercialization of Hydrogen through a global trade market, as we know it with Oil & Gas, is not in the picture yet, but may come at a later stage, after 2035.

Currently, the Hydrogen market is made of the historical market of hydrogen for industry, plus new opportunities, such as: decarbonizing heavy industries (cement, steel, chemical), and creating synthetic fuels. Both new streams of opportunities are supported and initiated for a big part by Governmental subsidies.

Still, Hydrogen requires to mature technologically as the gigawatt of electrolyzer capacity initially announced for 2026 will most probably be ready around 2030. Today, going above 150 MW is still challenging and generates massive problems of automation and reliability. This technical issue will

need to be solved before hydrogen can scale up and industrialize its production and distribution.

Yet, volumes of hydrogen projects are still being announced, especially in Green Hydrogen (+1,100 initiatives listed by the EU for 2025 while 5 % will materialize only). This discrepancy between projects announced and real business is still blurring the vision of this market to all actors in the supply chain and in the investors. Thus, we advocate and advise all our customers to make a thorough qualification of all projects when tracking Hydrogen (and derivatives) projects: engineering capacities, license, permit, land.

### Who is involved in Hydrogen production? (Fig. 1)

Oil & Gas actors have been working on decarbonation of their industry for several years.

The Supermajors originally looked at energy transition through Renewables but are now stepping out of it. Not because it is not a viable solution but because of low profitability, especially because of the lack of operation need.

These operators having a high level of expertise in fluids, liquid or gaseous,

Source: 2b1st Consulting



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find in Hydrogen and e-fuels a natural fit. No surprise we find them involved in 15 % of these projects.

The second type of operator is National Oil Companies, meaning companies mostly own by a state, for example in Middle East or Asia. They are concentrating 21 % of all investments as some of these projects are strategic for their country to be independent from imports and create local value from natural resources.

Then, which companies are investing the remaining 64 %? Answer is independent companies. They are numerous, often not listed on the stock market. Some others are historical actors like ThyssenKrupp or Linde, others were barely known before COVID like Lanzajet.

This leadership of independent companies creates a second difficulty for Pump & Valves manufacturers in identifying opportunities as operators are less known, and thus complex to approach.

### Where are the Projects? (Fig. 2)

Investments are scattered all across the globe but with different sizes and focus.

First outcome is that the dominant region for hydrogen projects is Europe. In Europe 2 type of projects are leading: green hydrogen and Sustainable Aviation Fuel (SAF) with some major differences between these two.

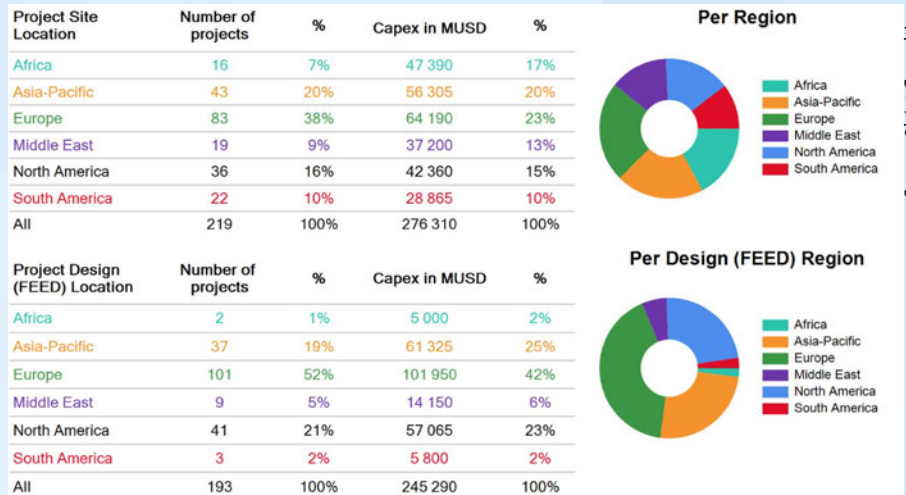


Figure 2: CAPEX in MUSD per Region (first graph) and per FEED location (second Graph) for Green Hydrogen (+ derivatives), and Synthetic Fuels projects. Extract done the 31st May 2025 reflecting project opportunities for the next 3 years

While SAF projects are still relatively small (av. CAPEX of \$350 MUSD), Green H<sub>2</sub> projects reach bigger investments size with \$1.1 BUSD in average. On one hand, large Green H<sub>2</sub> projects are usually strategic investments financially supported by governments but are also struggling to find their economic balance. On the other hand, SAF projects are going fast track pushed by EU regulations on SAF usage but managed by private investments. As a reminder, starting 1st of January 2025, all flights departing from Europe must blend 2 % SAF, and the ratio will grow every year. This approach lays the foundation for a market to emerge on the long run; which is not the case for green hydrogen itself yet.

In Middle East, the strategy of investment is different. UAE, Saudi Arabia and Oman each announced to

produce, on the long run, 25 % of the world Green Hydrogen demand. These countries are today living of the Energy production and they are clearly planning to continue doing so. Today it is Oil & gas, tomorrow it will be Green Hydrogen or Ammonia. At the time being, investments in hydrogen are shy. The usage of local needs for decarbonation is not their priority so far, and local operators are waiting for the electrolyzer to ramp up to the gigawatt in order to be price competitive. Once technical maturity is reached, and with the right market demand, large projects will start to be announced. Green Ammonia will be the preferred form of transportation as hydrogen under gaseous or liquid form, is either non-profitable or too complex for long distance. The first indicator in this direction is the amount of solar and desalination projects being realized. They do answer a local need but are also a requirement to produce green hydrogen. Among the three, one country is already investing heavily in green energy : Oman. Their current resources are not as rich as their neighbors; thus they decided to invest early on these technologies and develop several pilot projects to be in first position once market is ready.

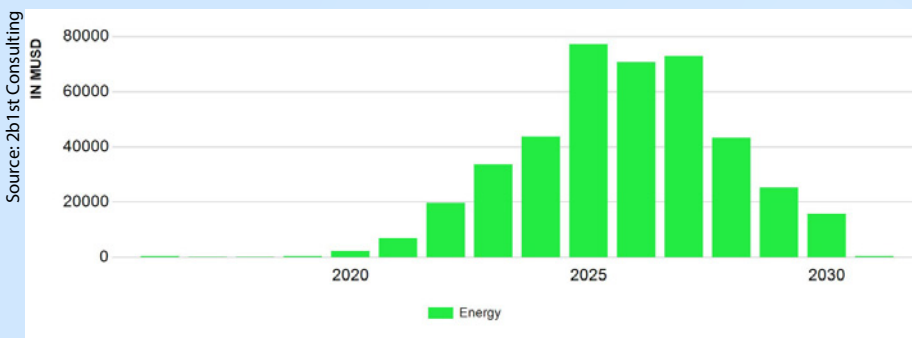


Figure 3: CAPEX in MUSD per year of EPC Contract Award for Green Hydrogen (+ derivatives) and Synthetic Fuels projects. Extract done the 31st May 2025 reflecting project opportunities for the next 3 years

Source: 2b1st Consulting



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### Let's speak the same language: some definitions

IOC : International Oil Company  
 NOC : National Oil Company  
 FEED: Front-End Engineering and Design  
 EPC: Engineering, Procurement and Construction

In USA and Canada, the leading application of hydrogen growth is SAF, pushed mostly by EU regulations. North American airlines flights taking off from Europe are impacted by the EU regulations meaning, they too need to blend SAF with normal jet fuel. For the production of green hydrogen in the role of decarbonation, it is clear the recent election of Trump in the White House has been a hard stop. Like for the windmill, hydrogen projects which were almost all depending on public money are being postponed or shelved. On the other hand, synthetic fuel projects are becoming economically viable on their own.

In some other corners of the world, we see also green ammonia as a strategic resource for the country. Several projects are being engineered with the objective of reducing ammonia imports that are commonly used in fertilizer production.

Last information we can extract from the graph is the fact that Europe is the beating heart of this market not only in project location, but also in terms of engineering capacity. More than 40 % of the projects worldwide are designed in Europe for hydrogen applications. The old continent is taking the technology leadership for all these projects, providing unique advantage to European manufacturers willing to enter the hydrogen market, including pumps and valves.

### Evolution of Project CAPEX (Fig. 3)

The new hydrogen market is growing fast, only limited by engineering capacities and electrolyzer size. The opportunity offered by hydrogen projects, under the condition to be accurately identify, is a unique occasion to diversify one's exposure to other industries and compensate for the current gloomy mood in other sectors.

Starting in 2020, green hydrogen projects were not as many as today with at the time 86 projects having their EPC contract awarded. The size was also different because most of them were in the range of 10 to 25 MW electrolyzers, corresponding to pilot and demonstrator projects.

Since then, the evolution of projects has been linear, and not exponential. We are experiencing an evolution more than a revolution in term of number and size of projects. In 2024, we have listed 177 green hydrogen projects having their EPC awarded, with a average size between 50 to 100 MW.

Thus, in only 4 years the volume of opportunities doubles in number but also doubles in size which represents a growth by a factor 4 in only 4 years. The forecast we have shows this trend to pursue in the same dynamic with a hydrogen market growing by 50 % every year till 2028 minimum.

### The role of Pumps and Valves in H<sub>2</sub> (Fig. 4 & Fig. 5)

In this developing market of hydrogen, many demonstrators and pilots' projects have proven the technical difficulty of producing and handling hydrogen. In most failure cases, the two critical points were the electrical supply of the electrolyzer and the fluid handling of hydrogen.

Focusing on this second point, it is common knowledge hydrogen being

# SwitchH2 NH3 OFFSET FPSO Green Ammonia



## General information

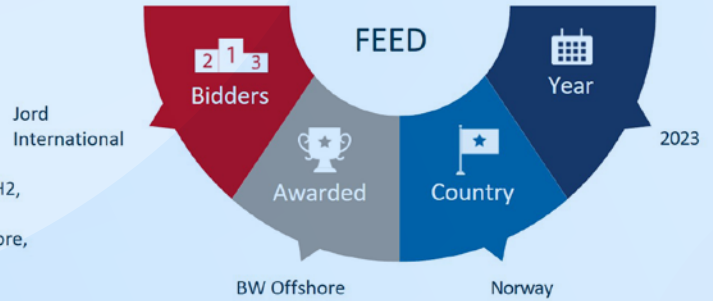


### JULY 2022

The Netherlands' independent green fuel company, SwitchH2, and the independent floating production storage and offloading (FPSO) vessel engineer and operator, BW Offshore, are considering developing NH3 FPSO, a green ammonia floating production unit.

SwitchH2 and BW Offshore will collaborate on a green ammonia FPSO that will be based near the floating wind farm. The floating wind farm should power the FPSO and produce green hydrogen and ammonia.

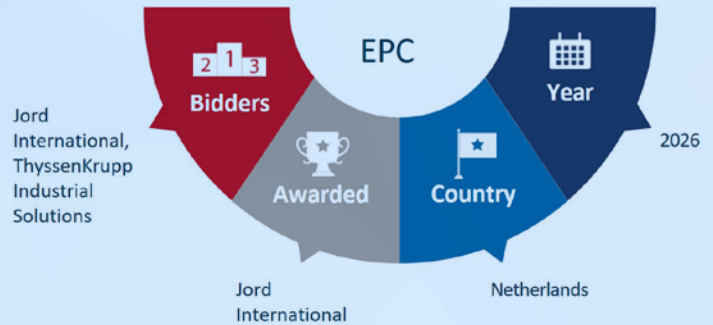
BW Offshore should modify an existing FPSO or Very Large Crude Carrier (VLCC) and install a 100-megawatt (MW) electrolyzer.



### SEPTEMBER 2022

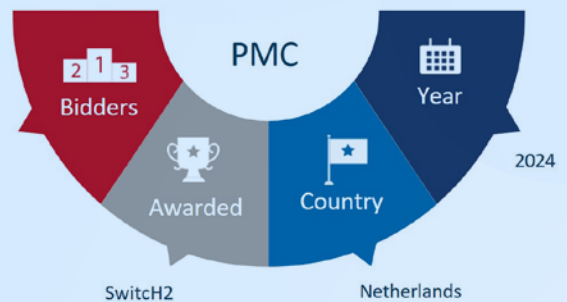
The vessel should be 330 meters long and able to operate in 200 meters of water deep. The project's proof of concept (POF) has been validated by DNV.

In April 2023, the project should move to front-end engineering, and design (FEED), the engineering, procurement, and construction (EPC) should follow by 2024, with operations expected by 2025



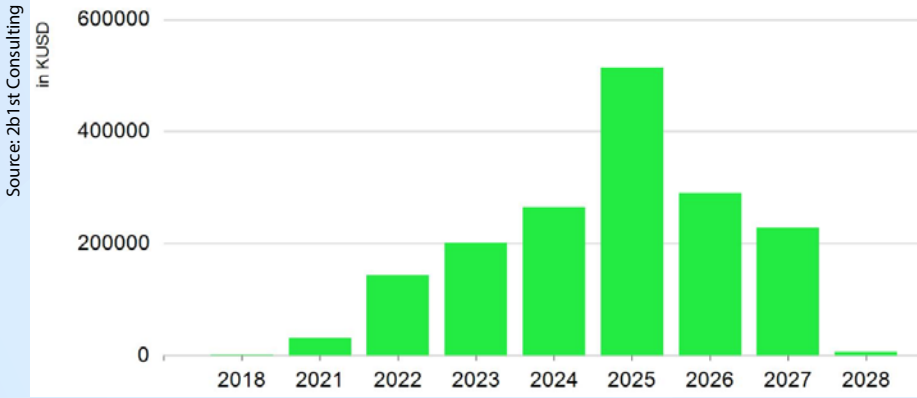
### OCTOBER 2023

SwitchH2 selected Ohmium International to develop PEM electrolyzer solutions. The PEM electrolyzer should now reach up to 300MW. Ohmium International should design it from its US office, and manufacture it from Indian facility.

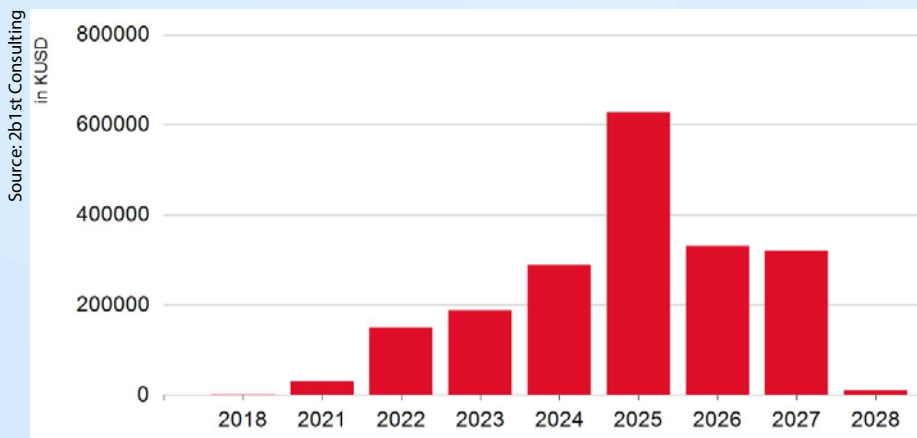




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**Figure 4:** Business Opportunity for Control Valves in KUSD per year of EPC Contract Award for Green Hydrogen (+ derivatives) and Synthetic Fuels projects. Extract done the 31st May 2025 reflecting project opportunities for the next 3 years



**Figure 5:** Business Opportunity for Centrifugal Pumps in KUSD per year of EPC Contract Award for Green Hydrogen (+ derivatives) and Synthetic Fuels projects. Extract done the 31st May 2025 reflecting project opportunities for the next 3 years

difficult to handle due to its minimum size for a molecule. Hydrogen H<sub>2</sub> molecules, having the capacity to pass through metallic pieces and normal welding, makes it hard to control in flow and storage. And due to the high price and little volume of green hydrogen production, no project can tolerate leakage of the produce H<sub>2</sub>. Another aspect but unknown is the carbon footprint of Hydrogen if released to the atmosphere, due to its capacity to destroy the ozone layer, making hydrogen worse than CO<sub>2</sub> emissions.

For both carbon footprint and optimization of volume production,

hydrogen projects have all interest in investing in best quality equipment. But it does not stop at the hydrogen handling itself. Green hydrogen production means separating water into oxygen and hydrogen, thus bringing the need for units of oxygen and water treatment; or even water desalination in some projects.

Often overlooked, those pretreatment and post treatment units are as critical to the process as the green hydrogen one and offer great opportunities for pump and valve manufacturers. The intense need for pump & valve is quite interesting compared to other types

of projects, because they represent an higher share of the total CAPEX compared to electrical equipment. For this reason, we see in our database the opportunities for pumps and valve growing faster than any other product line, at the exception of electrolyzer itself. Given today the volumes of Hydrogen production, the size of valves is relatively small in comparison to Oil & Gas industry. Currently, the need for valves is concentrated on instrumentation valves of few inches, and a bit less on piping valves. Our forecast is showing a steady growth for valves, passing from a market a \$10 millions in 2020 to \$150 millions in 2025.

### Interested in knowing more about Energy Projects?

2b1st Consulting is supporting companies working on Energy projects with data, expertise and network. Our experts have extensive knowledge of projects and have access to an unique granularity for all valves and pumps manufacturers.

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