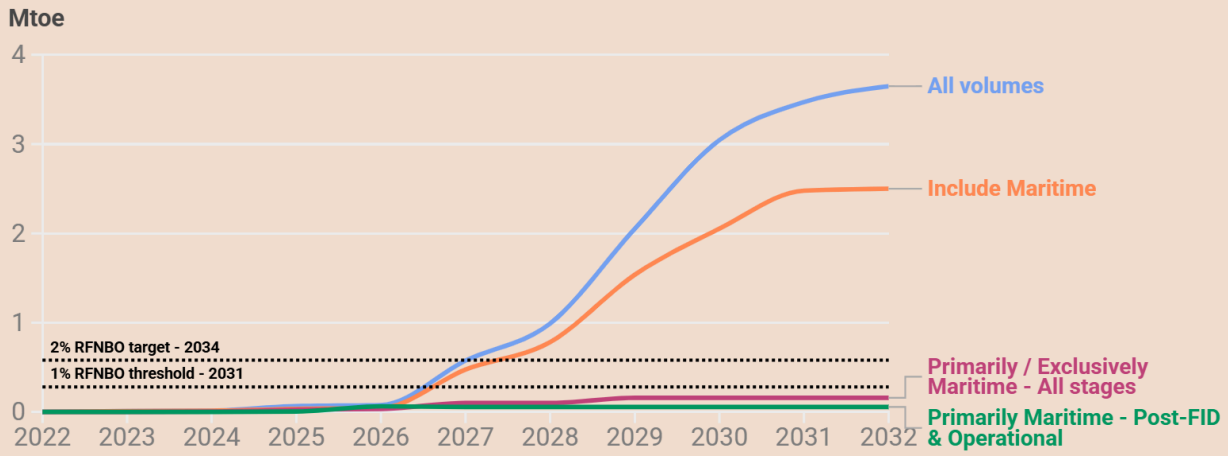
BRIEFING - December 2025

State of play on shipping e-fuels production in Europe

Summary

In its 2025 update of the shipping e-fuels observatory, T&E examined 80 European green hydrogen and e-fuels projects that could serve the maritime sector. While some have progressed in their development, total shipping e-fuels production appears unlikely to reach targeted levels, unless new policy incentives are implemented. Although the listed projects could produce 3.6 million tonnes of oil equivalent (Mtoe) by 2032, less than 5% is dedicated primarily to shipping. This sends a weak signal to the maritime sector considering that those volumes are below FuelEU's 2031 1% e-fuel uptake threshold and well below the 2034 sub-target of 2%. In the absence of clear EU and national policies combined with dedicated financial incentives, Europe's shipping e-fuels targets are likely to be met with imported fuels (or not met at all) representing a missed opportunity for Europe's climate leadership as well as to further its industrial and energy security goals.

Projected volumes targeting predominantly shipping are insufficient to meet the 2% e-fuels target.



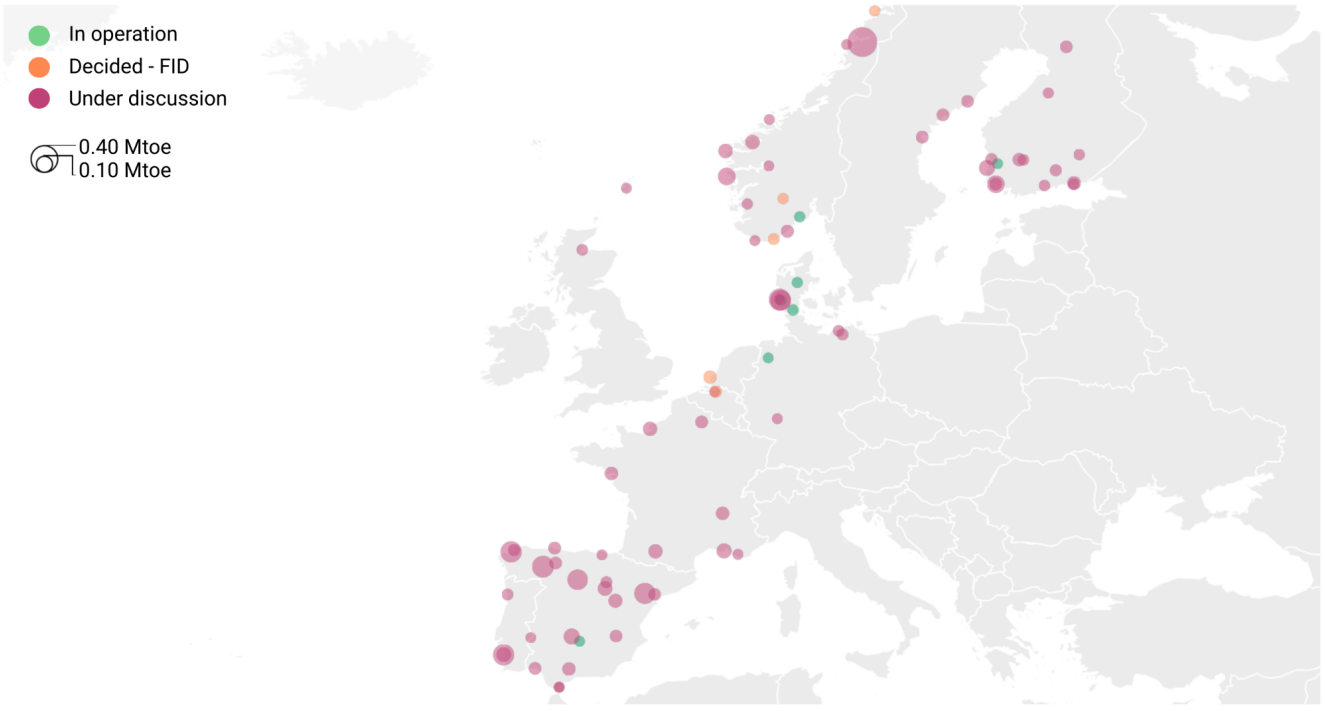
T&E Shipping E-Fuels Observatory (2025) • Includes volumes from pre-FID, post-FID, and operational.

However, while the maritime sector's transition towards e-fuels is slow, it is not backsliding: Denmark's Kassø e-methanol project became operational in 2025 and produces 0.02 Mtoe of e-methanol, part of which already goes to shipping. Countries such as Spain and France have potential volumes up 1.1 Mtoe/year that could potentially serve maritime, while Norway has the highest potential volumes targeting the maritime sector at 0.13 Mtoe annually, primarily in the form of e-ammonia.

1. Context

T&E's shipping e-fuels observatory maps all of the existing, confirmed, and planned green hydrogen and e-fuels production sites across Europe that could target the maritime sector. We consider those projects' feasibility and end users to assess whether Europe's green e-fuels production potential matches shipping's estimated demand based on current policies. Our observatory focuses on green hydrogen and e-fuels produced from renewable electricity, given that these fuel alternatives are the only scalable options with the biggest emission reduction potential, and can be a source of energy for ocean-going vessels that cannot be directly electrified. We published the first version of our e-fuel observatory in May 2024, mapping 60 e-fuel projects linked to the shipping sector. This briefing summarises our updated version of the e-fuels observatory, based on 80 green hydrogen and e-fuel projects (hydrogen, e-methanol, e-ammonia and e-methane), and provides context on the policy environment for e-fuels project development.

Overview of the 2025 shipping e-fuels observatory



1.1 Policy context

Currently, shipping decarbonisation in the EU is driven by measures agreed under the Fit-for-55 package, including the Emissions Trading System (ETS), Fuel EU Maritime Regulation (FuelEU), Alternative Fuels Infrastructure Regulation (AFIR), and Renewable Energy Directive (RED) III.

Most importantly, FuelEU Maritime requires ships that travel to, from or within the EU to reduce the GHG intensity of their energy incrementally, eventually reaching -80% reduction by 2050 from a fossil baseline of 91.16g CO_2e/MJ. It includes a conditional 2% target for renewable fuels of non-biological origin (RFNBO) that will apply to ships from 2034 provided that total RFNBO use has not reached 1% by 2031. This regulation also allows ships to count each unit of RFNBO energy twice (the 'multiplier') in their annual compliance balance until 2033 to encourage their use. At present, this is the only binding legislation that will require ships to use a certain quantity of green e-fuels in the world, albeit at a relatively modest level.

While FuelEU regulates the demand for e-fuels, RED III recommends the incorporation of an indicative target of 1.2% RFNBO supply at European ports by 2030. Member states had until 21 May 2025 to transpose this directive into their national legislation. At this point in time, Denmark is the only country to have done so, without providing an RFNBO supply target for shipping. Germany, the Netherlands, and Spain are expected to transpose the objectives by the end of 2026 while other countries such as Belgium and France – which similarly to the Netherlands are considering incorporating an RFNBO shipping target – are more likely to transpose the directive in 2027.

At the global level, the draft IMO Net-Zero Framework (NZF) was set to implement 'two-tier' GHG reduction targets on the energy used by ships, and penalties for ships that do not meet these targets. However, following the postponement in October 2025 of the decision on adopting the framework, there is significant uncertainty around its implementation. The draft framework itself does not include specific incentives for e-fuels, although many details have been left to 'guideline' regulations.

Given the global uncertainty and the EU's focus on reinforcing its industrial strength and sovereignty, the production and use of RFNBO fuels in Europe remains critical, and would help fulfil many of the EU's core objectives, including those linked to climate change. In fact, in its Sustainable Transport Investment Plan (STIP) published in November 2025, the European Commission recognises that achieving FuelEU GHG emissions reduction targets for 2035 (-14.5%) will require 4.6 Mt of synthetic e-fuels.

2. 2025 e-fuels observatory

According to T&E's observatory, 80 projects in Europe representing a total of 3.6 Mtoe of e-fuel could become operational by 2032.[1] While 2.5 Mtoe of those volumes may target the maritime sector among other industries, just 158,300 toe is linked to projects dedicated primarily to the maritime sector. This level is below the FuelEU's 1% RFNBO threshold for 2031 (estimated at 280,000 toe based on current volumes) and well below the conditional 2% target from 2034,

[1] This level could go up to 4.1 Mtoe when accounting projects *without* an operational date, including 250,000 toe primarily dedicated to the maritime sector.

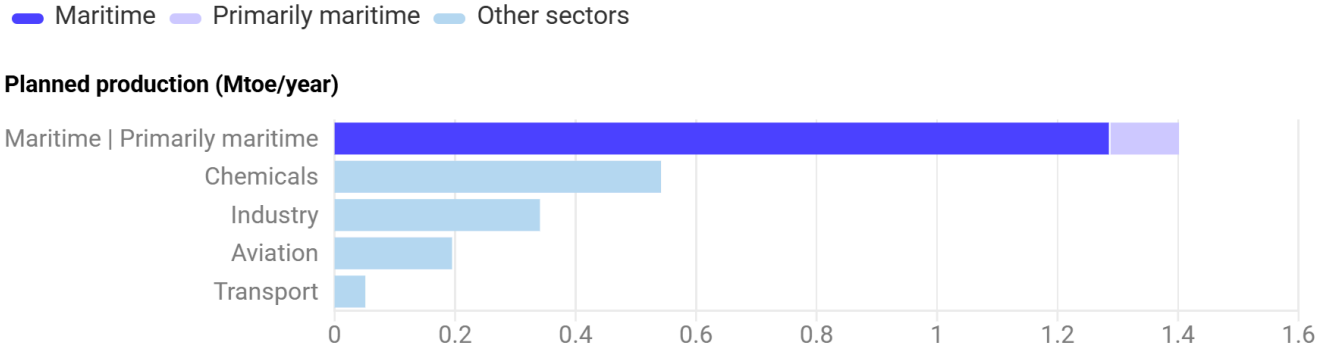
especially considering that only two projects targeting primarily shipping, representing 24,300 toe, are currently operational.

2.1 Overview of e-methanol projects

Out of the 29 projects dedicated to the production of e-methanol, one became operational in 2025. The Kassø project in Denmark (52.5 MW electrolyser power capacity and a projected 42,000 tonnes/year e-methanol production or 20,000 toe) led by European Energy secured an offtake agreement with Maersk to which it delivers part its e-methanol production to power a 30,000 GT containership. **Kassø is the biggest European green e-fuel project dedicated to the maritime sector,** but it is unlikely to be replicated elsewhere in the absence of offtake agreements and a regulatory system that does not mandate or incentivise a greater use of green e-fuels in shipping.

The remaining 28 projects are pre-FID and represent an estimated production potential of 1.38 Mtoe of fuel per year by 2032. Out of those, 19 projects consider the maritime as a potential offtaker, but only three intend to primarily serve shipping. In terms of e-fuel volumes, this means that 0.9 Mtoe could go towards maritime if all these projects become operational, allowing the sector to surpass the 1% threshold.

The maritime sector is the most frequently cited potential offtaker of e-methanol volumes.



T&E Shipping E-fuels Observatory (2025) • Target sectors are those mentioned by producers as potential offtakers. A given volume can be earmarked to two different sectors (e.g. the producer mentioned both maritime & industry as potential offtakers).

The maritime sector is often mentioned as a potential offtaker among e-methanol project owners. E-methanol does not face as difficult technical challenges as green hydrogen or green ammonia, and can already be used onboard ships today: currently, there are 19 methanol-compatible operating vessels representing 5.7 million GT, while an additional 337 methanol-powered vessels representing nearly 30 million GT are on order. The wide potential range of offtakers also plays in favour of e-methanol. For example, several project owners confirmed that **depending on the policy signals from the maritime sector, a potential switch**

towards aviation could be considered, as part of a methanol-to-jet pathway. T&E's Sustainable Aviation Fuel (SAF) observatory published in December 2024 noted that 13 European SAF projects in Europe intended to rely on the methanol-to-JET process. When operational, these could require around 3 million tonnes of methanol per year.

E-methanol & CO_2 sourcing

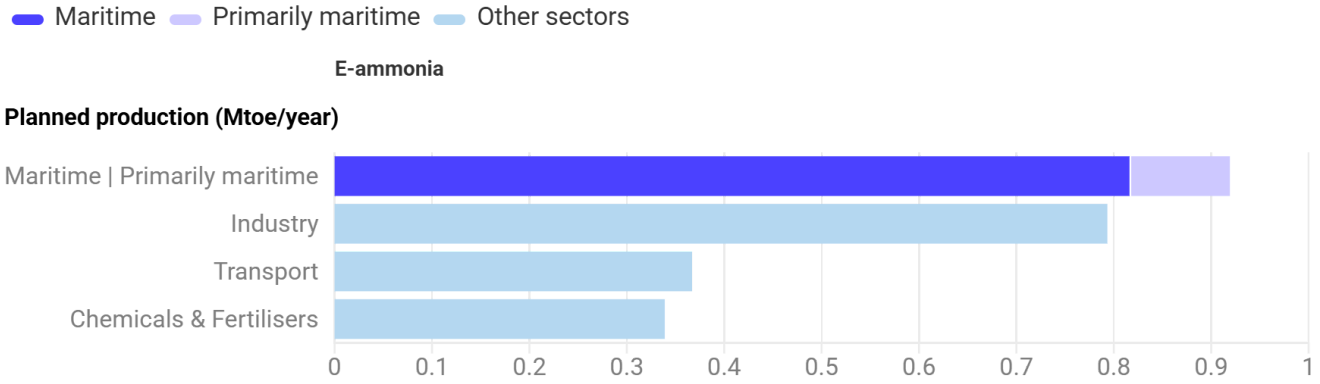
The e-methanol projects in our observatory would result in a projected production of 2.9 Mt tonnes of e-methanol per year by 2032. This would require an estimated 3.9 Mt of CO_2 annually, equivalent to 4.2% of the 92 Mt sustainable, accessible biogenic CO_2 in Europe in 2022. In our observatory, 13 out of 29 e-methanol projects reported CO_2 sourcing information and indicated a preference for biogenic sources (e.g. forest residues, paper pulp waste, biogenic output from cement production). However, several producers perceive access to a concentrated and reliable source of CO_2 as a constraint, with CO_2 concentration often inconsistent, influencing their projects' location, scalability and costs. Three e-methanol producers also confirmed that **not all potential CO_2 source points have established capture and transport infrastructure, for which investment depends on the commercial deployment of e-fuels projects.**

2.2 Overview of e-ammonia projects

Out of the 19 green ammonia projects in our observatory, two are operational. The Puertollano project by Iberdrola and Fertiberia in Spain has been operating since 2022 and produces 3,000 tonnes of green ammonia, while the Herøya Green Ammonia project in Norway by Yara started operating mid-2024 with a production capacity of 20,000 tonnes/year. Both plants are targeting the fertiliser industry, but could switch to serve maritime too, though the estimated production would only amount to 10,000 toe annually. The 17 remaining projects are all pre-FID, with a combined potential of 1.14 Mtoe,[2] and two projects have reached the front-end engineering design (FEED) stage. This includes one Norwegian project requiring additional offtakers before being able to reach FID, and another project in Spain awaiting access to the required grid capacity. This demonstrates the need to tackle the difficulty in finding long-term shipping offtakers, and to address delays in processing grid connection requests.

[2] We noted that 14 e-ammonia projects provided data regarding their projected production volumes,

The maritime sector dominates e-ammonia demand, representing more than twice that of the fertilisers and chemical industries.

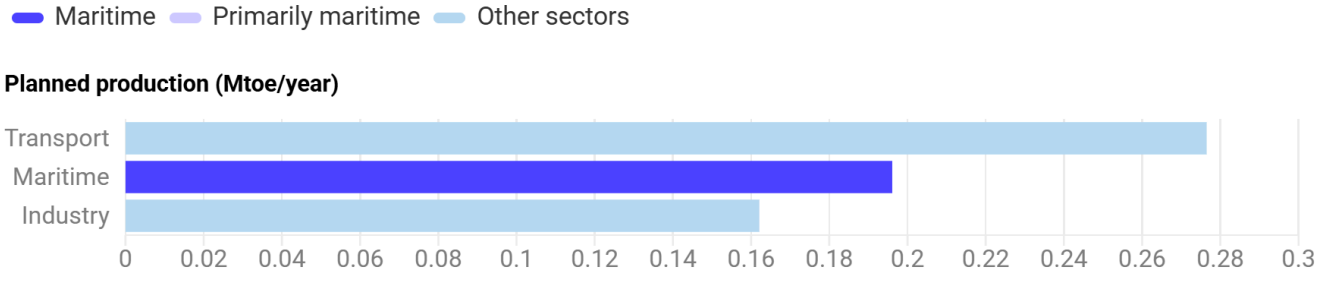


T&E Shipping E-fuels Observatory (2025) • Target sectors are those mentioned by producers as potential offtakers. A given volume can be earmarked to two different sectors (e.g. the producer mentioned both maritime & industry as potential offtakers).

Despite being a less mature fuel option for ships, and the volume of dual-fuel ammonia tonnage on order being 11 times lower than for e-methanol, pre-FID e-ammonia volumes that could serve the maritime sector are not far behind e-methanol – 1.14 Mtoe versus 1.38 Mtoe for e-methanol. A majority of e-ammonia projects consider the maritime as a potential offtaker, followed by general industry, transport and fertilisers. While green ammonia could replace grey ammonia in fertilisers, demand is likely to remain weak in the absence of legislation mandating their use.[3]

2.3 Overview of e-methane projects

No e-methane volumes are primarily dedicated to shipping.



T&E Shipping E-fuels Observatory (2025) • Target sectors are those mentioned by producers as potential offtakers. A given volume can be earmarked to two different sectors (e.g. the producer mentioned both maritime & industry as potential offtakers).

[3] This might not be valid in other world regions. For example, India recently positioned itself as a green ammonia hub with the launch of its green ammonia tender which aims at producing 724,000 tonnes of green ammonia over 10 years to decrease the country's reliance on grey ammonia imports used for agricultural purposes.

Out of the 11 e-methane projects, two are operational in Finland and Germany, and target industry and transport in general, meaning that their production is less likely to benefit shipping directly. The remaining nine projects are all pre-FID; all of them are located in Finland and six of them are developed by the same company (Nordic Ren-Gas). They represent an estimated production potential of 420,300 toe. Out of those projects, only three, with a potential of 196,100 toe, consider the maritime as a potential offtaker, much lower than e-methanol and e-ammonia. This is happening despite a growing number of dual-fuel LNG-powered vessels – there are currently 1,471 LNG-powered vessels in the fleet and 1,003 on order. This also goes against the frequent industry claims that e-LNG will represent a significant part of the pathway for ships switching to LNG.

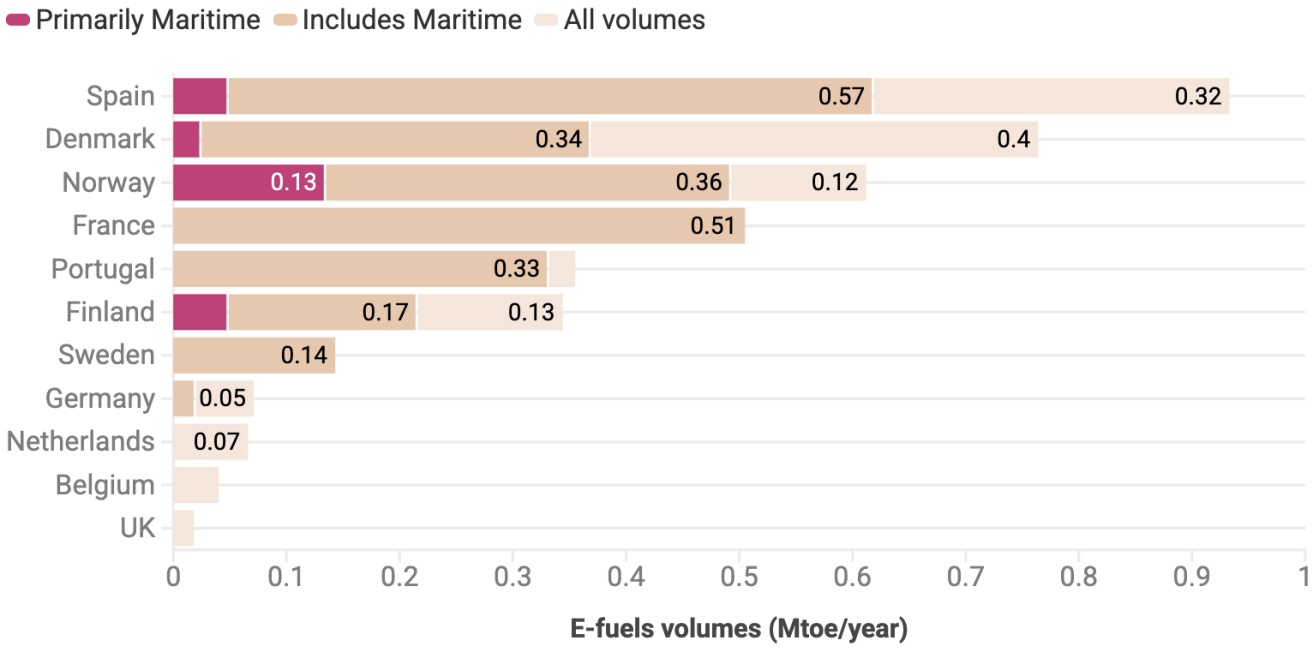
2.4 Overview of green hydrogen projects

Out of the 23 strictly green hydrogen projects, one is operational: the Måde project by European Energy started operating in October 2024, and supplies 1,500 tonnes of green hydrogen for transportation, industry, as well as a mobile shore-power system at the port of Esbjerg. In addition, five other projects have reached FID. Two of these are targeting industry and transport in general, making it less likely that such volumes will reach the maritime sector. But the remaining three projects, all of which are in Norway, intend to deliver compressed hydrogen to ships. These projects include Hydrogen Hub Agder, the Bodø project, and the Rjukan project. The remaining projects are pre-FID and represent 1.15 Mtoe, but only 0.41 of those volumes belong to projects that consider the maritime sector.

3. Leading countries

Spain and Denmark hold the largest potential e-fuel volumes

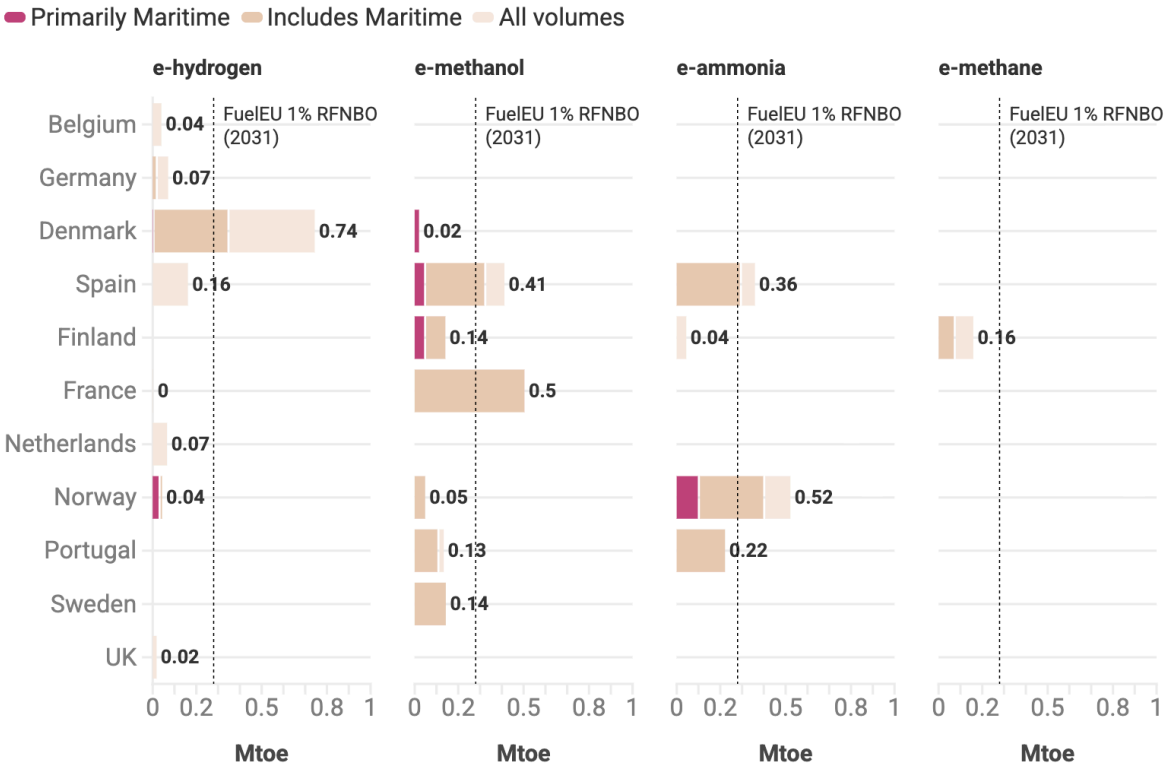
but Norway leads the way on e-fuels dedicated to the maritime sector.



T&E Shipping E-fuels Observatory (2025) • Includes all green hydrogen and e-fuels projects regardless of their development stage (pre-FID, post-FID, or operational). Projected operational dates between 2025 and 2032.

Most green hydrogen and e-fuel production is concentrated in Spain, Denmark, Norway, and France. A significant share of these volumes is intended to supply at least partially the maritime sector – 100% in France, 63% in Spain, 53% in Norway, and 42% in Denmark. However, the picture changes when looking only at volumes primarily dedicated to shipping. Nearly one-quarter of Norway's projected volumes in our observatory target shipping as their main end user primarily through e-ammonia. On the other hand, leading producing countries in our observatory are only dedicating small volumes to the maritime sector – 0.02 Mtoe in Denmark and 0.05 Mtoe in Spain, indicating that the maritime sector is more often targeted among a range of other industrial end-users. Finland is the only other with one e-methanol project dedicated to the maritime sector (0.05 Mtoe).

Volumes dedicated primarily to the maritime sector were only found in Norway, Denmark, Finland, and Spain.

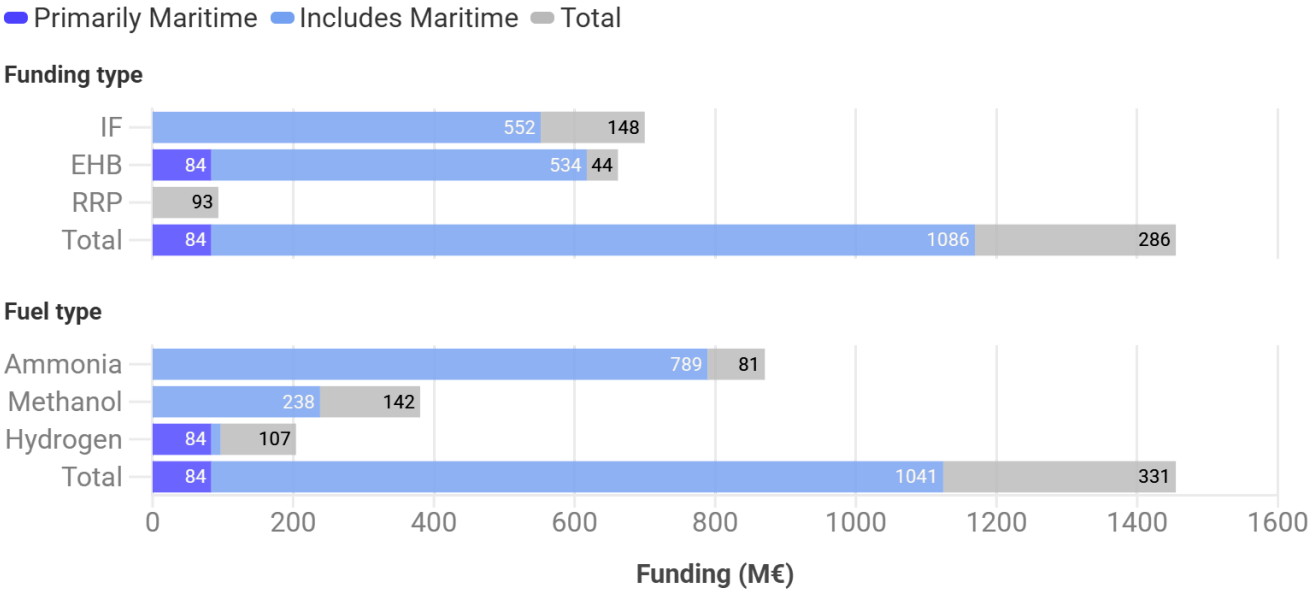


T&E Shipping E-fuels Observatory (2025) • Based on pre-FID, post-FID and operational projects e-fuel projects.

4. Financial support for green e-fuels in shipping

Our research found that 14 projects received some level of EU financial support: six projects were supported by the Innovation Fund, seven by the Hydrogen Bank and one by the Resilience and Recovery Plan. When it comes to supporting hydrogen and e-fuels projects dedicated *primarily* to the maritime sector, the cumulative support from the EU over three years (between 2022 and 2025) amounted to €83.5 million, a small amount in comparison to other schemes.

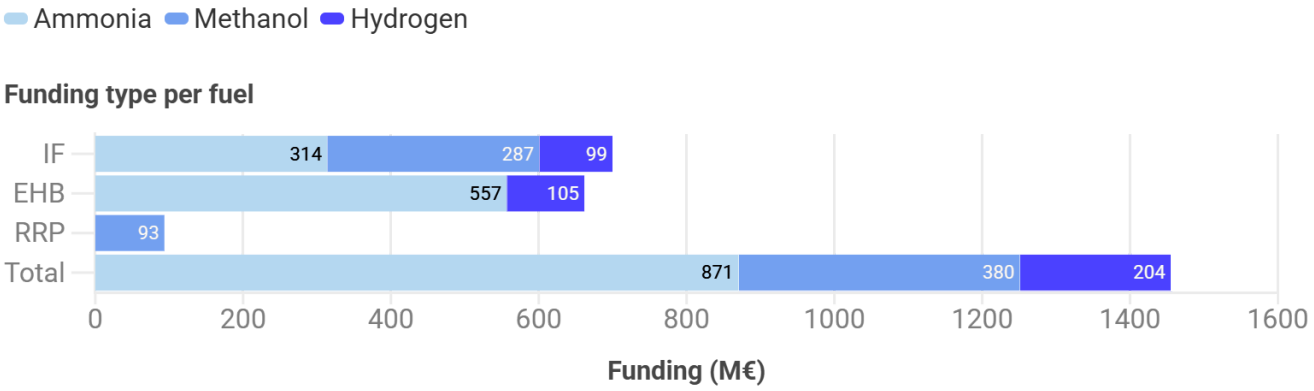
The financial support for projects targeting the sector directly remain small, with €83.5 million over 3 years



Source: T&E Shipping E-fuels Observatory (2025) • Fundings are cumulated from 2022 to 2025. • IF: Innovation Fund, EHB: European Hydrogen Bank, RRP: Recovery and Resilience Plan.

While e-methanol and e-ammonia are e-fuel options that stand out as promising fuel alternatives for the sector, all of the funding directed to maritime-centric projects goes to green hydrogen. Noticeably, the European Hydrogen Bank did not reward any project producing e-methanol, and almost exclusively supported ammonia-producing projects.

The European Hydrogen Bank mostly supports ammonia production



T&E Shipping E-fuels Observatory (2025) • Fundings are cumulated from 2022 to 2025. • IF: Innovation Fund, EHB: European Hydrogen Bank, RRP: Recovery and Resilience Plan.

Policy Recommendations

Considering the slow development of green hydrogen and e-fuels projects dedicated to the maritime sector in Europe – despite the long-term need to accelerate e-fuel uptake in shipping and the potential strategic benefit to the EU – T&E recommends the following policy options to incentivise their use:

- Allocate a share of shipping ETS revenues at the EU level to support RFNBO production in Europe.
- Restrict the EU-wide double-sided auction announced in the Sustainable Transport Investment Plan (STIP) to RFNBOs *only*, given that advanced biofuels are already incentivised through FuelEU which does not allow food and feed crop-based biofuels for compliance purposes.
- Consider increasing the conditional RFNBO sub-quota under FuelEU. Simplify the regulation by removing the 2031 1% RFNBO threshold which sends mixed signals to shipping companies and e-fuel producers.
- Change the way the multiplier is incorporated in the GHG attained formula under FuelEU so that it applies both to the ship *and* pool level.
- Consider encouraging the competitiveness of the European e-fuel industry through dedicated incentives under FuelEU. This could take the form of an obligation for ships calling at EU ports to bunker a specific quantity of EU-made RFNBOs, or incorporating a higher multiplier on the use of EU-made RFNBOs.
- Incorporate the 1.2% RFNBO supply target for shipping suggested under RED III in the national transposition in the remaining member states. Ensure that only RFNBOs are included in this target.
- Establish hydrogen infrastructure deployment targets for the supply and bunkering of e-methanol, e-ammonia and e-hydrogen across TEN-T maritime ports through the Alternative Fuel Infrastructure Regulation (AFIR). Remove the targets for the supply infrastructure of liquefied methane which is already underway and does not need to be further incentivised.
- Incorporate a multiplier of 2 for zero and near-zero (ZNZ) green e-fuels within the GFI compliance guidelines to be developed at the IMO.

Further information

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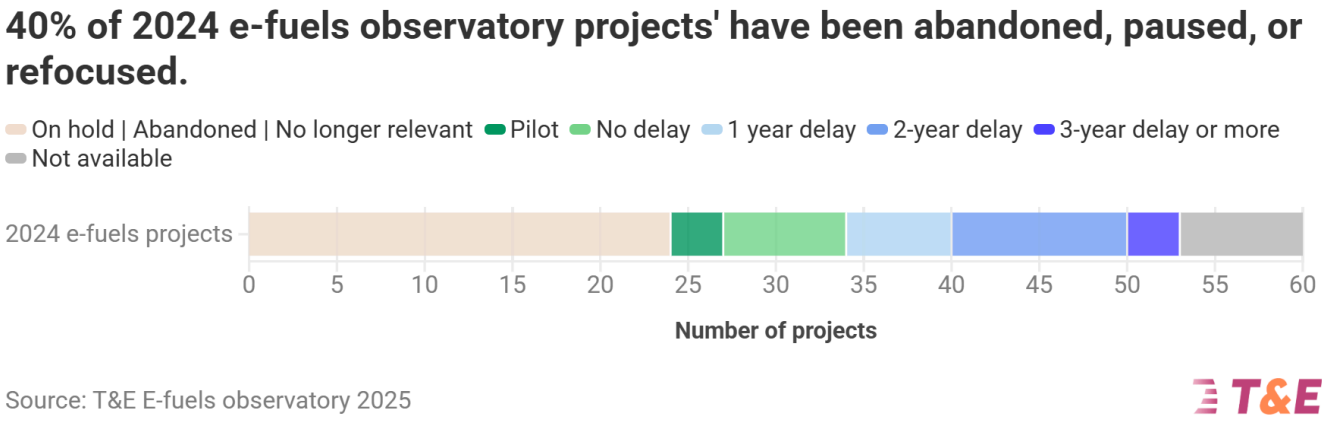
Annex I - Changes from the 2024 Observatory

Out of the 60 green hydrogen and e-fuels projects identified in 2024, 26 projects were found to be either abandoned, on hold, no longer relevant, or pilot projects[4], affecting an estimated 4.5 Mtoe of the 7.4 Mtoe/year previously expected to be eventually available by 2030. If we only consider volumes exclusively targeting the maritime sector, an estimated 0.4 Mtoe out of a projected 1.1 Mtoe meet one of these criteria and are not expected to be realised. Based on the 34 projects that remain viable (55%), 23 are pre-FID with nearly one-third now operating on revised timelines, with announced operating dates delayed by one to two years compared to 2024. Only three projects reported delays of more than three years.



Status update on “operational” and “FID – Decided” projects

Out of the two hydrogen and e-fuels projects categorized as operational in 2024, one remains so. In fact, the Puertollano project by Iberdrola in cooperation with Fertiberia in Spain has been operating since 2022 and currently produces 3,000 tonnes of green ammonia to be used as fertilisers. The other project that was operational and no longer is was a pilot e-methanol project in Iceland by CRI that had been operating since 2012. The reason for this halt appears to be linked to the company refocusing on low-carbon projects in China and Norway.

Out of the 11 “FID - Decided” projects that T&E recorded in 2024, five became operational, two remained categorized as “FID - Decided”, three stayed at a pilot stage, while one was put on hold.[5] The five operational projects represent a small total of 0.07 Mtoe per year, and only two are predominantly targeting the maritime sector while one is focusing first on the fertilisers industry, but could eventually deliver e-ammonia to the maritime sector. Interestingly, the two maritime-focused projects are both in Denmark and are developed by the company European

[4] No longer relevant includes different categories including projects that remained at pilot stage, changed production etc. More details in the methodology section.
[5] While the Hellesylt project by Norwegian Hydrogen was categorized in 2024 as “FID - Decided” and started operating in November 2024, it is classified as a pilot project. The HyDeal España project which was past FID stage is now on hold following withdrawal by AccelorMittal reportedly because of higher-than-anticipated prices.

Energy. However, only one project intends to produce green e-fuels. This ultimately means that out of the 0.10 Mtoe post-FID volumes exclusively or partially targeting shipping that we had assessed in 2024, 0.02 Mtoe became available this year.

The remaining two operational projects classified as "FID - Decided" that may have potentially targeted the maritime sector have taken a different route. The Hysynergy project by Everfuel (20 MW electrolyser capacity & 3,000 tonnes/year green hydrogen production) became operational in February 2025. While the company confirmed that its production could accommodate a range of offtakers including the maritime sector, the current production is used to replace grey hydrogen at a refinery and will be used at a later stage for local mobility purposes (e.g. buses in Germany and the Netherlands). The other project is the H4Chem-El green H_2 plant by the German company BASF (54 MW electrolyser & H_2 production of 8,000 tonnes/year) which was inaugurated in March 2025. BASF confirmed that its hydrogen would be used as a feedstock for chemical products, and potentially later for mobility purposes in the Rhine-Neckar metropolitan region.

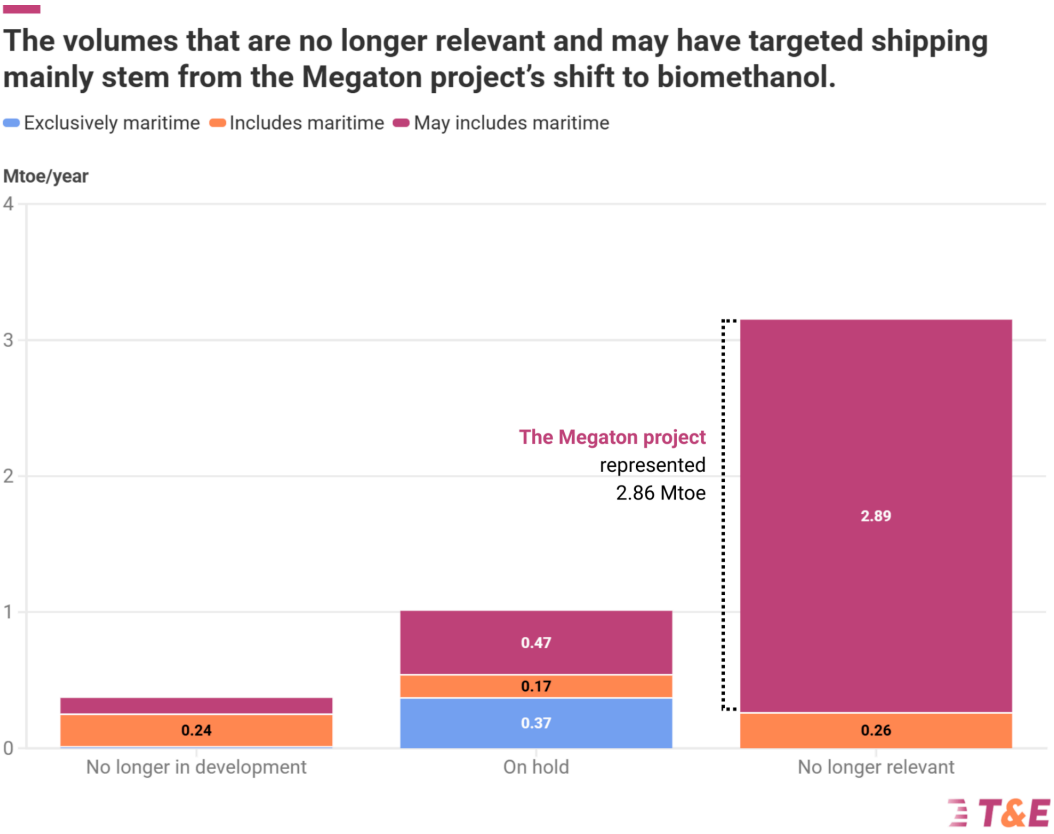
Finally, our research also shows that two projects that had reached FID in 2024 remained in that category. The Hydrogen Hub Agder changed ownership and is now under Greenstat. It is projected to become operational by 2027. In addition, the Bodø project led by GreenH reached FID in January 2025 and will supply 3100 tonnes of compressed hydrogen to ferries operated by Torghatten Nord from 2026 onwards. Both projects are expected to serve predominantly the maritime sector.

Status update on pre-FID projects

Out of the 48 pre-FID projects recorded in 2024, eight European green hydrogen and e-fuels projects representing 0.35 Mtoe/year across are no longer in development. While it is not possible to ascertain the cause, some failed because of poor economic planning and/or overly optimistic economic projections, and a lack of explicit regulatory support. For example, one project in Finland which targeted the maritime sector announced its bankruptcy in June 2025. Rising costs and a lack of long-term offtake agreements, combined with an absence of legislation requiring the use of green e-fuels in shipping reportedly undermined financial institutions' confidence in the project.

In addition, eleven hydrogen and e-fuels projects, representing 1.0 Mtoe/year of green e-fuels or hydrogen, are considered on hold or 'dormant' due to a lack of up-to-date information since 2023, especially following the withdrawal of key company partners, or due to ambiguous publicly available information. For example, the status of the Green Fuels for Denmark project is unclear following the withdrawal in October 2024 of the company consortium led by Orsted. While the green ammonia plant by St1 Nordik OY appears to be awaiting permission for a wind farm, publicly available information announced that the St1 had halted the development as it

failed to obtain the permit needed. Finally, our research found that seven projects were considered to be no longer relevant because of a change of production focus or because they were only intended as pilot projects.



- **From e-fuel production to biofuel production:** The Megaton Project led by GreenGo in Denmark originally aimed to produce 1 Mt (2.87 Mtoe) of green methanol by 2030. In May 2025, the company announced a shift from e-methanol to bio-methanol production in response to "the current reality". This was the biggest planned green e-fuel production site targeting the maritime sector that T&E had recorded in 2024. The change was motivated by the price gap between e-methanol and bio-methanol, and readiness to pay from shipping companies. As a result, the objective now is to produce 340,000 tonnes of biomethanol per year, which can reportedly be produced at lower cost with current feedstocks. This was the only project to make such a change.

- **Target sector change**: Some projects with previously limited information on offtakers confirmed explicitly that shipping was not considered a potential offtaker. For example, the project Green Wolverine in Sweden intends to produce 1 Mt of fossil-free mineral fertilisers with offtakers in the agricultural sector. Another example is the Green H_2 Atlantic project in Portugal which confirmed that it intended to provide green hydrogen to refineries.

- **Pilot project**: We noted that three projects remained at pilot stage. This includes the REDDAP v. Ramme project in Denmark. The project is expected to produce 5,000 tonnes of green ammonia annually and is not intended to be commercial: its production is likely to be used for fertilisers and chemicals, as well for a project between the engine manufacturer MAN and DTU for the development of an ammonia engine (without pilot fuel). The Hellesylt Hydrogen Hub project by Norwegian Hydrogen (3 MW electrolyser capacity and 500 compressed green hydrogen tonnes/year) which was classified as "FID – Decided" in our 2024 observatory also falls in this category.

Annex II - Methodology

This methodological annex provides explanations of the data collection, assumptions, and limitations of the observatory. To update the shipping e-fuels observatory, we first reviewed the status of the green hydrogen and e-fuels projects recorded in our 2024 observatory. We assessed which projects remain viable, which ones are post-FID or operational, and which ones appear to be no longer in development or on hold/dormant. We then consolidated the information of our observatory by searching for additional green hydrogen and e-fuels projects that predominantly or could potentially serve the maritime sector, thus providing a more comprehensive picture of green e-fuels availability by date and location. Finally, we completed this research through bilaterals with 25 green hydrogen and e-fuel producers in Europe.

Similarly to the 2024 e-fuels observatory, we classified viable projects in three categories:

- **In operation OR Operational**: projects that are already producing e-fuels for commercial markets;
- **Decided – FID OR Post-FID**: projects that have received a final investment decision (FID). FID is considered the central condition for the realisation of a project;
- **Under discussion OR pre-FID**: projects that are at any stage before the final investment decision stage, or have a lack of information on the status of operationalisation.

We also classified e-fuels projects according to their targeted offtakers into three categories:

1. E-fuels projects that *primarily* target the maritime sector;
2. E-fuels projects which state that the maritime sector is one of the targeted offtakers, among others;
3. E-fuels projects that intend to target the transport sector more generally, with a possibility this may include maritime. If a project clearly specifies the transport sector/s targeted and maritime is not included, we exclude it.

Other relevant details

1. We relied primarily on open source information including companies' annual and quarterly reports from 2024 or 2025 as well as press releases. Information was also cross referenced with other sources such as articles from Quantum Ammonia and Hydrogen databases and specialised publications including Energy Watch and Hydrogen Insights. We also crossed-checked information on winners of EU Innovation Fund and Hydrogen Bank funding from the years 2022, 2023 and 2024.

2. Whenever possible a direct contact was established with the owner of the project to cross-check online information and obtain more details on the project itself including

information that was not available online. In total, T&E managed to have bilateral conversations covering 60% of the projects in the observatory.

3. Whenever possible, information collected about the project was shared directly with the owner of the project to confirm it, and to check confidentiality. When a project owner did not wish to disclose any information or was not available, T&E generally relied on the owner's website. For at least 30 out 80 projects, we had to rely partly on online information.

4. T&E directly led this data gathering, but cooperated with other organisations, such as the German NGO NABU and Portuguese NGO ZERO, to gather updated project details and contact relevant e-fuel producers in some countries.

5. Information about e-fuels projects was collected between 1 April 2025 and 30 August 2025. After that date, only information shared by project developers directly with T&E was added.

6. Regarding production potential, the projected total production was considered, except when the fuel provider segmented the projected production in multiple phases – in that case we used 'first phase' quantities corresponding to project startup. We did not exclude projects based on a fuel quantity threshold. For 15 projects, no information was available on production potential, so we assume 0 tonnes/year in any totals

7. In the 2025 edition of the observatory, we decided to include projects producing methane from green hydrogen. As with other fuels, if an e-methane project intended to only produce e-methane for the gas grid, or other industries, and did not specify that maritime or more broadly transport could be an end user, it was not included in our observatory.

Annex III - List of projects

Project name	Project developer	Country	Operational date (or projected)	Project status	Electrolyser capacity (MW)	green hydrogen (tonnes)	e-ammonia (tonnes)	e-methanol (tonnes)	e-methane (tonnes)
Airpark Laage	Apex Energy Teterow GmbH, East Energy Verwaltungs GmbH	Germany	2029	Pre-FID	100	10,000			
Albacete project	ET Fuels	Spain	Not available	Pre-FID				100,000	
Årdalsfjorden in Fiskå industrial area	GreenH, Brødrene Nordbø	Norway	Not available	Pre-FID	Not available				
Arendal	North Ammonia	Norway	2029	Pre-FID			130,000		
Armonia Green Galicia	IGNIS	Spain	2028	Pre-FID	200		145,000		
Athena	Alkeymia	Spain	2030	Pre-FID	300		150,000		
ATLANTIS	Hy2gen	Germany	In operation	In operation	Not available				
Begonia	Alkeymia	Spain	Not available	Pre-FID	260			140,000	
BENORTH2 (ABoroa power plant)	Nortegas	Spain	2030	Not available	200				
Berlevåg Green ammonia value chain project	Varanger Kraft, Aker Clean Hydrogen	Norway	2028	Pre-FID	110				
Bodø hydrogen	GreenH, Luxcara	Norway	2026	Decided - FID	20.0	3,100			
Cádiz - Campo de Gibraltar Park	Moeve, C2X	Spain	Not available	Pre-FID	500				

Conseil I	Hy2Gen	Germany	Not available	Pre-FID	2.0	312			
Cromarty Hydrogen Project	Storegda, Scottish Power	UK	Not available	Pre-FID	10.6	6,400			
Deméter	Alkeymia	Spain	Not available	Pre-FID	200		160,000		
E-CHO	Elyse Energy	France	2031	Pre-FID				200,000.00	
E-methane Facility	Arctic Sisu Corporation Oy	Finland	2028	Pre-FID					69,654
EF Övik	Liquid Wind	Sweden	2029	Pre-FID	150			100,000	
ELYgator	Air Liquide	Netherlands	Not available	Decided - FID	200	23,000			
eM-Numancia	Elyse Energy	Spain	2028	Pre-FID				50,000.00	
eM-Rhone	Elyse Energy	France	2029	Pre-FID	240			150,000.00	
Enhance project	Air Liquide	Belgium	Not available	Pre-FID	Not available				
ErasmoPower 2X	Power2X, The Canadian Pension Plan Investment Board (CPPIB), Ekhi Energy	Spain	2029	Pre-FID	650	55,000			
Finnfjord E-methanol plant	Carbon Recycling international (CRI)	Norway	2031	Pre-FID				100,000.00	
Flagship Three	Liquid Wind, Umeå Energi	Sweden	2028	Pre-FID	150			100,000.00	
Flagship Two	Liquid Wind	Sweden	2029	Pre-FID	150			100,000.00	

FS4 Haapavesi	Liquid Wind	Finland	2031	Pre-FID	150			100,000	
FS7 Naantali	Liquid Wind	Finland	2031	Pre-FID	150			95,000	
Gen2-LH2	Gen2 Energy	Norway	Not available	Pre-FID	150				
Green Coast	Elyse Energy, Lhyfe	France	2031	Pre-FID	210			150,000	
Green Hydrogen Mobility Project	Fusion Fuel	Portugal	Not available	Not available					
GREEN MEIGA Project	Iberdrola, Foresa	Spain	2027	Pre-FID	151			100,000	
GreenH Kristiansund (Vestbase)	GreenH, NorSea Group	Norway	Not available	Pre-FID	10				
H2 Energy Esbjerg	Morgen Energy	Denmark	2030	Pre-FID	1000	135,000			
H2Driven	Dourogás and Capwatt	Portugal	2027	Pre-FID				50,000	
HammerfestH 2	Green H	Norway	2029	Pre-FID	Not available				
Harjavalta P2G	P2X Solutions	Finland	2024	In operation	20				
Herøya Green Ammonia	Yara	Norway	2023	In operation	24		20,000		
Holmaneset GAP	Fortescue, Holmaneset H2	Norway	2027	Pre-FID	280		226,000		
HØST	Copenhagen Infrastructure Partners (CIP)	Denmark	2029	Pre-FID	1000	120,000			
Hydrogen Hub Agder	Greenstat (Francaise de l'Energie)	Norway	2027	Decided - FID	20.0	8,000			

Hyoffwind plant	Virya Energy	Belgium	2027	Decided - FID	25	14,000			
Hysencia	Angus Enterprise	Spain	2027	Pre-FID	35	1,689			
HyTech Port Rostock	Rostock Energy Port cooperation GmbH	Germany	2028	Pre-FID	100	6,500			
Iverson	Hy2Gen, Copenhagen Infrastructure Partners (CIP)	Norway	2030	Pre-FID	270		200,000		
Kassø	European Energy	Denmark	2025	In operation	52.5			42,000.00	
Kerava	Nordic Ren-Gas	Finland	2029	Pre-FID	50				13,200
Korgen	Fuella	Norway	2032	Pre-FID	500		400,000		
Kotka	Nordic Ren-Gas	Finland	2029	Pre-FID	50				13,200
La Robla Green	Reolum	Spain	2027	Pre-FID	200			100,000	
Lahti	Nordic Ren-Gas	Finland	2028	Pre-FID	100				26,400
Måde	European Energy	Denmark	2024	In operation	3.0	1,500			
Madoqua Power2X	Power2X, Madoqua Renewables, Copenhagen Infrastructure Partners (CIP)	Portugal	2030	Pre-FID	500		500,000		
Metanol-projekt ved Nordjyllandsværket	Aalborg Forsyning, Reno-Nord, CIP	Denmark	Not available	Pre-FID					

Methavert	Qair	France	2030	Pre-FID	150			200,000	
Mikkeli	Nordic Ren-Gas	Finland	2030	Pre-FID	50				13,200
Musel GreenMet	HyFive	Spain	2027	Pre-FID	100			100,000	
Naantali project	Green North Energy	Finland	2029	Pre-FID	280		100,000		
NeoCarb	Elyse Energy	France	2031	Pre-FID	399			250,000	
Nokia (Tampere)	Freija AS	Finland	2029	Pre-FID					58,000
OrCHyDé	Verso Energy, RTE	France	2029	Pre-FID	270			110,000	
Pilar (part of Hyberus)	Alkeymia	Spain	2029	Pre-FID	200		150,000		
Pilatus (part of Hyberus)	Alkeymia		2028	Pre-FID	50			36,000	
Pori	Nordic Ren-Gas	Finland, Aittaluoto & Kirrinsanta	2030	Pre-FID	100				26,400
Power-to-X	NeoGreen	Portugal	2027	Pre-FID	330			230,000	
Project Catalina	Copenhagen Infrastructure Partners (CIP), Enagás, Naturgy, Fertiberia, Vestas	Spain	2028	Pre-FID	500		200,000		
Project Skiga	Fuella	Norway	2030	Pre-FID	130		100,000		
Puertollano	Fertiberia, Iberdrola	Spain	2022	In operation	20.0		3,000		

Ranua project	ET Fuels	Finland	Not available	Pre-FID				100,000	
Rjukan project	Norwegian Hydrogen	Norway	2027	Decided - FID	25	3,665			
San Roque Ammonia (Huelva Energy Park)	Moeve, C2X	Spain	2028	Pre-FID	400				
Sandnessjøen	GreenH, Helgeland Havn	Norway	2027	Pre-FID	20				
Shetland Hydrogen Project 2	Statkraft	UK	2032	Pre-FID	400				
Sierra sur	Alkeymia	Spain	2030	Pre-FID	200			90,000	
Slagentangen – Tønsberg	GreenH, Esso Norge, Grieg Edge and North Ammonia	Norway	2027	Pre-FID			100,000		
Sophya (part of Hyberus)	Alkeymia	Spain	2029	Pre-FID	160			93,000	
Sunrhyse	Hy2Gen	France	2026	Pre-FID	4	500			
Tampere PtG	Nordic Ren-Gas	Finland	2028	Pre-FID	50				13,200
TES + CPC	TES, CPC Finland - Luoto energia Oy	Finland	Not available	Pre-FID	500				125,000
Triskelion	Forestal Del Atlantico	Spain	2028	Pre-FID	52			57,000	

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