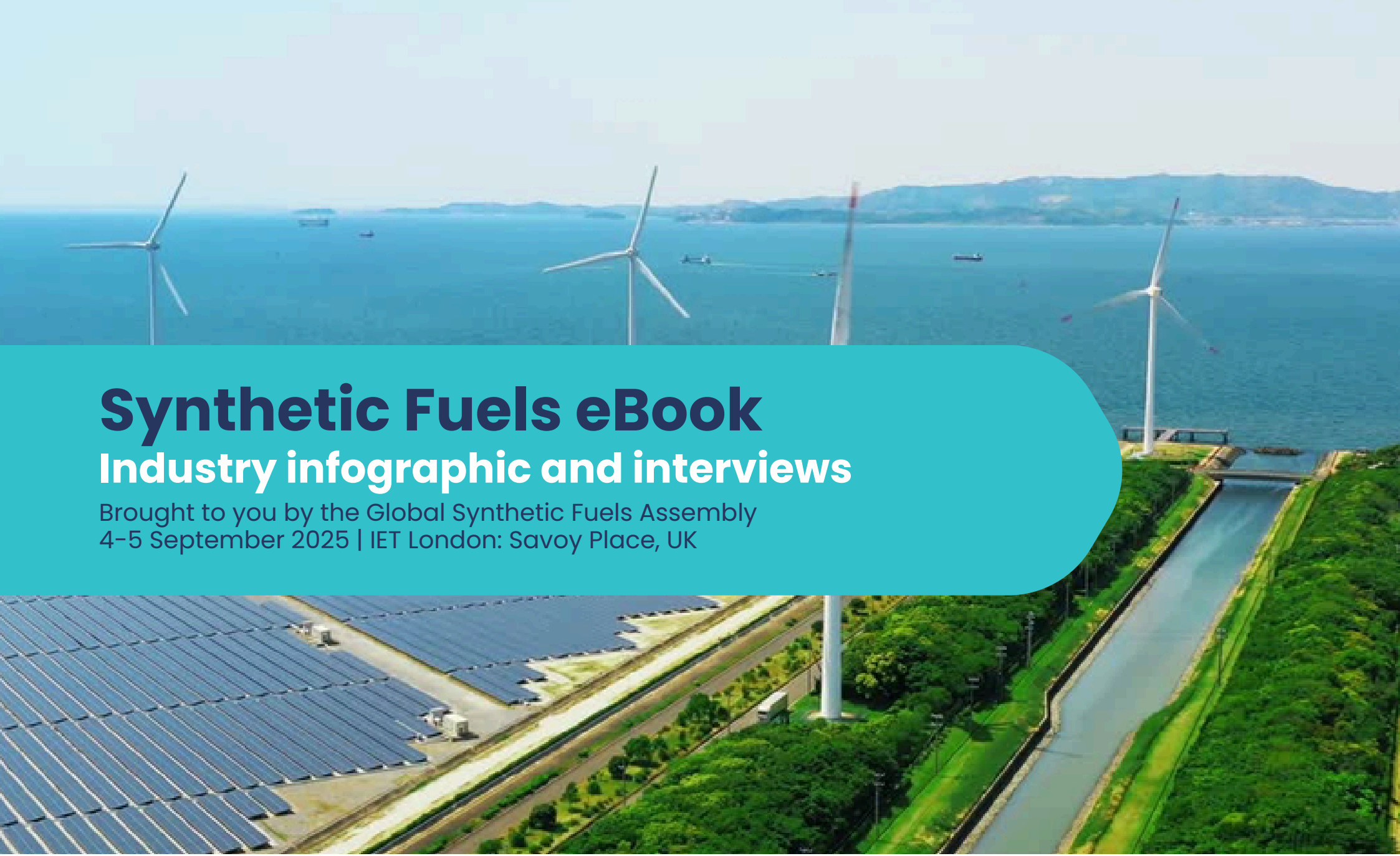

Synthetic Fuels eBook

Industry infographic and interviews

Brought to you by the Global Synthetic Fuels Assembly
4-5 September 2025 | IET London: Savoy Place, UK

the energy huddle

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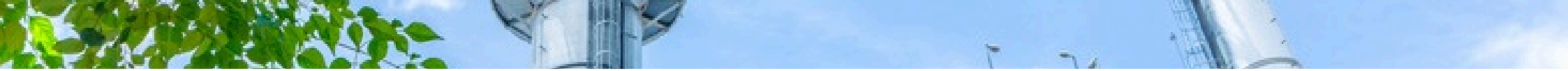


The path to viability: Challenges and accelerating the rise of synthetic fuels

Welcome to our Synthetic Fuels eBook - and thank you for joining the conversation. The global transition to cleaner energy has never felt more urgent, or more complex. As governments and industries accelerate decarbonisation efforts, **synthetic fuels are emerging as a key part of the solution**. They'll also play an important role in meeting the EU's 2028 target, which requires at least 2.6% of transport fuels to come from renewable fuels of non-biological origin (RFNBOs). Synthetic fuels have emerged as a promising solution for the aviation, shipping, road transportation industries due to their:

- *ability to integrate with existing supply chains*
- *compatibility with current storage and fuelling infrastructure*
- *climate-neutral potential when produced using renewable resources.*

But while the potential is clear, the path to commercial viability remains challenging. Across Europe and globally, synthetic fuel projects have been announced but many remain in feasibility or FEED stages. As of mid-2025, fewer than 5% of planned projects globally have progressed past the development stage. So how can the market accelerate progress? Much of the focus now lies in better alignment between industry and finance: sharing risk more effectively, standardising project metrics, and securing long-term offtake agreements that provide revenue certainty. Accelerating Final Investment Decisions (FIDs) will also require addressing persistent roadblocks, including high capital and operating costs, feedstock limitations, and financial models that are often misaligned with market realities.

Despite strong policy signals such as the EU's ReFuelEU Aviation regulation, and new EU subsidy plans, the challenge of **unlocking eFuel supply** still remains. Commercial-scale eSAF production facilities are still in development with industrial volumes not expected until 2026 or later. In addition to supply uncertainty, our community is also challenged with high costs, limited feedstock availability, and an uncertain regulatory and incentives environment. The sector is looking to international oil companies (IOCs) to take the lead, but progress also depends on **evolving financial structures** and the **ability to secure longer-term offtake agreements.** Securing feedstock at a reasonable cost remains a challenge, and hydrogen producers are weighing their options, whether to enter the market directly or commit to further processing into eFuels. Infrastructure development and the establishment of green hydrogen corridors from regions rich in renewable energy will also play a key role in accessing lower-cost feedstocks.

This eBook aims to unpack these challenges - and the progress - across the full synthetic fuels value chain. Through interviews with project developers and policy experts, we explore what it really takes to get a project off the ground. To complement these insights, we present findings from our industry-wide survey, where we've asked: *What's the biggest challenge you face today? What do you see as the biggest technological challenge for fuel development? What keeps you up at night?*

One recurring theme is clear: **no single player can build this market alone**. Strategic partnerships across technology, project developers, finance, regulation, and offtakers will be the cornerstone of any project that reaches scale. That's why we're also proud to announce the launch of the first annual **Global Synthetic Fuels Assembly**, taking place on 4–5 September in London. It's a space for real dialogue, relationship-building, and knowledge exchange, exactly what this emerging industry needs to move forward, together. I look forward to continuing the conversation with you there.

Bryony Senczyszyn
Founder,
The Energy Huddle

Lara Naqushbandi
CEO,
ETFuels

In your opinion, what is the most exciting movement within the synthetic fuels market?

The most exciting development is regulatory clarity. Once you do the math, FuelEU Maritime creates a clear and compelling business case for e-methanol by 2030. The regulation already defines a framework that makes e-methanol commercially viable - with 2x multipliers, high penalties for non-compliance, and tradable credits that bring e-methanol close to or even below cost parity with conventional fuels.
At a global level, the IMO now has a decarbonisation mandate in place - this is transformational, especially compared to SAF which still lacks global regulation. We expect October to confirm further global subsidies for e-fuels, alongside rising carbon prices. Together, these factors are poised to unlock serious investment and global demand for e-fuels.

What's the biggest hurdle currently facing your industry?

Offtake. The challenge is educating and enabling customers to:

- Understand the regulatory framework and how it underpins a strong economic case for e-fuels
- Differentiate real, competitive e-fuel projects from the noise
- Build a realistic picture of 2030: pricing and availability of biofuels, e-fuel supply/demand dynamics, and the financial upside of over-compliance
- Shift customer mindsets from just buying fuel on spot contracts to meet energy requirements, to actually taking a more strategic approach to fuel procurement that considers not just energy but also ensuring security of supply of the scarce green fuels needed to avoid hefty compliance penalties.

Are there any exciting new projects that ETFuels is involved in?

Yes - our first project, Rattlesnake Gap in Texas, is set to deliver 126,000 tonnes per annum of ultra-low carbon, cost-competitive e-methanol starting in 2030. The site benefits from world-class wind, and we have already secured all necessary feedstocks, including additional renewable power and biogenic CO_2 as well as a number of worldclass partnerships across the value chain.

If there was one thing keeping you up at night, what would it be?

Bringing together the many parts of the project in a way that ultimately benefits all stakeholders.

Lara Naqushbandi
CEO,
ETFuels

Why is collaboration so important in the synthetic fuels industry?

This challenge is too big for any single player. It's essential to find partners who are aligned in purpose and to build toward shared outcomes.

What makes the Global Synthetic Fuels Assembly a great platform to discuss these topics?

I'd need to experience it more fully to answer that, but there is clearly value in bringing the right stakeholders into the room to align on challenges and solutions.

Monika Rybakowska
Policy Director,
Airlines for Europe

What is the biggest hurdle your industry is currently facing?

The single biggest hurdle is creating a functioning synthetic fuel-or eSAF-market in Europe. Today, eSAF is produced in negligible volumes, at only a handful of sites globally. The cost gap between eSAF and conventional kerosene remains vast, and we need the policy tools to close it. Without mechanisms like a market intermediary and/or Contracts for Difference, as well as proper reuse of ETS revenues in the form of SAF allowances or SAF allocations under the ETS Innovation Fund it's extremely difficult to attract the large-scale investment needed. We also need to prioritise aviation's access to renewable electricity and hydrogen. Europe has set ambitious mandates for fuel suppliers through ReFuel EU and now is the time for the European Commission and Member States to invest in the SAF industry and help derisk the offtakes. Mandates themselves will not create a market. We need urgent action to turn them into real supply.

If there was one thing keeping you up at night, what would that be?

It's the risk that Europe misses its moment to lead on synthetic fuels and SAF more broadly. SAF is 56% of aviation's decarbonisation pathway (Destination 2050). We have the engineering know-how, strong sustainability standards, and political ambition—but we're not yet delivering the conditions to scale up production. Fuel suppliers are withdrawing from renewables and returning to fossil fuels, discouraged by a lack of clarity and investment support. Meanwhile, global competitors are racing ahead with strong public-private support. If we don't build this market now - with the right blend of policy stability, financial tools, and investor confidence - the cost burden will grow and European competitiveness will suffer. The cost of doing business is rising fast – driven by more stringent regulations than elsewhere. By 2030, we estimate it will reach €27.6 billion for A4E airlines; by 2050, the annual SAF cost for A4E members is estimated at €33 billion. As estimated by the updated Destination 2050 Roadmap, the total cost of aviation's transition to net zero is now projected at €1.2 trillion – up €500 billion from 2023 estimates.

- That is why, in the EU the Sustainable Transport Investment Plan must:
- Kick-start a true EU Aviation Strategy
- Help manage transition costs for airlines and passengers
- Support SAF scale-up across all technologies (HEFA, eSAF, advanced biofuels)
- Recycle EU ETS revenues into SAF and extend SAF allowances post-2030

Why is collaboration so important for the synthetic fuels industry?

Monika Rybakowska
Policy Director,
Airlines for Europe

Because the barriers we face are structural and cannot be solved by any one actor alone. We need joined-up efforts across industry, government, and finance to address the chicken-and-egg dilemma of supply and demand. This means for example designing market intermediary mechanisms - so producers and airlines can sign long-term contracts with confidence. It means increasing and expanding the SAF allowances and changing the ETS Innovation Fund rules to ensure that SAF projects are truly bankable. And it means investing not only in PtL production, but also in supporting infrastructure - hydrogen transport, renewable electricity access, and CO_2 sourcing. Collaboration is the only way to tackle these interdependencies and fast-track the emergence of a real e-fuel market.

What makes the Global Synthetic Fuels Assembly a great platform to discuss these topics?

This event is one of the few that truly connects the dots—from technology developers and investors to policymakers and offtakers like airlines. That ecosystem approach is exactly what we need. As long-term customers of synthetic fuels, airlines are ready to commit - but only if the right enabling framework exists. The Assembly gives us a space to align on the financial instruments, regulatory reforms, and shared priorities needed to accelerate deployment. It helps transform isolated pilot projects into a full market ecosystem. And crucially, it keeps the focus on collaboration - not competition - between the actors that must make this transition work.

What excites you most about the momentum behind synthetic fuels today?

What's exciting is that synthetic fuels are no longer a distant solution - they're now part of real policy, real planning, and real investment strategies. The ReFuel EU mandates, the growing number of PtL projects, and the push for intermediary support mechanisms show that we're moving from theory to action. There's strong momentum around integrating aviation into Europe's broader green industrial policy. If we can now follow through - by scaling support under STIP, unlocking ETS revenues, and ensuring a level playing field - we have a genuine opportunity to lead globally in clean aviation fuels. That vision is within reach, and it's energising the entire value chain.

**these views on the market reflect the position in May/June 2025?*

Moritz Schwencke
CEO and Co-Founder,
Eternal Power

In your opinion, what is the most exciting movement within the eFuels market?

The eFuels market is accelerating, driven by industry demand, tech advances, and policy support. The required industrial pull in key sectors like aviation and shipping are adopting hydrogen and its derivatives as sustainable alternatives, with companies like Maersk, United Airlines and others assessing and investing. Policies like the EU's RED III and U.S. tax credits or EU ETS - although some adoptions would be helpful - start to give the necessary policy framework, establishing demand (for instance for SAF), while production costs will fall once production is ramping.
Though challenges remain in cost competitiveness, especially in the early phases of the market, eFuels have the potential to reshape energy markets and aiding decarbonization in hard-to-abate industries. The next 3–5 years will be critical for proving scalability - making this one of the most dynamic spaces in clean energy today.

What's the biggest hurdle currently facing your industry?

The primary challenge remains the high cost of production relative to fossil fuels. While green hydrogen and eFuels offer a sustainable alternative, scaling up requires significant infrastructure investments and regulatory support. In this context, advancements in the Renewable Energy Directive III (RED III) and the qualifications for Renewable Fuels of Non-Biological Origin (RFNBO)-compliant projects are particularly crucial. A major obstacle is the additionality criterion, which imposes extensive investment requirements and thereby hinders the broader development of production. As a result, the adoption and scaling of production are slowed, as first movers face increased financial burdens while essential infrastructure remains insufficient.

Are there any new exciting projects that Eternal Power is involved in?

Eternal Power is actively advancing two key projects that mark the first industrial deployment of its green hydrogen solutions.
The first project is located in Dummerstorf, Northern Germany, featuring an 80 MW electrolyzer with a planned expansion to 300 MW. Currently in the PRE-FEED phase, the project has already secured an offtake termsheet valued at €2.8 billion. The Final Investment Decision (FID) is scheduled for 2026.
The second project is in Piteå, Sweden, where a 400 MW electrolyzer is being developed to produce e-methanol. This project is also in the PRE-FEED phase, with an expected FID in 2026.
Both projects reflect Eternal Power's commitment to large-scale hydrogen deployment, leveraging economies of scale to enhance cost efficiency and ensure long-term viability.

If there was one thing keeping you up at night, what would that be?

Moritz Schwencke
CEO and Co-Founder,
Eternal Power

A key concern is the ability to bridge the gap between technological feasibility and commercial scalability. While significant advancements in electrolysis, carbon capture, and fuel synthesis are being made constantly, the challenge lies in securing the necessary investment, policy frameworks, and offtake agreements to ensure project bankability. The speed at which regulations evolve to support synthetic fuels will ultimately decide the industry's trajectory and how fast the transition will be able happen. Encouragingly, the industry's willingness to transition toward a more sustainable future through hydrogen and its derivatives is evident. However, for this momentum to translate into large-scale deployment, governments must recognize this shift and establish the regulatory and financial mechanisms needed to accelerate the transition.

Why is collaboration so important for the synthetic fuels industry?

Collaboration is essential due to the complex nature of synthetic fuel production and deployment, which involves a value chain that spans multiple industries, often previously unconnected. Successful integration of these industries is key. These include renewable energy providers, electrolyzer manufacturers, carbon-emitting companies, carbon capture specialists, and fuel distributors. Additionally, as the industry is still in its early stages, many critical infrastructure requirements are not yet in place on a large scale. Consequently, local authorities must play a pivotal role in facilitating projects within their regions by providing the necessary support.
Ultimately, it is evident that no single entity can drive this transformation alone. Public-private partnerships, cross-sector alliances, and international cooperation are crucial for overcoming cost barriers, ensuring infrastructure readiness, and creating demand certainty for eFuels.
An illustrative example of this is the CO2 input required for the synthesis of eFuels. To obtain CO2 at a competitive price, carbon-emitting companies must be willing to adapt their facilities to capture it. While this is technically feasible, many companies are not initially set up to do so, requiring openness and a willingness to cooperate and transform in ways they had not originally anticipated.
Summing up, since the hydrogen market is highly complex and with billion CAPEX investments, it is crucial that market participants cooperate in order to jointly walk the first steps of the talk. We sometimes call this “hydrogen is teamwork”!

What makes Global Synthetic Fuels Assembly a great platform to discuss these topics?

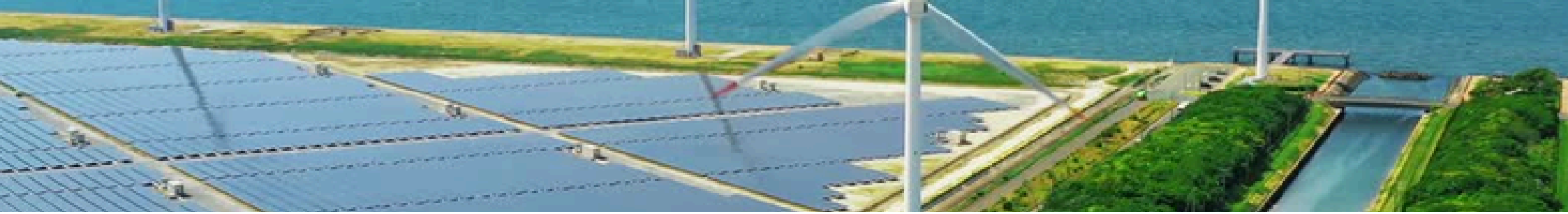
The Global Synthetic Fuels Assembly brings together industry leaders, policymakers, and technology innovators to address critical challenges and opportunities in the eFuels sector. The event serves as a hub for knowledge exchange, fostering collaboration, investment strategies, and technological breakthroughs. By convening key stakeholders, it accelerates the development of viable

Moritz Schwencke
CEO and Co-Founder,
Eternal Power

pathways for scaling synthetic fuels and supports the global transition to a low-carbon energy system.

What is the mission and vision for Eternal Power as a company?

Eternal Power's mission is to actively shape the green hydrogen market as a pioneer. The company aims to develop, construct, and operate hydrogen production facilities and its derivatives on a global scale, thereby running down the cost curve to achieve “cost leadership”, as economist Michael Porter outlined in his competitive strategies.
The strategic vision is to establish itself as an integrated global producer of green hydrogen, with a particular focus on transforming hard-to-decarbonize sectors such as shipping. To achieve this, Eternal Power is committed to building scalable and cost-efficient hydrogen production and logistics. The initial focus is on industrial applications to create a strong demand base and leverage economies of scale to reduce costs.
Additionally, Eternal Power is dedicated to developing infrastructure projects that ensure the safe and efficient transport of hydrogen. This will lay the foundation for broader adoption, including in private markets, once these applications become economically and technologically competitive.
With that, Eternal Power aims to combine both an attractive RoI for its shareholders and a fast track for decarbonization for the environment.



Deniese Ramsundarsingh
Development Director,
HYRO, Octopus Energy Generation

What's the biggest hurdle currently facing your industry?

Getting grid connection, sourcing the renewable power to produce green hydrogen whether it is direct wire or PPA, conflicting policies that means CO_2 is being taken away as an input molecule.

In your opinion, what is the most exciting movement within the synthetic fuels market?

New business models where there is more collaboration along the value chain.

Are there any new exciting projects that HYRO, Octopus Energy Generation is involved in?

Yes, there are and these are early stages for e-fuels.

If there was one thing keeping you up at night, what would that be?

All the biggest hurdles mentioned above.

Why is collaboration so important for the synthetic fuels industry?

Because old business and commercial models will not work to get us to where we need. Old models do not consider the kinds of new risks and how to mitigate them hence old models will add more costs.

What makes Global Synthetic Fuels Assembly a great platform to discuss these topics?

Connecting with others trying to solve the same problems.

Gunnar Holen
CEO,
Nordic Electrofuel

In your opinion, what is the most exciting movement within the synthetic fuels market?

I find that this represent a unique opportunity to decarbonise aviation in an affordable way where we can utilise existing infrastructure.

What is the biggest hurdle your industry is currently facing?

To get projects bankable. We are developing projects which are first of its kind. As such investors and banks sees risks in this. This need to be bridged by long term offtake contracts which aviation companies is not used to provide and for EPC providers to make EPC wraps which is expensive.

Are there any exciting new projects that Nordic Electrofuel is involved in?

Yes we have a series of very exciting projects in Norway and the Middle East. I can see an overview if wanted.

If there was one thing keeping you up at night, what would that be?

It is to get the first projected equity funded.

Why is collaboration so important for the synthetic fuels industry?

We are developing an completely new industry. To get this of the ground all players need to cooperate in order to get it going.

What makes Global Synthetic Fuels Assembly a great platform to discuss these topics?

I understand you will be bringing together representatives from across the value chain. Regulators, project developers, financiers, EPC providers etc.

Geert Decock
Electricity & Energy Manager,
Transport & Environment (T&E)

In your opinion, what is the most exciting movement within the synthetic fuels market?

There is a growing realisation among experts and industry that green hydrogen and synthetic fuels will be expensive and need to be targeted at sectors, where electrification is not an option. Hopefully, politicians will catch up soon.

What's the biggest hurdle currently facing your industry?

E-fuels producers are struggling to find airlines and shipping companies willing to sign the long-term off take agreements needed to secure their Final Investment Decision.

Are there any new exciting projects that Transport & Environment is involved in?

T&E is advocating to use a H2Global style 'clearing house' to enable the long-term off take agreements for e-fuel producers, which will also act as an intermediary to enable shorter-term contracts for e-fuel purchases by airlines and shipping companies.

If there was one thing keeping you up at night, what would that be?

Regulatory uncertainty. If the EU's regulatory framework is called into question (rules on green and low-carbon hydrogen, but also the adopted mandates in the ReFUelEU, FuelEUMaritime regulations and the Renewable Energy Directive), this nascent industry will suffer a major setback. T&E's advice: Stay the course and implement.

Why is collaboration so important for the synthetic fuels industry?

We're creating a new industry from scratch. Collaboration between industry players and civil society is important to head in the same direction and maintain a high level of ambition to start scaling up e-fuels by 2030.

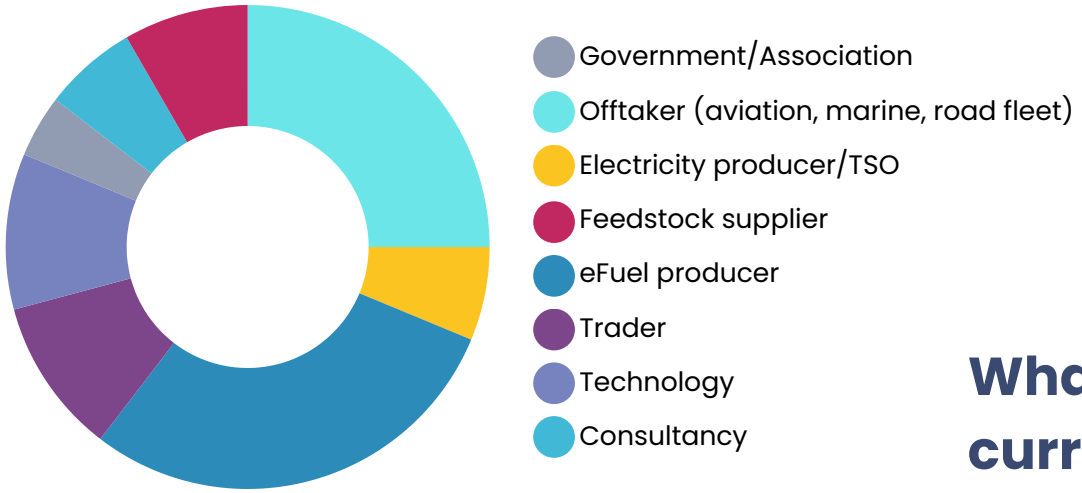
What makes Global Synthetic Fuels Assembly a great platform to discuss these topics?

The overall programme and the various panels are focused on the key relevant topics that will be decisive for the future of this industry. I hope to learn a lot.

The Energy Huddle market survey results on:

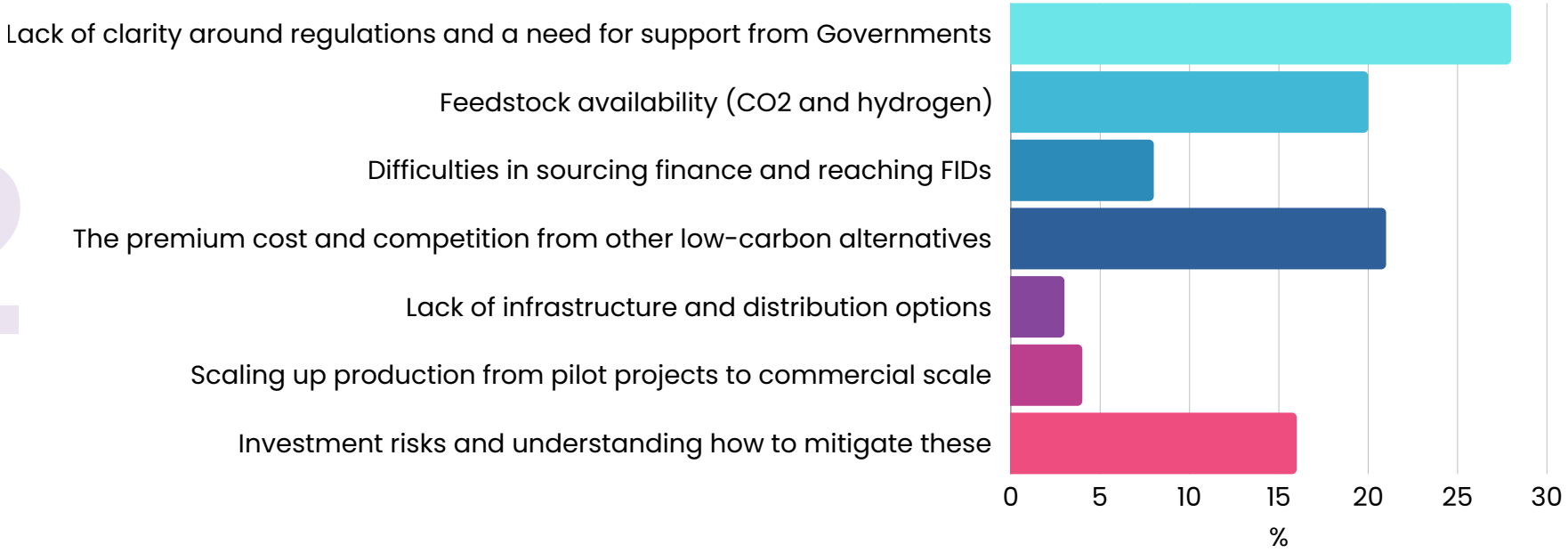
Company type of survey respondent

Q1



What is the biggest challenge you're currently facing?

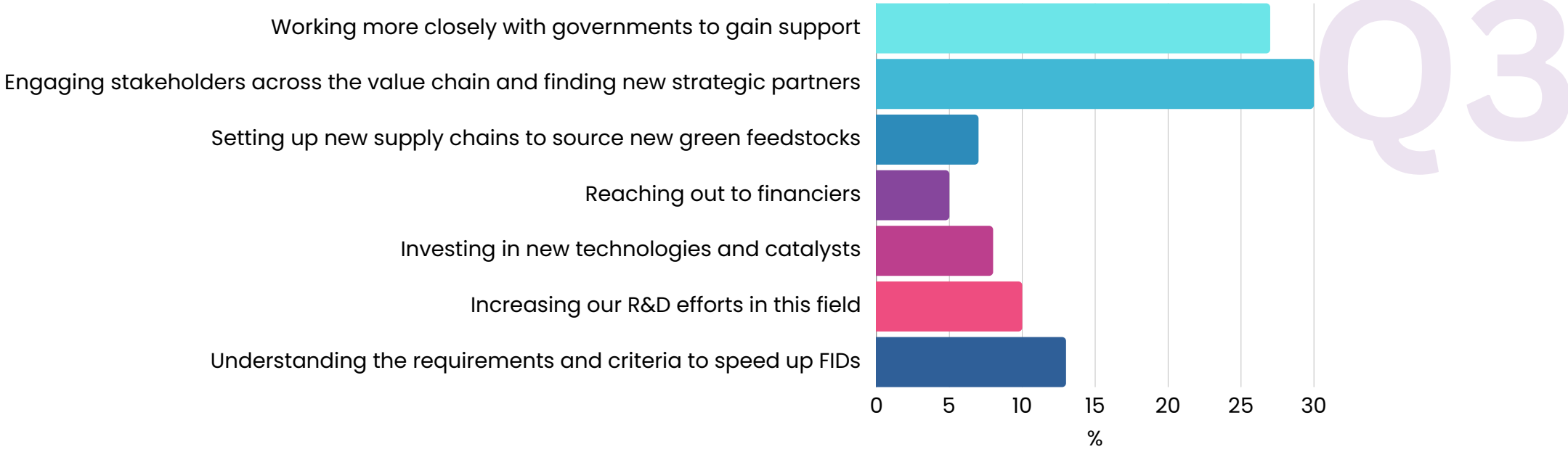
Q2



The Energy Huddle market survey results on:

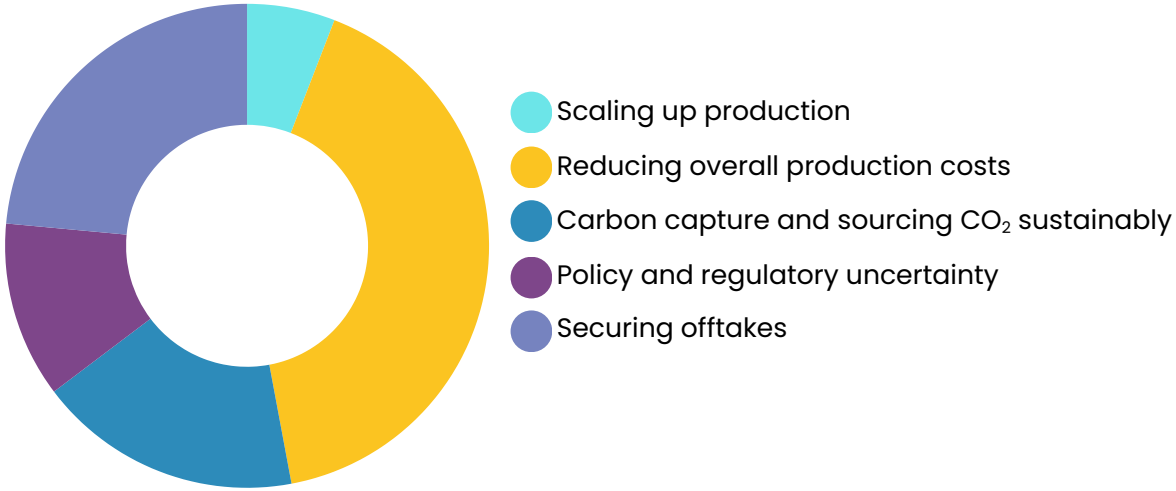
What steps is your organisation taking to overcome your main challenge?

Q3



Q4

What do you see as the biggest technological challenge for fuel development?



The Energy Huddle market survey results on:

Q5

What one question keeps you up at night?

How can synfuels compete with HVO/renewable diesel for applications like aviation and marine?

Will project developers and offtakers be able to commit long-term in the face of uncertain regulatory incentives and volatile energy prices?

How can the collection and separation of wastes, applicable to renewable processes, be improved within the UK?

How are conflicting policies affecting the availability of CO_2 as an input molecule?

How can you find offtakers to ensure bankability?

How can climate reduction be valued better?

Regulatory uncertainty leading to delays

How can we ensure that the synthetic fuels industry scales fast enough to meet the decarbonization targets of hard-to-abate sectors—without compromising affordability and infrastructure readiness?

How to source CO_2

How can the interest in hydrogen become beneficial for synfuels?

SBTi/GHG approval

How do you approach sourcing renewable power for green hydrogen—direct wire or PPA?

The Energy Huddle market survey results on:

Q6

What is the next BIG thing for the synthetic fuels market?

Carbon capture technologies

CCU/CCS regulation

Reduce production costs

Nuclear energy

Competitive cost

Sourcing green hydrogen

CO_2

Government mandates

Book and claim

RFNBO certification

Reaching FID for first-of-a-kind projects

Low-cost renewable hydrogen

Advanced pyrolysis and gasification

Global trade routes

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Yann Dumont
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Nordic Electrofuel

Lara Naqushbandi
CEO
ETFuels

Olaf Rumberg
CEO
E.ON Gas Mobil

Moritz Schwencke
CEO and Co-Founder
Eternal Power

Katja Loehnert
Chief Project Engineer Sustainable Aviation Fuel
Rolls Royce

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