

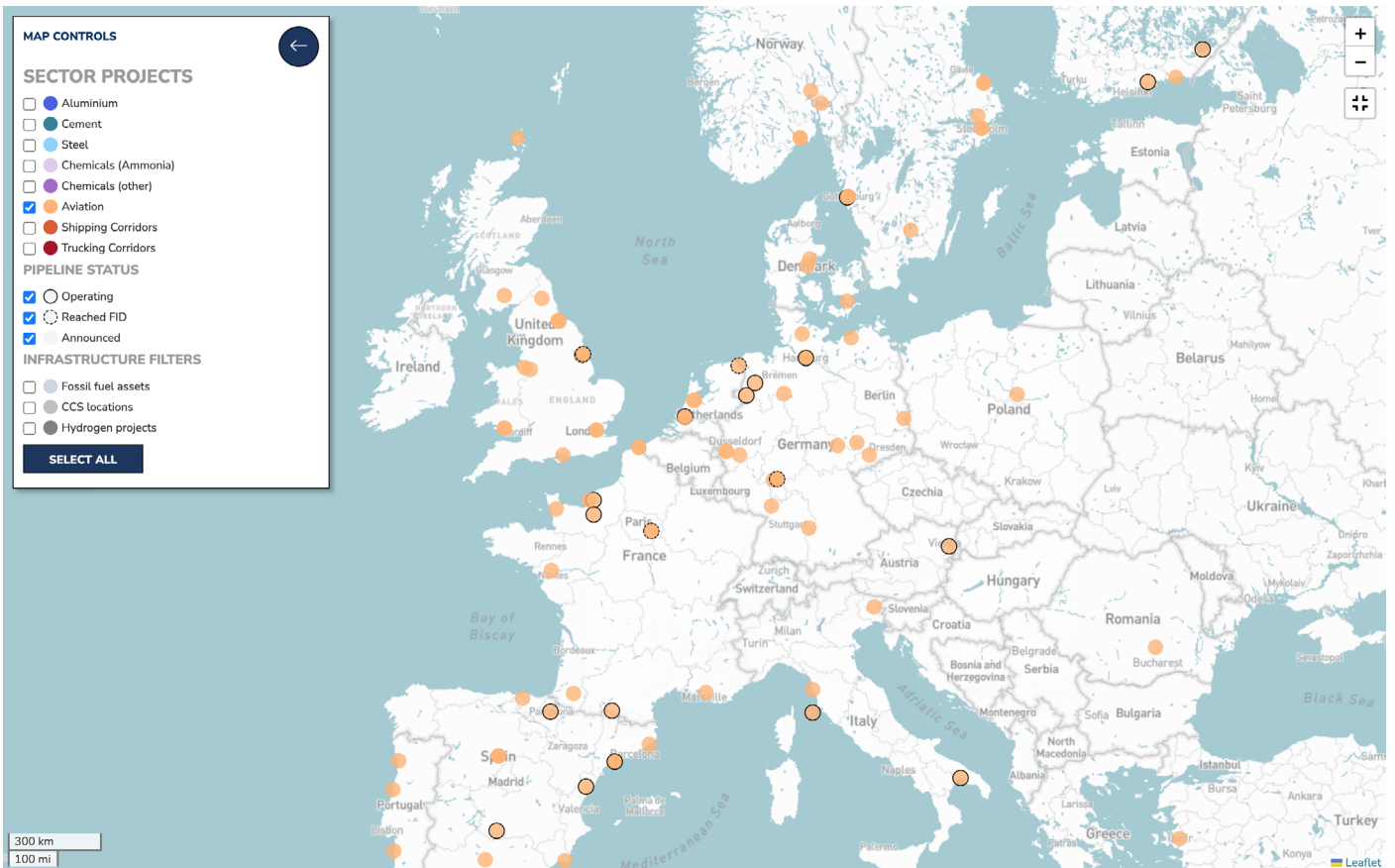
AUG 2024



GLOBAL PROJECT TRACKER

CASE STUDIES:

LEVERS OF ACCELERATION DRIVING PROGRESS IN THE PROJECT PIPELINE

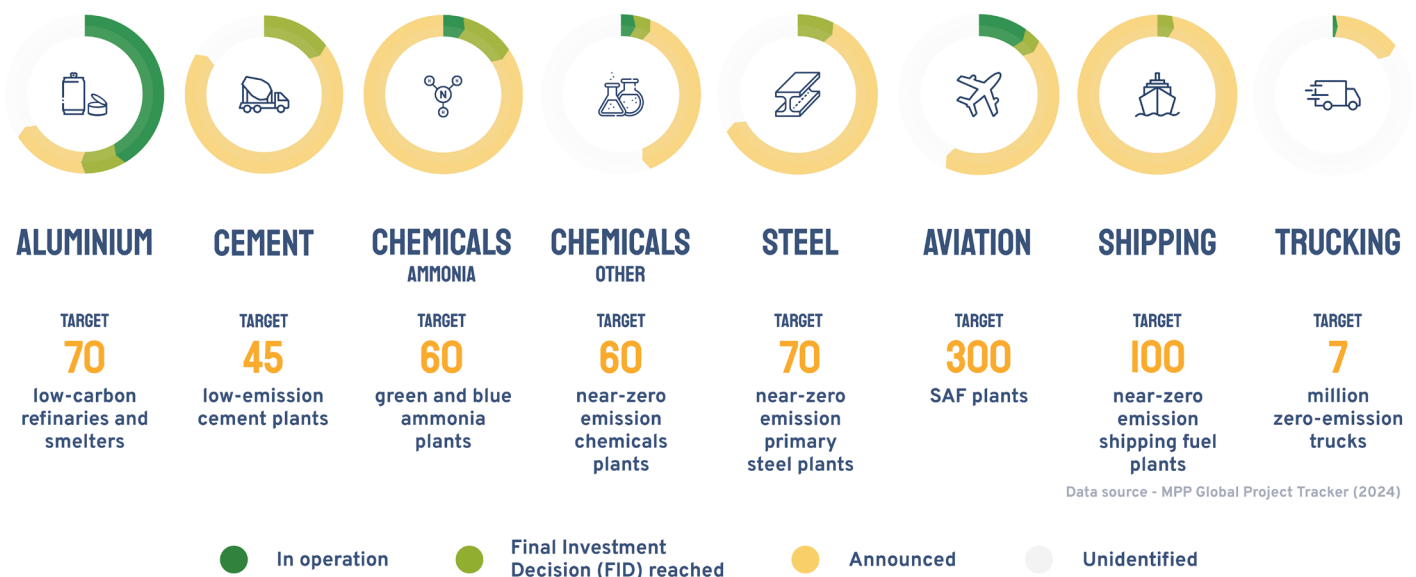


[MPP Global Project Tracker excerpt showing Sustainable Aviation Fuel plants at Announced, FID and Operational status – April 2024 data]

Mission Possible Partnership (MPP) launched the new Global Project Tracker in April. Mapping investment in the pipeline of necessary decarbonisation projects across seven heavy industry and transport sectors that cause 30% of all global emissions, data from the Tracker demonstrated that although industrial decarbonisation has started, work must be accelerated to deliver a further 600 commercial-scale decarbonisation projects to final investment decision (FID) over the next few years and bring the so-called ‘harder-to-abate’ sectors in line with their end of decade milestones for net-zero 2050.

This latest insight briefing, derived from further study of the Tracker, explores how different geographies and industries can accelerate investment decisions in the project pipeline, to bring the heavy-emitting industry and transport sectors on track and drive progress towards 2030 targets. It builds on the growing body of evidence contained within the map to reveal the progress that is already being made in certain sectors and regions and to explain what is driving the early markets for clean industrial products.

INDUSTRIAL DECARBONISATION HAS STARTED BUT NEEDS TO ACCELERATE TO MEET 2030 TARGETS



Data source - MPP Global Project Tracker (2024)

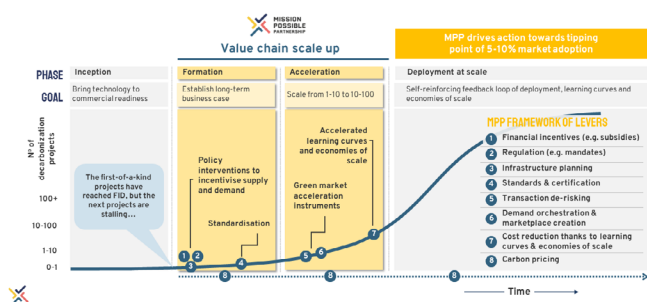
[Progress observed in the Tracker against 2030 decarbonisation milestones for seven heavy industry and transport sectors causing 30% of all global emissions – April 2024 data]



Accelerating decarbonisation through the application of levers

By following the progress of global decarbonisation projects as they move towards FID, it has been possible to identify and set out enabling policy, financial and market coordination levers.

MPP has observed how these levers have supported the development of critical projects in specific geographies and driven their progress towards investment. Enabling levers are also helping the development of early-stage markets for decarbonised industrial products, in particular sectors and geographies, as they move from their ‘market formation’ phase - with investment in single first-of-a-kind (FOAK) projects – towards acceleration and scale-up, and the delivery of the next wave of decarbonisation projects. These observations are captured within a series of case studies.



[Once a critical mass of projects is operational, tipping points are reached, and the new technology grows exponentially]

[\(click image to enlarge\)](#)

Whilst the case studies often describe sector-specific advantages provided by the levers through their current application, this briefing also demonstrates the ripple effect that successful projects are creating, and the generalised market learnings that can be spread to other heavy industries and regions.

It is these wider learnings spread across sectors that can accelerate overall decarbonisation progress and ensure that critical milestones for net-zero 2050 can be met.

Case studies of current progress to drive learning

The case studies in this briefing set out the role that select levers are having in supporting the progress that is taking place in the project pipeline. Whilst in practise, multiple levers are often applied to support deep decarbonisation at once, and these are often best used in parallel, the case studies demonstrate how the individual levers are helping to accelerate projects towards FID at different stages.

The examples explore policy and finance levers that have helped to accelerate the early market journey towards project FID across different sectors and regions, followed by levers that are accelerating project deployment through market mechanisms that orchestrate demand and increase willingness to pay.

Tailored policy levers

1. Mandates: EU SAF blending mandate
2. Subsidies: IRA 45V and DOE loan guarantees
3. Auctions: European Hydrogen Bank
4. Intermediaries: Northern Lights

Financial de-risking levers

5. Equity co-investment: Airline co-investments in SAF
6. De-risking supply: New Energy Risk insurance models; Revenue certainty models

Market acceleration levers

7. Co-ordination across the value chain: FertigHy; Total H2 tender; Pepsi Co. and Fertiberia
8. Demand aggregation: First Movers Coalition

The case studies show some of the most important progress that is being made in specific sectors and regions today. Their generalised learnings reveal how we can deploy levers in the right way to kick-start new markets for clean industrial products, and the mechanisms that can drive the scale that’s needed to move from having one ‘first-of-a-kind’ project at investment to the next projects in each sector. The levers identified are crucial to bringing demand and supply together and promoting the best procurement practices needed to accelerate project delivery.



I. MANDATES

CASE STUDY: EU SAF MANDATE



SECTOR SPOTLIGHTED: AVIATION



SECTOR LEARNINGS: ALL
(ALUMINIUM, CEMENT, CHEMICALS, STEEL, SHIPPING, TRUCKING)

Background and policy detail

(source: [US International Trade Association](#))

The “ReFuel EU” regulation was adopted by the European Union in October 2023 as part of broader “Fit for 55” decarbonisation programme.

The regulation requires that all fuel made available to aircraft operators at EU airports contains a minimum percentage of SAF blending:

- Beginning in 2025, fuel uplift at EU airports must contain at least 2% SAF.
- Increases each year: 6% by 2030, 20% by 2035, 70% by 2050.
- Includes sub-target for synthetic fuels (PtL), which need to be scaled up due to limited feedstocks, but are more nascent than other production routes: 1.2% in 2030, 35% in 2050.

Subsidy support is being made available – the EU has set aside 20 million free allowances (with an estimated value of €2bn) from EU ETS to help airlines bridge the green premium between SAF and conventional jet fuel between 2024 and 2030.

The EU is not the only jurisdiction enacting SAF blending mandates: the UK, Japan and a range of other countries are now putting similar policies in place.

The USA, another region with a large number of SAF projects, has pursued a different strategy, supporting projects via tax credits and further incentives through fuel standard schemes.

Evidence of impact

Since the ReFuel EU announcement, there have been **12 offtake agreements** worldwide, with the two out of the top five largest disclosed agreements involving European airlines. (ICAO):

- **Feb 2024 - International Airlines Group (IAG):** Made the largest SAF purchase to date with a 14-year offtake agreement for 981.3 million liters from Twelve.
- **Jan 2024 - Ryanair:** Entered into 6-year offtake agreement with 125 million liters from Enlive.



MANDATES: TAKEAWAYS

1. Mandates provide long-term certainty.

Legislating that mandates run through to 2050 creates a stable backdrop for investment decisions by equity investors, debt investors, and operators.

Mandates encourage first movers since airlines know that they will need to procure significant SAF volumes in the future.

One shortcoming of Refuel EU is that the legislation says the e-SAF sub-target will be reevaluated before 2030, to assess whether the target is feasible. This creates uncertainty for e-SAF, which has hurt investment flows. In contrast, SAF from Hydroprocessed esters and fatty acids (HEFA) have not been re-evaluated. This provides stability and confidence for investors, thereby supporting the development of the SAF industry effectively.

Subsidies carry the question of what happens when the funding runs out. The US IRA has led to a large initial “bang” of SAF projects. But uncertainty remains over the longer term, if the business case is reliant on subsidies.

2. Pair a mandate with funding to drive change.

A mandate alone might be insufficient to drive action if the underlying economics/investment conditions are challenging.

While Refuel EU is a mandate (“stick”), there are funding opportunities available (“carrots”). Through the EU ETS, there are allowances tied with SAF usage. EU Innovation Fund has EUR 40bn available, split across a range of sectors; three SAF projects have received funding through the fund. There are many other incentive mechanisms available (such as EU ETS free allowances and EU member state funds), though they are more fragmented and complex.

3. Mandates must have teeth to be taken seriously.

There must be consequences for missing targets. Indonesia has long had SAF blending mandates. These are consistently missed, as there are no real penalties.

Refuel EU will have meaningful fines for suppliers who do not meet the targets. Fines will be levied in the amount of ~2x the green premium of SAF vs. fossil jet fuels. This means that adhering to the policy is the only logical economic decision for suppliers.



2. SUBSIDIES

CASE STUDY I: US IRA & DOE LOAN GUARANTEES - 45V CREDIT FOR PRODUCTION OF CLEAN HYDROGEN



SECTOR SPOTLIGHTED: CHEMICALS



SECTOR LEARNINGS: ALL
(ALUMINIUM, CEMENT, STEEL, AVIATION, SHIPPING, TRUCKING)

Background and policy detail

The 45V legislation allows US producers to receive tax credits over a 10-year period for low-carbon hydrogen. A maximum tax credit of \$3 per kg hydrogen is allowed, depending on CO₂ emissions per kg of H₂ (ICCT).

Evidence of impact

The 45V credit for clean hydrogen production has significantly accelerated investment in hydrogen and ammonia projects in the US, doubling the current capacity (IEA- Hydrogen production projects):

- Since 2022, 30 projects with a total capacity of 800,000 Nm³ H₂/hour (in terms of IEA zero-carbon estimated normalized capacity) have been announced.
- Before the 45V credit (1982 to 2021), there were 17 projects with total capacity was 480,000 Nm³ H₂/hour.

The Rhodium Group indicates substantial investment announcements across hydrogen and electrolyser investments ([Clean Investment Monitor](#)):

- Electrolyser Announcements: Total \$1.8 billion, though this is relatively small due to awaiting clarity on 45V rules.
- Hydrogen Investments: Over \$47 billion announced, with \$5 billion spent, highlighting the impact of policy uncertainty.
- Geographic Focus: Most investments are in California and Texas, driven by existing infrastructure and favorable policies.



CASE STUDY 2: US IRA & DOE LOAN GUARANTEES - DOE LPO – LOAN GUARANTEES (TITLE XVII)



SECTOR SPOTLIGHTED: CHEMICALS



SECTOR LEARNINGS: ALL
(ALUMINIUM, CEMENT, STEEL, AVIATION, SHIPPING, TRUCKING)

Background and policy detail

The Title 17 Clean Energy Financing Program is targeted at energy infrastructure projects to provide loan guarantees for US projects that support clean energy deployment. The scheme is administered by the U.S. Department of Energy (DOE) Loan Programs Office (LPO) and can guarantee up to 90% of a loan in case of borrower default.

Evidence of impact

The LPO database to date shows the uptake of these policy incentives is dominated by renewables and EV-related investments, with relatively small hydrogen investments. This is most likely due to policy uncertainty.



SUBSIDIES: TAKEAWAYS

1. A financing ecosystem is needed for maximum impact.

Many producers may be small and unprofitable, meaning they cannot directly benefit from the tax credits. Tax equity financing allows organisations of all sizes to capitalise on the value of 45V, widening the pool of those benefiting and providing stackability.

2. A need for introducing and harmonising standards.

Introducing low carbon fuel standards (LCFS) and harmonising standards between the EU and US in parallel can significantly stimulate demand and facilitate market growth:

- Standard harmonisation improves regulatory clarity and reduces risk for projects supplying to markets covered by EU regulations, ensuring smoother operations for offtakers using or exporting fuels.
- Clean fuel standards are a valuable compliance tool gaining traction in the US, it's important not to overly rely on them.
- State-level cap and trade programs and other demand levers also play crucial roles in driving the adoption of clean energy solutions.

3. Public decision making must be nimble.

Market conditions change rapidly. In many cases, the DOE is taking 6-12 months (or more) to make decisions. This needs to be faster to match the pace of industry change, especially for startups. For example, the Direct Air Capture Hubs Program saw a nearly two-year gap from application release to fund disbursement for most projects. Implementing

rolling applications or committing to multiple annual application windows could help make funding more accessible and equitable, supporting both startups and established industry players.

4. Long-term certainty is needed for maximum impact.

Given the long time horizon of projects, businesses and investors need certainty that financing will not disappear with changes in administration or when initial funding pot runs out. The tax credits are durable because:

- (1) they require legislative action and,
- (2) a huge portion of the value will accrue to industry interests that benefit from bipartisan support.

5. Comprehensive incentives can accelerate implementation.

US policy provides various tax credits that work together across the value chain to reduce costs. For example, a PtL SAF plant's value chain could potentially access federal tax credits for renewables, manufacturing electrolyzers, clean hydrogen production, CO2 sourcing, and the production of aviation fuel.

6. Spending power and political challenges determine effectiveness.

The US's ability to issue debt and political support across parties make these tax credits more effective compared to other markets.



3. AUCTIONS

CASE STUDY: EU HYDROGEN BANK



SECTOR SPOTLIGHTED: CHEMICALS



SECTOR LEARNINGS: ALL
(ALUMINIUM, CEMENT, STEEL, AVIATION, SHIPPING, TRUCKING)

Background and policy detail

The EU Hydrogen Bank provides funding to renewable hydrogen projects in the EU. The bank runs a competitive auction for a 10-year fixed subsidy mechanism, supporting each kg of renewable hydrogen produced.

The bank supports two financing mechanisms: one for creating a domestic EU market and one for international imports, ensuring comprehensive market coverage.

Evidence of impact

The first auction was completed in April 2023 and was oversubscribed by a factor of 15, demonstrating a large number of prospective supply side projects. The European Commission published results from the auction, including average production costs by country and offtake prices, indicating willingness to pay ([source](#)).

This saw 132 bids received from 17 European countries requesting over 15 times the available €800 million budget.

Seven winners were selected:

- Total subsidy of EUR 720mn awarded, with individual project subsidies ranging from EUR 8 to 245mn.
- Despite the maximum support producers could bid for being set at €4.5/kg, the clearing price for the auction was €0.48/kg.
- Winners plan to produce 1.58 million tonnes of H₂ over ten years.
- The winners of the auction were concentrated in Iberia and Scandinavia, where the average hydrogen production costs of applicants were significantly lower than other regions (e.g. the average cost in Spain was €5.8/kg, versus €13.5/kg in Poland). This suggests a strong pull towards regions with competitive renewable energy supply.



AUCTIONS: TAKEAWAYS

1. Auction based mechanisms can drive competition and enable transparency in the value chain.

By sharing information on bids, the EU Hydrogen Bank has helped drive price discovery.

As exemplified by the EU Hydrogen Bank, price discovery can provide transparency in the value chain and may facilitate market formation.

2. Using public capital to facilitate offtake and investment.

The bank required projects to line up offtake agreements for at least 60% of the production volume. Long-term contracts provide price certainty and reduce risks.

The European Hydrogen Bank's approach leverages public funds to catalyse private investments, enhancing production volumes and overall impact.

3. Given different cost profiles across different sectors, sector specific instruments may be necessary.

Following an initial trial auction, a second round will be launched. This will include a differentiated pot of money for shipping projects.



4. INTERMEDIARIES

CASE STUDY: LONGSHIP / NORTHERN LIGHTS CCS



SECTORS SPOTLIGHTED: CEMENT AND STEEL



SECTOR LEARNINGS:
ALUMINIUM, CHEMICALS, AVIATION, SHIPPING, TRUCKING

Background and policy detail

(source)

Longship is a full CCS project in Norway, that covers CO₂ capture from industrial sites, transportation, and storage underneath the seabed.

It will be an open-source infrastructure for CO₂ transport and storage. The project is an example of public-private collaboration to develop critical infrastructure for the energy transition.

Northern Lights is a sub-component of the Longship project, which covers the transportation and storage of CO₂. It is a JV between Shell, Equinor, and Total.

The Norwegian government provides funding (both to industrial sites for carbon capture and Longship for transport/storage). Current storage capacity is 1.5 mt CO₂ / year (planned to be operational in 2024), with plans to increase to 5 mt in Phase 2.

Evidence of impact

There is strong industry interest in utilising Northern Light's CO₂ transport and storage:

- Two commercial agreements signed for transport and storage of CO₂ in Northern Lights (Yara and Orsted) (source).
- LOI's signed with 11 companies for CO₂ storage (figured as of June 2021, likely outdated - source).

The project has kickstarted carbon capture projects at other industrial sites. For example, Heidelberg's site in Brevik received funding for carbon capture. Based on learnings from Brevik, it has announced 4 additional projects (source).



INTERMEDIARIES: TAKEAWAYS

1. Government action is needed to provide the public goods which companies rely on.

Commercial interest in using the CCS infrastructure evidences its importance. But without government action, no one party will be able to provide the needed infrastructure at scale.

2. Public/private partnerships can kick start an industry.

The Norwegian government is partnering with private sector companies to develop infrastructure, meaning that funding burden and risk is shared.

Moreover, the government can play an important coordinating role (e.g., by bringing together Shell, Equinor, and Total into a JV).

3. Additional examples of intermediary success include.

- a. Saudi PIF & NEOM: FID reached for large-scale green H₂/ammonia project at NEOM.
- b. Netherlands & Porthos: CCS project is led by three state enterprises: Port of Rotterdam, Gasunie, and EBN.



5. EQUITY CO-INVESTMENT

CASE STUDY: LANZAJET



SECTOR SPOTLIGHTED: AVIATION



SECTOR LEARNINGS: SHIPPING, TRUCKING

Background and policy detail

Projects may struggle to get debt financing and traditional equity investment since venture capital (VC) does not fund infrastructure and private equity (PE) lacks experience in this area. Bringing on offtakers as co-investors is an alternative route for equity financing.

LanzaJet was founded in 2020 to focus on the development of SAF. It has joint investment/offtake agreements with Southwest, BA, and Microsoft. Over the last four years the business' investment programme has developed:

- 2020: LanzaJet business was spun out from LanzaTech.
- 2021: British Airways invests. As part of investment, signs offtake agreement from production facility in US and agrees to explore building SAF biorefinery in UK ([source](#)).
- 2022: Microsoft invests \$50mn project finance for Freedom Pines Fuels, with plans to purchase bio-diesel fuel for data centres ([source](#)).

- 2024: Freedom Pines Fuels SAF production facility opens ([source](#)).
- 2024: Southwest invests \$30mn, and agrees to be anchor offtaker for potential new facility ([source](#)).

Evidence of impact

The Freedom Pines Fuels facility opened in 2024, made possible by a combination of factors:

1. Joint investment and offtake agreements with:
 - Southwest Airlines
 - Microsoft
 - British Airways (10-year offtake agreement)
2. Financial support:
 - \$50 million in grants from the Breakthrough Energy Catalyst program
 - Tax credits of up to \$1.75 per gallon through the Inflation Reduction Act

This demonstrates the benefits of transparent offtake agreements, with government incentives, and private sector partnerships across the value chain.



EQUITY CO-INVESTMENT: TAKEAWAYS

1. Investors are not as comfortable with SAF debt.

New joint equity models are arising (H2 Green Steel is another example with over 20 equity investors). Debt providers are currently hesitant to fund US SAF projects, projects need equity investors.

2. First-of-a-kind (FOAK) projects will need full equity funding initially.

Debt investors might be enticed 1-2 years post-construction, once consistent revenues and operational data are available.

3. Offtake transparency in SAF is crowding in private sector investment.

Investment grade credit ratings from potential offtakers provides strategic anchor customers.

4. Nuance of subsidy (US) vs. mandate (EU) approach.

Large incentives have created a big bang effect for e-SAF in the US

- Success stories from the US are triggered by IRA Tax Credits and Offtake Agreements, yet a long term regulatory framework is missing.

- LanzaJet benefited from:

- USD 50Mn grants from BE catalyst,
- IRA Tax credits up to \$1.75/gallon,
- 10-year e-SAF offtake agreement with British Airways.

5. Monetization of tax credit.

It is still in question as to who will monetise the tax credits generated by the LanzaJet project. Likely the candidates are investors with substantial, predictable tax appetite (Microsoft?).

6. Bank underwriting of SAFc vs physical offtake.

There is a need for clear guidance from bankers on how they underwrite SAF certificates (SAFc) compared to physical offtake. In theory, banks should lend if a creditworthy counterparty agrees to pay the project, but this has not yet happened widely.

7. Capital recycling.

A key question is how and when project owners will recycle capital now that the project is operational. Equity investors may look to raise debt from an infrastructure credit fund or sell equity shares at a premium.



6. FINANCIAL DE-RISKING

CASE STUDY I: NEW ENERGY RISK INSURANCE



SECTORS SPOTLIGHTED: ALL

(ALUMINIUM, CEMENT, CHEMICALS, STEEL, AVIATION, SHIPPING, TRUCKING)

Background and policy detail

The Problem: Developers of decarbonisation projects often lack operational data. Even if technologies are proven at pilot scale, they are often unproven at commercial scale. This means it is hard to get insurance at a viable price, which also means it is hard to get financing.

- Technology risks: lack of system performance guarantees and uncertainties in plant cost and EPC timeline estimations.
- Feedstock risks: Lack of long-term feedstock supply e.g. CO₂e source, electricity.
- Infrastructure risks: Lack of access to grid infrastructure or Syncrude refining, blending and supply infrastructure.

The Solution: New Energy Risk has an advanced modelling approach which allows it to price risk for novel technologies, enabling it to insure first-of-a-kind projects.

- Engineers on the team can assess and put together a statistical model from the forward-looking data such as demonstration, engineering design and scientific design.
- By overlaying the financial structure, the NER is able to underwrite a project that does not have operating data.

Evidence of impact

NER claims to have unlocked over \$4 billion for the development of new and renewable clean energy technologies.

For example, in the energy sector, NER enhanced Bloom Energy's ability to secure financing, reduce costs, and scale its innovative fuel cell technology.

- In 2013-2015, Bloom Energy secured multiple performance insurance policies including a large loan in 2013, larger bond financing in 2014, and an even larger syndicated bank loan in 2015.
- As a result, Bloom Energy was able to (1) reduce cost of financing the installation of hundreds of servers, (2) reduce the financing time, and (3) offer customers a cost-effective 15-year warranty.



CASE STUDY 2: EPC PERFORMANCE GUARANTEES & REVENUE CERTAINTY MECHANISMS



SECTORS SPOTLIGHTED: ALL

(ALUMINIUM, CEMENT, CHEMICALS, STEEL, AVIATION, SHIPPING, TRUCKING)

Background and policy detail

Given that many new projects are first-of-a-kind (FOAK) and integrate many different technology components, there are few EPC firms that can do a “full wrap” (i.e., provide end-to-end service).

Full-wrap EPC contracts are extremely common across the power/infra sector, often leading to projects receiving investment-grade credit ratings. However, such contracts are expensive and complex.

Global supply chain disruptions, workforce availability, and permitting issues further complicate the availability of full-wrap EPC contracts.

To de-risk projects, EPC performance guarantees and warranties are needed.

Evidence of impact

- Operating data is critical for de-risking clean technology investments. For example, proving that a new plant has never had a day of downtime over three years.
- In the US power sector, companies like Bechtel and Burns & McDonnell have acted as equity partners in JVs, similar to offtakers being co-investors. This dynamic might be seen in industrial decarbonisation as well.
- For US hydrogen projects, obtaining EPC wraps is reportedly difficult or impossible. However, this is less of an issue for investors if the project sponsor is a large entity with in-house engineering capabilities, such as a global energy major or chemicals conglomerate.
- A pure-play hydrogen or SAF developer will require either a full-wrap EPC contract or some guarantee of repayment to their investors (e.g., insurance) in case of construction delays.



EPC PERFORMANCE GUARANTEES & REVENUE CERTAINTY MECHANISMS: TAKEAWAYS

1. Complexity, cost and limited expertise make full-wraps unavailable.

Full-wrap EPC contracts are often avoided due to their complexity and high costs, especially for innovative projects with integrated technologies.

Few EPC firms possess the comprehensive expertise required for full-wrap services across novel technology integrations.

2. Alternative risk mitigation strategies are needed.

- **Governments** can bear unwrapped risks through subsidies, grants, or guarantees to ensure project viability and attract private investment.

- **OEMs** can be involved in risk-sharing mechanisms, possibly through extended warranties or performance guarantees.
- **Risk mitigation funds** can provide a financial safety net for projects, covering potential cost overruns and delays.

Large companies with robust in-house engineering teams can mitigate the need for full-wrap contracts, reducing dependency on external EPC firms and providing greater control over project execution.

For smaller developers or those lacking extensive in-house capabilities, obtaining insurance or financial guarantees is crucial. These mechanisms can provide investors with confidence in project completion and financial returns.



7. COORDINATION ACROSS THE VALUE CHAIN

CASE STUDY I: FERTIGHY



SECTOR SPOTLIGHTED: CHEMICALS



SECTOR LEARNINGS: ALL (ALUMINIUM, CEMENT, STEEL, AVIATION, SHIPPING, TRUCKING)

Background

FertigHy ([source](#)) was founded by EIT InnoEnergy, who aims to accelerate the establishment of green industrial companies within the EU and provides grants and funding to get set up, and then to replicate and build scale. InnoEnergy has a parallel project in the Steel sector, called Gravithy.

The FertigHy project plans to start construction on 1Mt low-carbon fertiliser plant in Spain. The plant has not yet reached FID.

FertigHy aligns a coalition of players from across different parts of the value chain including:

- Renewable Energy development:
 - Ric Energy – solar power project developer brings its knowledge to the photovoltaic (PV) and electricity markets.
- Green Hydrogen and Ammonia performance:
 - MAIRE – EPC player with experience in fertilizer, hydrogen, and chemicals.
- Project financing and business solutions:
 - Siemens Financial Services – brings

experience in financing large-scale industrial projects alongside solutions such as factory digitalisation and automation to electrification solutions.

- Fertiliser wholesalers:
 - InVivo - major agriculture company supports as a purchaser and distributor of fertilizers to 300,000 farmers, representing over 200 cooperatives.
- Final product developers:
 - Heineken – drives demand for low-carbon barley and other crops
- Coordination:
 - EIT InnoEnergy - will provide business acceleration services with its European Green Hydrogen Acceleration Center (EGHAC).

The initiative integrates the hydrogen production and agricultural sectors, creating a streamlined supply chain that facilitates efficient production, distribution, and utilisation of green hydrogen in fertilisers.

By securing long-term purchase agreements with fertiliser producers and agricultural companies, value chain coordination reduces market risks, ensuring a stable demand for green hydrogen.



CASE STUDY 2: TOTAL GREEN HYDROGEN TENDER



PRIMARY SECTOR IMPACT: CHEMICALS



SECONDARY SECTOR IMPACT: (ALUMINIUM, CEMENT, STEEL, AVIATION, SHIPPING, TRUCKING)

Background

In 2023 TotalEnergies called for tenders for 0.5mt of green hydrogen annually to decarbonise its European refineries, aiming to replace grey hydrogen and reduce emissions by around 5 million metric tons of CO2 per year.

Part of the rationale was to kickstart the sector with a strong demand signal stating: “We need electrolyzers

in massive quantities. This is also the purpose of this call for tenders: to give a boost to this sector.” (Director of Petrochemical Refining in Europe, TotalEnergies).

In 2024, TotalEnergies signed a 15-year offtake deal with industrial gases firm Air Products for 70,000 tonnes of green hydrogen a year from 2030, to be used in its Northern European refineries.

CASE STUDY 3: PEPSI CO. AND FERTIBERIA



SECTOR SPOTLIGHTED: CHEMICALS



SECTOR LEARNINGS: (ALUMINIUM, CEMENT, STEEL, AVIATION, SHIPPING, TRUCKING)

Background

PepsiCo and Fertiberia have formed an alliance to launch a pilot programme to utilise green hydrogen-based fertilisers, and the initiative will start with a pilot program targeting potato cultivation in Álava, La Rioja, and Burgos. The project aims for a 15% reduction in agricultural emissions by 2025. The program plans to expand to 1,500 hectares by 2025, significantly increasing its impact.

This collaboration aligns with PepsiCo’s goal of net-zero emissions by 2040 and Fertiberia’s by 2035, and demonstrates action is being taken, positioned as part of Pepsi Co’s regenerative agriculture practices.

Pepsi Co’s involvement with Fertiberia demonstrates corporate leadership in transitioning to green hydrogen, setting a precedent for other companies in the food and beverage industry.



8. DEMAND AGGREGATION

CASE STUDY: FIRST MOVERS COALITION



SECTOR LEARNINGS: ALL

(ALUMINIUM, CEMENT, CHEMICALS, STEEL, AVIATION, SHIPPING, TRUCKING)

Background

(source: [FMC Impact Report](#))

The First Movers Coalition is a global coalition of companies working together to leverage their purchasing power to decarbonise the world's heavy-emitting sectors. The coalition aims to achieve significant emissions reductions by 2050 through the adoption of technologies that are not yet available at scale.

By 2030, the coalition intends to build early market demand for these technologies to facilitate their mainstream adoption.

Impact of the demand signal

FMC members have moved from commitment to action, signing offtake agreements and fostering global collaboration.

The coalition has grown from 35 members at launch to 96 members with 121 commitments across 7 sectors, projecting an annual demand of \$16 billion for emerging climate technologies by 2030. Examples include:

- **Aluminum:** Commitments from new members and notable offtake agreements, including partnerships between Hydro and Volvo, and Constellium and Renault.
- **Aviation:** Development of SAF hubs and investment in SAF production, with key initiatives involving

Delta, United Airlines, and Airbus.

- **Cement and Concrete:** Commitment to near-zero emissions in cement/concrete procurement, with projects from Heidelberg, Cemex, and Holcim.
- **Carbon Dioxide Removal (CDR):** Significant purchases and investments from members like Microsoft and BCG, supporting large-scale CDR projects.
- **Shipping:** Commitments to zero-emission fuels and significant offtake agreements involving Maersk, Höegh Autoliners, and MOL.
- **Steel:** Investments in fossil-free steel production with projects like Hybrit and partnerships involving Vattenfall, SSAB, and Volvo.
- **Trucking:** Agreements for zero-emission trucks, with notable collaborations between Holcim and Volvo, and PepsiCo's investment in charging infrastructure.

Evidence of impact

FMC members have signed 94 offtake agreements across seven sectors, driving significant investments in decarbonisation projects.

By 2030, FMC's commitments are expected to result in annual emissions reductions of 31 million tonnes of CO₂e.

Specific projects, such as the development of SAF hubs and the expansion of ELYSIS, demonstrate tangible progress by securing offtake.



DEMAND CO-ORDINATION: TAKEAWAYS

1. Demand signals by first movers kick start projects by demonstrating ambition and willingness to pay a premium.

Early demand is crucial for kick starting projects, scaling emerging technologies and achieving net-zero emissions. Joint efforts and strategic alliances are key to accelerating the adoption of clean technologies.

Developers and investors need to know there will be a market for their green products. Signals can be in the form of active participation by end-users/offtakers (e.g. Heineken and InVivo with FertigHy), through explicit market signals (e.g. Total H2 tender), or demand buyers' clubs (e.g. FMC)

2. Bringing together different players across the value chain de-risks projects and enables efficiencies.

Downstream companies (e.g. consumer goods & FMCG) can step in & find new ways to prove bankability for clean industrial producers; reducing their own scope 3 and driving growth of the low-carbon economy, in turn reducing the dependency on mandates and subsidies (explored in opening case studies).

There is a lower commercial risk, as offtakers and end-users are committed to the project. Investors can have greater certainty that there is a market for the product, even with a green premium.

The collaboration and dialogue among the players across the value chain will bring common understanding on the margins, which can be aligned to minimise premiums.



SUMMARY

MPP's Global Project Tracker has demonstrated the need to accelerate global decarbonisation project delivery in the so-called 'harder-to-abate' sectors to bring some 600 commercial-scale deep decarbonisation projects to final investment decision over the next few years.

This latest research leverages the real-world insight from the Tracker's growing body of evidence to help explain the levers that are being used to accelerate the vital market creation needed to secure investment in decarbonisation projects.

The aim is to help inspire the shift in focus needed to accelerate from single projects to the 100s needed across the seven heavy-emitting industrial and transport sectors, to ensure these global industries transition at pace to meet their 2030 decarbonisation milestones towards full decarbonisation by 2050.

