

AVIATION'S CLIMATE TRANSITION

An Investor Due Diligence Guide to
SAF Opportunities, Risks & Integrity

AVIATION'S CLIMATE TRANSITION

An Investor Due Diligence
Guide to SAF Opportunities,
Risks & Integrity

October 2026



S Y S T E M I Q

Authors

Andrew Howell, CFA Head of Research
Environmental Defense Fund

Guillaume Morauw Senior Analyst
Environmental Defense Fund

Jason Martins Associate Manager
Systemiq

Lucas Meijer Associate
Systemiq

Peter Gault Senior Director
Systemiq

Peter Hulshof Partner
Systemiq

About Environmental Defense Fund

At Environmental Defense Fund, we find practical, powerful solutions to the world's biggest environmental challenges. We leverage our deep expertise in science and economics to focus on the areas where we can make the greatest impact. With a global presence in more than 30 countries, EDF delivers results by partnering across sectors and communities to stabilize the climate, improve public health, and protect people and nature.

About Systemiq

Systemiq is a systems change company that works with businesses, policymakers, investors and civil society organisations to reimagine and reshape the systems that sit at the heart of society - energy, nature and food, materials, built-environment, and finance - to accelerate the shift to a more sustainable and inclusive economy. Founded in 2016, Systemiq is a certified B Corp, and has offices in Brazil, France, Germany, Indonesia, Kenya, the Netherlands and the UK. Find out more at www.systemiq.earth or via [LinkedIn](#).

FOREWORD

Aviation is one of the most complex sectors of the global economy to decarbonize, particularly because the demanding range and payload performance requirements of aviation limit the scalability of alternatives to high-energy-density liquid fuels. Sustainable aviation fuel, or SAF, therefore represents an important near-term lever to start reducing emissions, but one that faces significant cost challenges and must be assessed alongside the broader set of technologies, infrastructure and operational changes required across the ecosystem.

SAF is not a single, uniform solution: production pathways vary materially in maturity, cost, scalability and lifecycle emissions, while feedstock availability, sourcing and traceability create additional constraints. These differences matter both for environmental integrity and for the commercial viability and investment risks associated with individual projects and corporate transition strategies.

As responsible investors and fiduciaries to our clients, Calvert seeks to understand how these transition challenges affect the resilience of the companies in which we invest, while continuing to engage with corporates and the financial community to address them. Across the aviation sector, uncertainty over who will bear the cost of decarbonization and the extent to which costs can be passed through to customers, can have implications for margins and competitiveness of companies. Many of the bottlenecks facing SAF are system-level challenges that no single company can solve alone, requiring coordination across fuel producers, feedstock suppliers, airlines, infrastructure providers,

customers and financial institutions, alongside constructive involvement from policymakers and regulators. Policy can strengthen demand and improve project economics, but credible investment cases will still depend on technological advancements, reliable supply, bankable offtakes and appropriate risk allocation by investors.

The financial community not only provides capital but can also help to advance progress in challenging-to-abate sectors such as aviation by improving information sharing, strengthening corporate engagement, supporting market coordination and contributing to constructive policy dialogue. Continued education on the practical challenges and opportunities surrounding SAF is essential if investors are to distinguish credible transition strategies from ambition alone. EDF and Systemiq's work provides a valuable contribution to that effort by translating a complex and rapidly evolving market into practical questions for investors and lenders to assess the eligibility, bankability and integrity of SAF-related opportunities and transition strategies. We welcome and support efforts that deepen understanding, encourage appropriate collaboration across the value chain and help create the conditions for a credible aviation transition.

Jun Goh Senior Associate, ESG Fixed Income Research Analyst
Anuj Gulati Managing Director, Global Head of Fixed Income ESG Strategy & Research



Calvert

Calvert Research & Management

Provided for informational purposes only and should not be construed as investment advice, a recommendation to purchase or sell specific securities, or to adopt any particular investment strategy. The opinions expressed are those of the authors and are subject to change at any time without notice. Calvert is not the author of this report and the opinions expressed in the report are those of the Environmental Defense Fund. The information does not address the financial objectives or specific needs of individual investors. The views expressed do not reflect the opinions of all investment personnel at Morgan Stanley Investment Management (MSIM) and its subsidiaries and affiliates (collectively "the Firm") and may not be reflected in all the strategies and products that the Firm offers.

TABLE OF CONTENTS

FOREWORD	3
INTRODUCTION	5
Purpose of this guide	5
Guide structure	6
ABBREVIATIONS	7
AVIATION SECTOR TRANSITION PRIMER	8
A1. Climate transition levers and SAF focus	8
A2. Policy landscape: Implications for investor engagement	12
A3. Investor exposure and engagement across aviation	17
SAF DUE DILIGENCE TOOLKIT	21
B1. Toolkit architecture: from saf pathway to investor action	22
B2. Due diligence questions across themes	24
THE QUESTIONS	25
B3. SAF pathway-specific evidence standards, risk flags and escalation pathways	28
AtJ (Alcohol-To-Jet)	30
BtL (Biomass-To-Liquids)	31
e-SAF	32
Relevance across all pathways	33
B4. Case studies: applying the toolkit to practical investor situations	35
Study 1: Project / asset-level capital	35
Study 2: Issuer / portfolio-level finance	37
CONCLUSION	39



INTRODUCTION

Aviation's climate context

Aviation accounts for approximately 2.5% of global CO₂ emissions, but its overall climate significance is higher once non-CO₂ effects such as contrails, nitrogen oxides and soot are included. Unlike road transport, where electrification is already reducing fossil-fuel use across much of the system, aviation will continue to rely on high-energy-density liquid fuels for medium- and long-haul flight. Demand for air travel is also expected to continue growing, increasing pressure on airlines, fuel suppliers, airports, manufacturers, lessors and their financial partners to show how the sector can credibly reduce its climate impact.

Addressing aviation's climate impact therefore requires a basket of solutions across the value chain. Fleet renewal, aircraft and engine efficiency, operational optimisation, airport infrastructure, contrail mitigation, zero-emission flight technologies and carbon removals all have roles to play. However, sustainable aviation fuel (SAF) stands out as the central near-term capital allocation and engagement topic, particularly for medium- and long-haul aviation where battery-electric and hydrogen aircraft are unlikely to provide a large-scale solution in the near term. SAF refers to a range of alternative liquid aviation fuels that can be used in existing aircraft with little or no modification and that have the potential to deliver substantially lower lifecycle greenhouse gas emissions than conventional jet fuel. These fuels can be produced through several different technology pathways using a variety of feedstocks, each with distinct implications for cost, scalability, climate integrity and investment risk. Industry-backed aviation roadmaps consistently identify SAF as the largest in-sector emissions-reduction lever to 2050.

Purpose of this guide

This guide is intended to assist financial institutions in identifying the opportunities and risks associated with aviation's climate transition, and to provide a practical framework for conducting due diligence on investments relating to sustainable aviation fuels. It is aimed at investors and lenders assessing projects, companies and infrastructure, as well as the policy, technology and commercial risks that will influence the pace and success of the sector's transition. **The guide is structured around two core investor audiences.**



1. For project / asset-level capital, including project finance lenders, infrastructure investors, growth-equity investors and strategic investors, it supports diligence on SAF production projects, fuel infrastructure and related platforms.



2. For issuer / portfolio-level finance, including corporate lenders, bondholders, credit investors, asset owners and asset managers, it supports assessment of company transition plans, SAF procurement strategies, cost exposure, supplier credibility, disclosure and stewardship priorities.

Mission-driven capital, including public finance, development finance and catalytic vehicles, is treated as an enabling category where grants, guarantees, concessional capital or revenue-stabilisation mechanisms may be needed to crowd in commercial capital.



Sustainable aviation fuel stands out as the central near-term capital allocation and engagement topic, particularly for medium- and long-haul aviation.

The guide's purpose is to help financial institutions ask sharper questions before treating a project, company plan or financing opportunity as credible. It does this through three tests:

- A. Eligibility** asks whether the pathway, project or claim meets relevant technical standards or certification requirements and qualifies under any applicable policy mandates or incentives.
- B. Bankability** asks whether offtake, pricing, counterparties, contracts, policy support and risk allocation can support financing or transition-plan credibility.
- C. Integrity** asks whether lifecycle emissions, non-CO₂ impacts, feedstock sourcing, traceability, double counting, environmental safeguards and social claims can withstand scrutiny.

SAF should not be treated as a single undifferentiated solution. HEFA, alcohol-to-jet (AtJ), biomass-to-liquids (BtL) and e-SAF differ materially in technology maturity, feedstock exposure, lifecycle emissions profile, scalability, policy eligibility and capital intensity. Policy momentum is also uneven. ReFuelEU Aviation and the UK SAF Mandate create demand-side compliance obligations, while the US Clean Fuel Production Credit improves supply-side economics but does not create guaranteed offtake. CORSIA and emerging Asia-Pacific policies add further signals, but also fragmentation. For investors, the key question is therefore not simply whether aviation must reduce its climate impact, or whether SAF demand is growing. It is whether specific projects, company strategies and financing cases are eligible, bankable and credible enough to support capital allocation, stewardship or public de-risking.

Used consistently, the guide should help investors identify evidence gaps, red flags and appropriate next steps: proceed with conditions, request further evidence, escalate engagement, require de-risking support or decline to proceed. For more detailed guidance on the environmental integrity of SAF, including lifecycle emissions accounting, sustainability

criteria, double counting and the integrity of emissions-reduction claims, this guide should be read alongside Environmental Defense Fund's [High-Integrity Sustainable Aviation Fuels Handbook](#).

Guide structure

Part A provides an aviation sector transition primer. It establishes why aviation's climate transition is financially relevant, why SAF is the central near-term focus, and how different investor audiences engage across the aviation value chain.

- A1. Climate transition levers and SAF focus:** Explains aviation's hard-to-abate profile, maps climate transition levers across the value chain, and compares SAF pathways.
- A2. Policy landscape:** implications for investor engagement: Translates major SAF policy instruments into investor-relevant implications, distinguishing demand-side mandates from supply-side support and highlighting fragmentation, eligibility and revenue-certainty risks.
- A3. Investor exposure and engagement across aviation:** Defines the guide's core investor audiences, project / asset-level capital and issuer / portfolio-level finance, and explains how financial institutions influence aviation's climate transition.

Part B provides a practical SAF due diligence toolkit. It compiles a structured set of questions, evidence standards, red flags and investor actions across SAF pathways and investor use cases.

- B1. Toolkit architecture:** from SAF pathway to investor action: Introduces the guide's three core diligence tests: eligibility, bankability and integrity, and explains how they apply across investor audiences.
- B2. Due diligence questions across themes:** Sets out the main diligence questions investors should ask across six themes, with separate lenses for project / asset-level capital and issuer / portfolio-level finance.
- B3. Evidence standards, risk flags and escalation pathways:** Translates the six diligence themes into SAF pathway-specific evidence standards, red flags and investor actions.
- B4. Case studies (applying the toolkit to practical investor situations):** Applies the toolkit to stylised project- and issuer-level cases, showing how evidence gaps translate into financing conditions, engagement priorities and escalation.

ABBREVIATIONS

AGM	Annual General Meeting
ASTM	ASTM International, formerly known as American Society for Testing and Materials
AtJ	Alcohol-to-Jet
ATAG	Air Transport Action Group
BtL	Biomass-to-Liquids
Capex	Capital expenditure
CfD	Contract for Difference
CO₂	Carbon dioxide
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DevEx	Development expenditure
DFI	Development Finance Institution
ECA	Export Credit Agency
EPC	Engineering, Procurement and Construction
ESG	Environmental, Social and Governance
EU ETS	European Union Emissions Trading System
FEED	Front-End Engineering Design
FID	Final Investment Decision
FOAK	First-of-a-kind
FSC	Forest Stewardship Council
FT	Fischer-Tropsch
GHG	Greenhouse gas
H₂	Hydrogen
HEFA	Hydroprocessed Esters and Fatty Acids

HoT	Heads of Terms
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICCT	International Council on Clean Transportation
IFC	International Finance Corporation
ILUC	Indirect land-use change
KPI	Key Performance Indicator
ktpa	Kilotonnes per annum
LCA	Lifecycle assessment
LUC	Land-use change
MPP	Mission Possible Partnership
MtJ	Methanol-to-Jet
MW	Megawatt
NGO	Non-governmental organisation
NO_x	Nitrogen oxides
PBtL	Power-and-Biomass-to-Liquid
RFNBO	Renewable Fuels of Non-Biological Origin
RFS	Renewable Fuel Standard
RSB	Roundtable on Sustainable Biomaterials
RSPO	Roundtable on Sustainable Palm Oil
RWGS	Reverse water-gas shift
SABA	Sustainable Aviation Buyers Alliance
SAF	Sustainable Aviation Fuel
TRL	Technology Readiness Level
UCO	Used cooking oil

Part A

Aviation sector transition primer



A1. Climate transition levers and SAF focus

The aviation sector is a material source of global emissions, with climate and health impacts that extend beyond CO₂. Aviation is estimated to account for approximately 2.5% of global CO₂ emissions, but its overall climate impact is significantly higher once non-CO₂ effects are considered. These include contrails, nitrogen oxides (NO_x), soot and other atmospheric effects that influence the Earth's radiative balance. Taken together, studies suggest aviation has contributed approximately 3.5–4% of observed global warming to date.¹ In addition, emissions of air pollutants around airports can have important local public health impacts.²

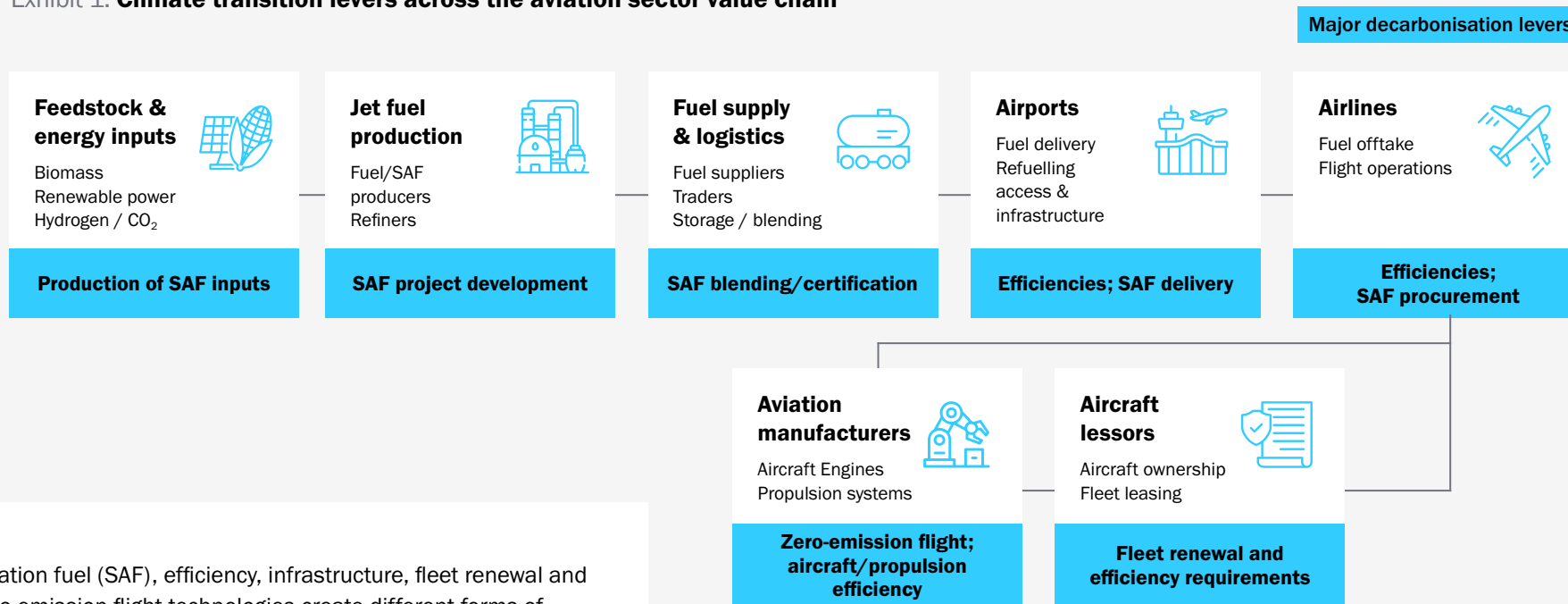
Aviation is among the hardest sectors to decarbonise because most commercial aircraft will continue to depend on high-energy-density liquid fuels. In power and road transport, renewables and electrification can replace fossil-fuel combustion directly across much of the system. In aviation, battery-electric and hydrogen aircraft may become important for short-haul and smaller aircraft segments; however, these technologies are unlikely to scale quickly for medium- and long-haul flight, where aircraft range, payload requirements and energy-density constraints create major technical barriers.

Aviation's climate transition is therefore not a single-segment or single-technology challenge. The relevant levers sit across the value chain, from feedstock and energy inputs through fuel production, logistics, airports, airlines, manufacturers and lessors. Exhibit 1 maps some of the key levers across the aviation system, showing where sustainable

¹ "What share of global CO₂ emissions come from aviation?" ([Our World in Data, 2024](#)) based on Lee et al. (2021), "The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018"

² Ultrafine particles in the vicinity of Schiphol Airport affect health ([RIVM, 2019](#)); Air quality and health-related impacts of traditional and alternate jet fuels from airport aircraft operations in the U.S. ([Arter et al. 2022](#))

Exhibit 1: **Climate transition levers across the aviation sector value chain**



aviation fuel (SAF), efficiency, infrastructure, fleet renewal and zero-emission-flight technologies create different forms of investor relevance.

Reducing climate impacts of aviation therefore requires a basket of solutions; industry-backed aviation roadmaps broadly agree that aviation will not reach net zero through a single lever:

- **Sustainable Aviation Fuel (SAF), including bio-SAF and e-SAF:** Drop-in liquid fuels made from sustainable biomass, waste, renewable power or captured carbon. Expected to be the largest in-sector emissions reduction lever (depending on the scenario, SAF constitutes 45-70% of emissions abatement by 2050³ – scaling up from ~0.8% of aviation fuel use today⁴).

- **Battery-electric / hydrogen aircraft:** Emerging propulsion technologies with greatest potential in short-haul and smaller aircraft segments, offering a route to reduce reliance on conventional jet fuel.
- **Aircraft and operational efficiency improvements:** Levers to reduce fuel burn through fleet renewal, aircraft and engine efficiency, improved routing, air traffic management, higher load factors and operational optimisation.

³ **Note:** Roadmaps shown focus on aviation net-zero CO₂ pathways and do not model contrail avoidance or other non-CO₂ mitigation as distinct levers. This is largely because contrail science, pathway-modelling methods and operational avoidance strategies are still evolving. Source: Aviation Net-Zero CO₂ Transition Pathways – Comparative Review (IATA, 2024). Based on ATAG (2021) Waypoint 2050 S2; IATA (2023) Net-Zero Roadmap S2; ICCT (2022) Vision 2050 Breakthrough Scenario; MPP (2022), Making Net-Zero Aviation Possible: An industry-backed, 1.5°C-aligned transition strategy, Prudent scenario

⁴ SAF Production Volumes Still Disappointing ([IATA, June 2026](#))

- **Contrail management:** Approaches to reduce contrail formation or climate impact by avoiding contrail-forming conditions or reducing the soot particles around which contrail ice crystals form. This includes operational avoidance through flight-planning, route and altitude adjustments; fuel-side measures such as processing for lower-aromatic / lower-sulphur conventional jet fuel⁵; and lower-soot engine technologies.
- **Removals/offsets:** Likely needed to address residual emissions that remain after in-sector measures, particularly for long-haul aviation.

While all levers will be required to reduce aviation's climate impact, SAF is the central near-term topic for capital allocation and investment. Battery-electric and hydrogen aircraft remain important long-term options, but their mainstream commercial viability is still limited by aircraft availability, range, infrastructure and fleet turnover. Efficiency improvements are also a finance-relevant lever, particularly through fleet renewal, aircraft and engine upgrades, and operational optimisation. These measures are typically assessed through airline capex, corporate lending or stewardship, rather than as standalone project finance opportunities, but they remain material to investor and lender engagement on aviation transition plans. Carbon removals and offsets may help address residual emissions but should not substitute for credible in-sector action. By contrast, SAF is already becoming a material financing, procurement and policy issue.

There is significant variation in the investment profiles of different SAF technology pathways, requiring different approaches to financial diligence. SAF pathways differ significantly in maturity, feedstock exposure, scalability, and capital intensity. For lenders, asset managers and public finance actors, the key diligence question is therefore not simply whether a company is using SAF or a project is

producing SAF, but which pathway is being pursued and whether the commercial structure can support investment. A representative set of commercially relevant SAF pathways is compared in Exhibit 2.

Bio-SAF and e-SAF have different maturity and scale profiles, and therefore require different diligence. Bio-SAF pathways are generally closer to commercial deployment. HEFA is the most mature route and benefits from existing commercial experience, while alcohol-to-jet and biomass-to-liquids are less mature but may expand the set of available bio-based options. However, bio-SAF is somewhat constrained by sustainable feedstock availability, competing uses, traceability and indirect land-use change risks. In comparison, e-SAF offers larger theoretical scale because it is based on green hydrogen and captured carbon dioxide rather than scarce biomass, but it is more capital intensive and depends on affordable renewable power, water availability, credible CO₂ sourcing, and technology integration. For investors, the near-term question for each is therefore whether a bio-SAF route can scale with integrity, and what support is needed to make e-SAF projects bankable despite first-of-a-kind risk, given their importance for long-term scale. Hybrid pathways involve a combination of the relevant risks from each side.

While costs vary across SAF pathways, all remain more expensive than fossil jet fuel, which benefits from a single primary feedstock, a mature, optimised refining industry, and sizeable historical petroleum subsidies.



For investors and lenders, the key question is not whether a project produces SAF, but which SAF pathway is being pursued and whether its commercial structure can support investment.

⁵ Potential for reducing aviation non-CO₂ emissions through cleaner jet fuel ([CE Delft, 2022](#)); Hydroprocessing of fossil fuel-based aviation kerosene – Technology options and climate impact mitigation potentials ([Quante et al, 2024](#))

Exhibit 2: Comparison between SAF pathways.⁶

SAF pathway		Feedstocks	Maturity /TRL	Cost of production	Lifecycle carbon intensity	Scalability (based on feedstock availability, integrity and sustainability)
Bio-SAF	HEFA (Hydrotreated Esters and Fatty Acids)	Bio-oils, such as used cooking oil (UCO), animal fats etc.	9 Commercial & competitive	LOW Mature hydroprocessing technology and comparatively lower conversion complexity	MEDIUM – HIGH Waste oils/fats typically low emissions; accounting for land-use change, can be high emissions	LOW Limited supply of UCO and degraded land crops Soy, palm widely available but compete with diesel and food
	Alcohol-to-jet (AtJ)	Alcohols, primarily ethanol e.g. from sugarcane, corn/maize	7–8 First-of-a-kind commercial-scale plants	LOW - MEDIUM Established alcohol production; typically lower costs for 1st generation ethanol vs. 2 nd generation cellulosic feedstocks	MEDIUM – HIGH 1 st generation feedstocks (i.e. crops) typically higher emissions than 2 nd generation feedstock routes	MEDIUM 1 st generation ethanol abundant in some countries (e.g. Brazil), but may compete with food/feed production 2 nd generation (e.g. waste-based) feedstocks more abundant, but commercial conversion is limited
	Bio-to-liquids (BtL) *via gasification +FT synthesis or MtJ technology	Lignocellulosic biomass (e.g. agricultural & forestry residues) or biogas	6–8 Demonstration / early commercial pipeline	MEDIUM High-capex gasification and syngas-cleaning drive higher costs	LOW – MEDIUM Agricultural and forestry residues can be low emissions; mixed municipal waste is higher	MEDIUM Fragmented supply of sustainable bio-mass (e.g. forestry/agriculture residues) with some degree of competition with other uses (heat, chemicals) Adding renewable H ₂ (“power-BtL”) can increase carbon utilisation, improving longer-term scalability
e-SAF *via FT synthesis or MtJ technology		Captured CO ₂ + green H ₂ (produced from clean electricity)	6–7 First-of-a-kind commercial-scale plants	HIGH Electrolyser capex, renewable electricity, and CO ₂ input dominate production costs	LOW Achieves low carbon intensity assuming renewable power and sustainable CO ₂ source	HIGH Theoretically unlimited but dependent on sufficient eligible CO ₂ supply / infrastructure Affordable renewable electricity key advantage

⁶ **Notes:** (i) BtL and e-SAF involve syngas production, which can be used to produce SAF via Fischer-Tropsch (FT) or Methanol-to-Jet (MtJ) technology. (ii) Power-and-biomass-to-liquid (PBtL) configurations are not shown separately. PBtL combines biomass gasification with renewable hydrogen addition to increase carbon utilisation and fuel yields. Because it shares the same core gasification and fuel-synthesis routes as BtL (typically Fischer-Tropsch or Methanol-to-Jet), it is treated here as a BtL variant rather than a distinct SAF pathway. While commercial deployment remains limited, the underlying FT synthesis technology is well established; key scale-up challenges relate primarily to low-carbon hydrogen supply and biomass feedstock collection, preprocessing and gasification.

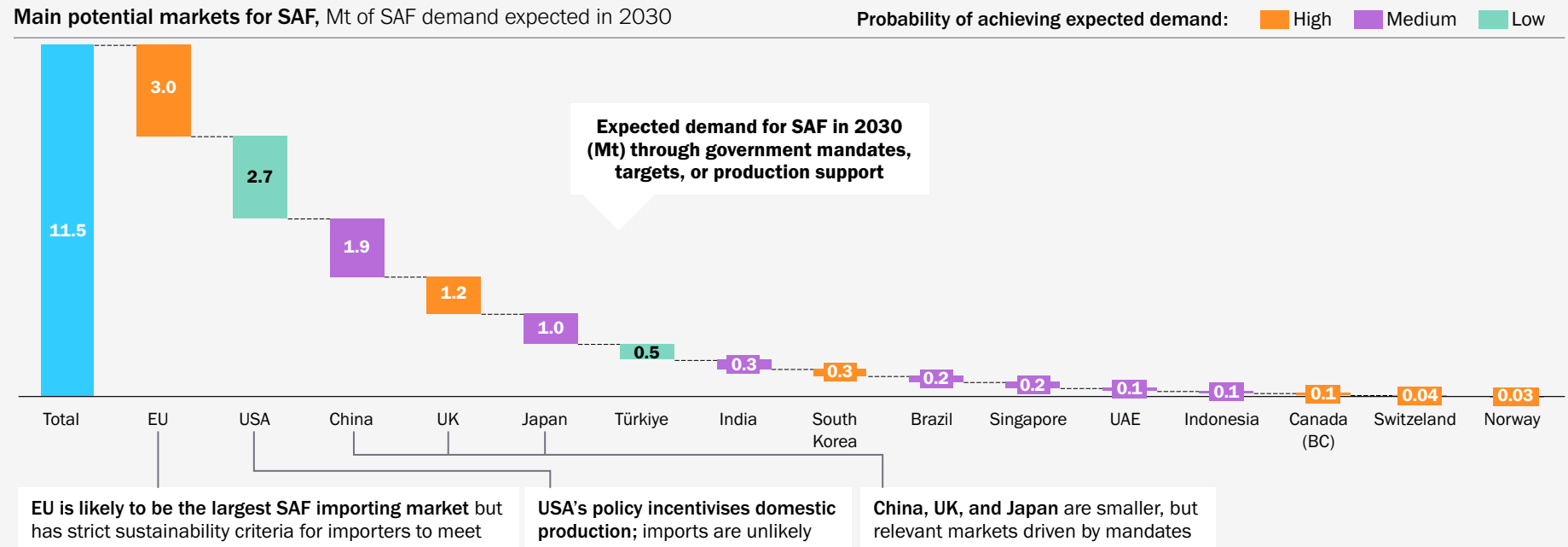
Source: Systemiq analysis and cost models (2026) from Project SkyPower: based on IATA (2024), DoE (2024), Zang et al (2021) and expert input. Lifecycle carbon intensities informed by “SAF Rules of Thumb” (ICAO).

A2. Policy landscape: Implications for investor engagement

Policy direction is increasingly clear, but implementation does not automatically create investable or credible transition outcomes. At the international level, ICAO provides an overarching policy signal through its collective global aspirational “Vision” to reduce CO₂ emissions from international aviation by 5% by 2030 through SAF, lower carbon aviation fuels and other aviation cleaner energies. While ICAO’s Vision does not impose specific obligations on individual states, it provides a common international framework that can inform and reinforce national and regional policy development.

ICAO’s CORSIA scheme adds a compliance link at the international level, since airlines can use eligible fuels to reduce their offsetting obligations. Below this global layer, aviation decarbonisation has moved from voluntary ambition into a more regulated transition agenda, with binding SAF obligations in Europe, carbon pricing (e.g. EU Emissions Trading System), and production-side incentives in the US. Moreover, several other jurisdictions—including the United Kingdom, India, Japan, Singapore and Brazil—have introduced or are developing SAF mandates or comparable policy frameworks to stimulate production and demand. Together, these measures create demand signals, compliance exposure and new sources of potential value across the sector.

Exhibit 3: **SAF demand in 2030 is concentrated in a small number of policy-driven markets⁷**



⁷ **Note:** Probability rating reflects policy and demand-materialisation likelihood, not domestic production capacity.

Sources: SkyNRG & ICF, SAF Market Outlook 2026; Systemiq analysis.

As Exhibit 3 shows, expected SAF demand to 2030 is concentrated in a small number of markets, but the likelihood of that demand materialising varies with the strength and maturity of the underlying policy. However, investors should distinguish between the existence of a policy signal and the *credibility* of a specific project or company strategy in relation to that policy signal. Mandates, penalties and incentives become finance-relevant only where they support eligible fuel, credible procurement or offtake, premium recovery, durable cashflows, enforceable demand and defensible transition claims.

A distinction should be made between demand-side compliance obligations and supply-side production support.

ReFuelEU Aviation and the UK SAF Mandate create compliance demand by reducing offtake risks for eligible SAF, while the EU ETS creates a carbon cost signal and its SAF allowances can offset part of the price premium for eligible SAF, supporting airline demand. CORSIA creates potential compliance value but does not require SAF blending. By contrast, the US relies more heavily on a combination of production incentives and

fuel-credit programmes. SAF project economics may depend on a policy stack that includes the Clean Fuel Production Credit (45Z), Renewable Fuel Standard (RFS) credits, and state-level mechanisms such as Low Carbon Fuel Standards. Not all US policies are technology-neutral in practice; for instance, both the RFS and 45Z exclude the category of e-SAF.

Exhibit 4 provides a non-exhaustive scan of major global aviation policies and translates them into investor-relevant diligence themes: who is obligated, what counts as eligible SAF, how compliance is evidenced, and what risks or investment implications follow. It also highlights the fragmented nature of the policy landscape, with different jurisdictions using different mandates, certificate systems, incentives, eligibility rules and review cycles. This fragmentation can create uncertainty and complexity for investors, especially where projects or companies rely on multi-market SAF strategies. Investors should therefore identify which national or regional policies underpin a project or company strategy, test whether eligibility and compliance value carry across relevant markets, and stress-test exposure to differences in policy design or review cycles.

Exhibit 4: **Compliance factors and investment risks/implications for key SAF policies (non-exhaustive).**

Policy	SAF compliance factors	Investment risks / implications
ReFuelEU Aviation ⁸ 	• EU-wide obligation on aviation fuel suppliers and self-supply airlines to increase SAF blended into conventional aviation fuel supplied at EU airports. • Minimum SAF shares: 2% from 2025, 70% by 2050; synthetic aviation fuel (e-SAF) sub-mandate: 1.2% by 2030, 35% by 2050. • Eligible SAF includes synthetic aviation fuels, advanced biofuels, eligible aviation biofuels from oils and fats, and recycled carbon aviation fuels. • Airlines must avoid excessive “tankering” (i.e. carrying extra fuel to avoid refuelling at certain airports), and EU airports must facilitate SAF infrastructure for delivery, storage and refuelling.	• Creates a strong long-term demand signal for SAF (especially e-SAF); does not by itself make individual projects bankable. • Investors need to test whether a SAF project is mandate-eligible and whether synthetic sub-mandate demand translates into bankable offtake demand for the project’s output. • Key risks include changes to eligible fuel definitions, feedstock restrictions, and airport-by-airport demand uncertainty. • Mandated regional demand improves the commercial case, but investors still need project evidence on offtake tenor, premium recovery and counterparty credit quality.

⁸ ReFuelEU aviation, European Commission ([online](#)). The regulation is subject to a scheduled Commission review in 2027.

Exhibit 4: **Compliance factors and investment risks/implications for key SAF policies (non-exhaustive).**

Policy	SAF compliance factors	Investment risks / implications
EU ETS and SAF Allowances⁹ 	• EU ETS carbon pricing requires aircraft operators on covered routes to surrender allowances for CO₂ emissions; free allocation to aviation has been fully phased out from 2026. • 20 million ETS allowances are reserved for 2024–2030 to cover part of the price gap between fossil kerosene and eligible non-fossil aviation fuels used on ETS-covered flights. • Support varies by fuel type: up to 95% of the remaining price gap for renewable fuels (e.g. e-SAF), 70% for advanced biofuels and 50% for other eligible non-fossil fuels.	• Reduces the effective SAF premium for airlines and can strengthen willingness to procure SAF, but does not itself provide guaranteed long-term offtake. • Higher support for e-SAF can materially improve relative economics; investors should test fuel eligibility, applicable support rates and whether allowance value is reflected in offtake pricing. • Policy duration and pending reform: the current allowance mechanism runs to 2030. A July 2026 Commission proposal, still under negotiation, would extend SAF support to 2040 with 110 million additional allowances for advanced bio-SAF and e-SAF. It would also add a €30 billion Investment Booster and make free allocation conditional on 'Invest in EU Decarbonisation Plans', both of which could support alternative fuel investment.
UK SAF Mandate¹⁰ 	• UK obligation on fuel suppliers to supply SAF; mandate starts at 2% of total UK jet fuel demand in 2025, rises to 10% in 2030, and reaches 22% in 2040. • Suppliers can meet the obligation by redeeming tradeable SAF Certificates or paying a fixed buy-out price. • A separate Revenue Certainty Mechanism will support eligible UK SAF projects through two-way strike-price contracts, funded by a levy on aviation fuel suppliers. • Eligible SAF includes waste and residue-derived biofuels, e-SAF, recycled carbon fuels, and low-carbon hydrogen. • Crop-derived biofuels cannot count; HEFA-type SAF from segregated oils/fats is capped year-on-year for the main obligation.	• Creates a clear UK demand floor, but project bankability depends on whether certificate values flow through to the SAF producer via offtake pricing, and whether buy-out levels support willingness to pay. • Investors should test whether the certificate value flows through to the offtake price, and whether the project remains viable if buyers choose the buy-out option over a higher SAF premium. • Feedstock restrictions and HEFA caps create eligibility and volume risk for bio-SAF pathways. • SAF certificates require approved third-party verification and may be revoked if supporting information is inaccurate or insufficient.
CORSIA¹¹ 	• ICAO's carbon offsetting scheme for international aviation: airlines must offset emissions growth above the scheme baseline (85% of 2019 emissions), while eligible SAF can reduce that obligation. • Offsetting obligations for the 2024–2026 first phase apply to volunteer states (130 states participating in 2026), while the 2027–2035 second phase applies to states above ICAO activity thresholds.	• CORSIA is a weaker SAF demand signal because it applies only above the scheme baseline and allows carbon credits instead; it creates compliance value, but not guaranteed demand or bankable offtake. • SAF projects may face differences between CORSIA eligibility and domestic mandate eligibility, creating multi-market compliance risk.

⁹ Reducing emissions from aviation ([EU Commission, 2026](#)); EU ETS: Commission publishes proposal for the revised Emissions Trading System ([Linklaters, 2026](#))

¹⁰ Sustainable Aviation Fuel (SAF) Mandate ([UK DfT, 2024](#)); Sustainable Aviation Fuel Mandate: Compliance Guidance ([UK DfT, 2026](#)); Sustainable aviation fuel revenue certainty mechanism: levy design ([UK DfT, 2026](#))

¹¹ Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), ICAO ([online](#)); CORSIA Fact sheet ([IATA](#))

Exhibit 4: **Compliance factors and investment risks/implications for key SAF policies (non-exhaustive).**

Policy	SAF compliance factors	Investment risks / implications
CORSIA	- Aircraft operators can reduce offsetting requirements by using CORSIA “Eligible Fuels”, including SAF and lower carbon aviation fuels, or ICAO-approved carbon credits. - Eligible fuels require monitoring, reporting and verification of approved sustainability certification schemes, lifecycle emissions values and sustainability criteria.	- Investors should test sustainability certification, lifecycle emissions assumptions, eligible feedstock status, double-counting controls and verification quality. - CORSIA design remains subject to periodic review, creating policy and market-value uncertainty over the financing tenor of SAF projects.
US Clean Fuel Production Credit¹² 	Production-side tax credit (45Z) available for clean transportation fuel, including SAF, produced domestically and sold between 2025 and 2029. - For SAF produced from 2026 onwards, the credit is up to \$1/gal¹³; lower lifecycle emissions increase credit value. - Fuels produced must be derived exclusively from feedstocks produced or grown in the US, Mexico or Canada. - Covered SAF pathways under 45Z include HEFA, alcohol-to-jet and gasification / Fischer-Tropsch (currently excludes e-SAF), plus additional SAF pathways recognised under CORSIA Default or Actual lifecycle methodologies.	- Can materially improve SAF production economics, but does not create guaranteed demand or offtake. - Investors should treat the credit as time-limited, eligibility-dependent revenue support rather than a durable demand signal. Projects should be sensitivity-tested for lower credit value, loss of eligibility, guidance changes, expiry after 2029 or changes in federal policy. - For e-SAF, project economics are likely to depend materially on the clean hydrogen tax credit (45V) and, where applicable, carbon capture / utilisation credits (45Q); anti-stacking rules mean these cannot be combined with 45Z at the same facility.
Emerging Asia-Pacific policies^{14,15} 	- Singapore has set a 1% SAF uplift target from 2027, with a goal to raise this to 3–5% by 2030. This is supported by a SAF levy on departing flights and a central SAF procurement mechanism. - Japan is targeting 10% SAF use by 2030, although it has yet to implement a binding regulatory mandate. - China has signalled policy; experts expect a potential 5% SAF mandate by 2030, but this has not yet been formally announced. - India has a proposed mandate of 1% in 2027, rising to 5% by 2030, focused on international flights.	- Expands potential global SAF demand, but with higher uncertainty around enforceability, timing and implementation. - Projects or companies relying on Asia-Pacific demand should test whether local policy creates enforceable offtake demand, certificate / attribute recognition and premium recovery. - China, India, and Japan: policy signals could materially affect global SAF demand and feedstock availability, but should be treated as upside / sensitivity cases until rules are confirmed.

Source: Systemiq and EDF

¹² Clean Fuel Production Credit (45Z), IRS, ([online](#)); Section 45Z Clean Fuel Production Credit ([2025 notice](#))

¹³ For SAF produced/sold in 2025, the credit was up to \$1.75/gal. Under the One Big Beautiful Bill Act, this was reduced to \$1.00/gal for 2026 onwards, subject to future legislative change.

¹⁴ Airline domain sustainability initiatives ([CAAS, 2026](#))

¹⁵ Beyond the transatlantic core: Emerging SAF mandates in global markets ([Carbon Direct, 2025](#))

Policy momentum is increasing interest among potential sponsors of SAF projects, but many such projects are not yet bankable. Capital is increasingly focused on aviation decarbonisation, but many opportunities face financing challenges associated with uncertain cashflows, early-stage technology and complex eligibility and sustainability risks. For example, in the European e-SAF market, [Project SkyPower](#) estimates that €15–25 billion of capital investment is needed by 2030 to build enough production capacity to meet EU and UK synthetic aviation fuel mandate requirements.¹⁶ However, the question of policy eligibility can add cost and execution complexity: RFNBO¹⁷ compliance affects renewable power sourcing and traceability; SAF projects can face “project-on-project” risk across renewable power, carbon supply, fuel production and distribution infrastructure; and public-support schemes may include supply-chain or sourcing conditions (e.g. limits on Chinese-origin electrolyser components in some EU hydrogen funding¹⁸). Moving from policy signal to investment decision therefore requires evidence on long-term offtake, premium-recovery mechanisms, technology readiness, certification status, delivery capability, lifecycle emissions integrity, feedstock provenance and downside sensitivities. These are decision-grade diligence questions, not generic ESG screening questions.

Policy should be treated as a live source of obligations, incentives and risks that investors can test through company engagement. With policy stability directly affecting bankability, investors should assess stability not only through legal status and review dates, but also through the scale of economic change required. For example, Europe’s near-term SAF mandate is expected to be met largely through bio-SAF, which is closer to current supply and market economics, while the e-SAF sub-mandate requires a much larger cost and

market-creation bridge and is therefore more exposed to affordability pressures, pushback or delay. Existing aviation transition-plan tools and benchmarks, such as International Financial Reporting Standards (IFRS) guidance on climate-related disclosures and transition plans, can help investors assess whether company transition plans are credible and sufficiently focused on execution, but investors still need more granular evidence on delivery. Engagement should therefore move quickly from policy awareness to evidence, e.g.:

- SAF procurement strategies
- signed or budgeted offtake agreements
- sustainability certification
- lifecycle analysis
- governance
- price exposure and cost pass-through
- supplier credibility
- contingency planning

The relevance of this evidence depends on how an investor is exposed to the underlying asset. Project and asset-level investors may assess bankability, construction and operating risks directly, while issuer- and portfolio-level investors may use corporate finance, stewardship and engagement to test companies’ strategies, capital allocation and delivery. Mission-driven capital may play a further role where additional de-risking is required. The next section maps these different forms of investor exposure and engagement across the aviation value chain.



With policy stability directly affecting bankability, investors need granular evidence on how SAF projects will be delivered, financed and scaled.

¹⁶ Accelerating the take-off for e-SAF in Europe ([Project SkyPower, 2024](#))

¹⁷ RFNBOs (Renewable Fuels of Non-Biological Origin) are subject to EU rules on additionality and temporal / geographic correlation of electricity supply. These requirements are intended to ensure that renewable hydrogen and e-fuels deliver genuine emissions reductions rather than increasing demand for existing renewable electricity capacity or higher-carbon grid power.

¹⁸ For example, the second Innovation Fund hydrogen auction introduced a criterion requiring projects to limit China-based components to no more than 25% of the total electrolyser capacity. Source: Innovation Fund IF24 Auction, Terms and Conditions ([European Commission, 2024](#)).

A3. Investor exposure and engagement across aviation

Financial institutions finance and invest across the aviation sector through different forms of capital, creating different exposures to the opportunities and risks associated with the sector’s climate transition. This includes different combinations of asset proximity and risk appetite: some financial institutions provide direct capital to projects and platforms, while others influence mature issuers through corporate finance, bonds, listed equity exposure and stewardship. Mission-driven capital also plays a role,

particularly where early-stage SAF or zero-emission-flight projects require de-risking before commercial capital can enter. The framework in Exhibit 5 is therefore illustrative rather than a classification of whole institutions. Large financial institutions may sit across multiple boxes depending on mandate, product or team. For the purposes of this guide, the two core investor audiences are (1) “project / asset-level capital” and (2) “issuer / portfolio-level finance”, with mission-driven capital treated as an enabling category that shapes bankability and de-risking needs. The table in Exhibit 5 breaks down these audiences in terms of risk appetite and their relationship to the underlying assets.

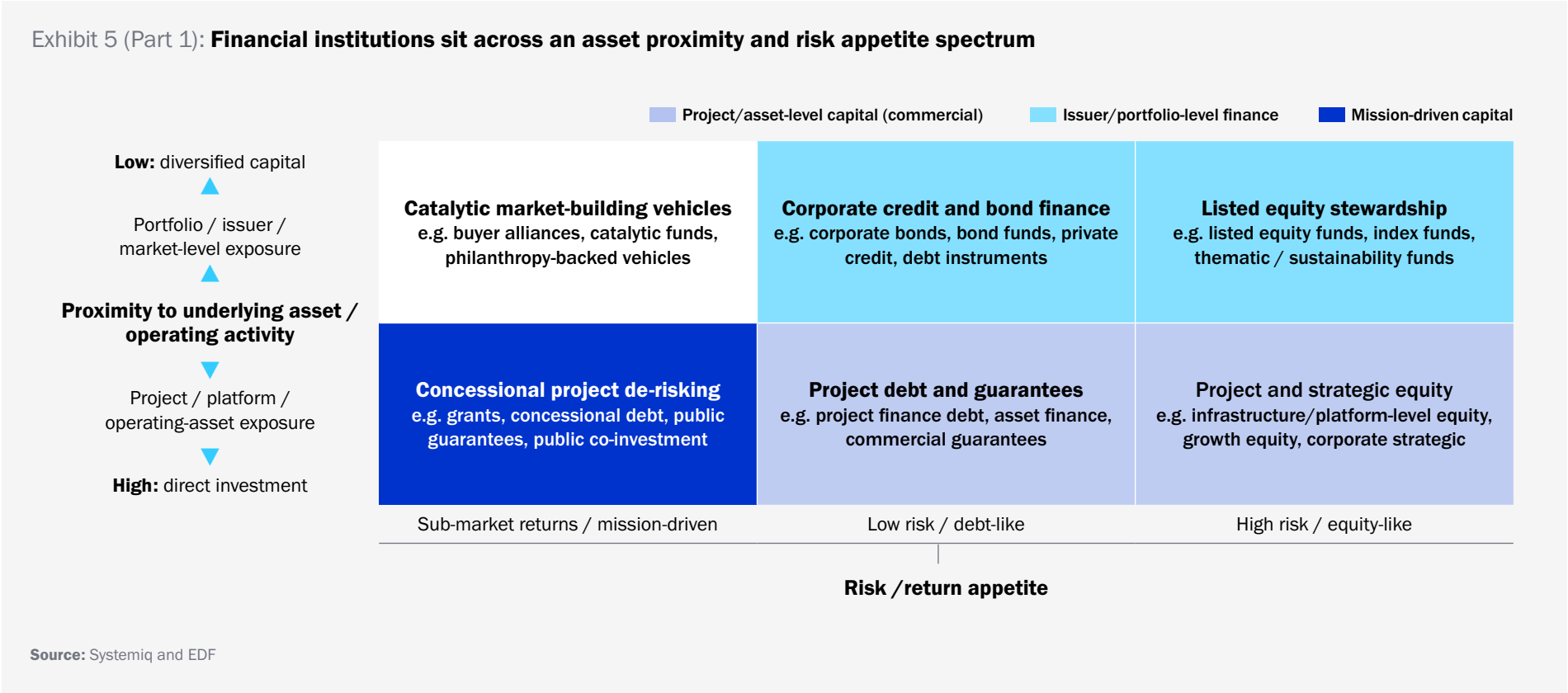


Exhibit 5 (part 2): **Different investor categories fulfil distinct financing and engagement functions across aviation**

Investor category		Types of investors / institutions	Main finance role(s)	
			WHAT	HOW
Project/asset-level capital (commercial)		- Commercial banks - Infrastructure equity investors/managers or infrastructure debt funds - Growth equity funds	Provide asset-level capital for SAF production and related fuel infrastructure	Assess project bankability, offtake, technology risk, construction risk and policy-backed revenues
Issuer/portfolio-level finance		- Corporate banks - Bondholders and credit investors - Asset owners and asset managers (with listed equity exposure)	Provide issuer-level financing or investment exposure through corporate lending, bonds and listed equity	Assess issuer credit risk, transition-plan credibility, SAF procurement strategy, capex plans and policy exposure; use stewardship and climate engagement to influence corporate strategy and disclosure
Mission-driven capital		- DFIs / ECAs - Multilateral / national development banks - Government loan-guarantee programmes - Philanthropic funders	De-risk early-stage or FOAK SAF projects and market-building structures	Assess which risks private capital cannot absorb; provides grants, guarantees, public co-investment, or revenue-stabilisation mechanisms to crowd in private capital
Catalytic market-building vehicles		- Buyer alliances, demand aggregators and market intermediaries - Catalytic / philanthropy-backed funds	Build early SAF markets through catalytic capital and shared market infrastructure	Coordinate buyers, pool commitments, fund market-enabling activities and absorb early-stage risk to strengthen demand certainty and crowd in commercial capital

Source: Systemiq and EDF

Investor relevance changes across the value chain because different climate transition levers sit in different kinds of assets and companies, as shown in Exhibit 6. SAF inputs, fuel production and fuel logistics are more likely to require direct project or platform capital because they involve new infrastructure, technology integration, construction risk and long-term offtake. By contrast, airlines, airports and aircraft lessors are mature operating companies; investors are more likely to influence them through procurement strategy, corporate finance, stewardship, disclosure and fleet-renewal decisions than through standalone project finance. Aviation

manufacturers and emerging zero-emission-flight technologies sit between these models, combining mature listed-company engagement with higher-risk capital needs for new aircraft, engine or propulsion technologies. Exhibit 6 therefore helps investors identify where their influence is strongest and where another type of capital or support may be required. Viewed across the value chain, it also shows where exposures connect: investors active in renewable power, hydrogen, CO₂ infrastructure and SAF may capture portfolio-level synergies or reduce individual project risks that a standalone project analysis can miss.

Exhibit 6: Investor engagement points differ across the aviation value chain, with direct capital concentrated around fuels and infrastructure

Illustrative mapping of where investor categories engage or influence the aviation value chain

Dots indicate the most typical engagement / influence routes, not all possible financing routes



Source: Systemiq and EDF

Exhibit 7 shows that financial institutions influence aviation's climate transition through several distinct mechanisms, each requiring different diligence questions and evidence. Some routes involve direct capital allocation, such as project finance, infrastructure equity or catalytic capital for SAF production, fuel infrastructure or zero-emission-flight technologies. Others work through issuer-level influence, including corporate lending, bond exposure, stewardship, AGM voting, board escalation, disclosure requests and portfolio criteria. Sector initiatives and conveners can also shape the

system by aggregating demand, aligning standards, building market confidence and supporting policy advocacy. This means investor action cannot be assessed through a single lens.

Part B therefore builds on this landscape by providing a practical diligence toolkit, setting out what investors should test, what evidence they should request, and when gaps should trigger further conditions, escalation or de-risking support.

Exhibit 7: Finance and market-building actors influence aviation's climate transition through distinct mechanisms, from capital allocation to shareholder engagement

Influence route	How influence is applied	Institution types	Transition impact	Examples
Asset-level capital allocation 	Direct debt/equity into SAF, zero-emission flight, etc.	- Banks / project finance lenders - Infrastructure equity investors/managers	Moves projects toward FID and scale-up	Project financing for SkyNRG's greenfield SAF facility in the Netherlands ¹⁹
Corporate lending and relationship banking 	Lending terms and client dialogue influence capex and procurement	- Relationship banks with airline, airport, or fuel-company clients - Corporate banking / sector coverage teams	Shapes corporate transition plans and execution	Pegasus Guidelines – RMI-led aviation lending portfolio alignment framework
Ownership, voting and stewardship 	Engagement, AGM voting, shareholder resolutions and board escalation	- Asset owners - Asset managers	Improves disclosure, targets, capex alignment and procurement	Asset manager engagement with listed airlines on SAF procurement and long-term offtakes
Sustainable finance instruments 	Green / transition / KPI-linked finance conditions	- Banks - Institutional investors - Bond arrangers	Links capital to credible decarbonisation outcomes	Air France-KLM sustainability-linked bond: €1bn bond linked to well-to-wake jet-fuel GHG intensity ²⁰
De-risking and catalytic capital 	Guarantees, concessional capital, grants, revenue-stabilisation mechanisms	- DFIs/ECA's - Public finance agencies / government loan guarantee programmes - Philanthropic capital	De-risks early-stage projects and crowds in private capital	US DOE Loan Programs Office - loan guarantee support for Montana Renewables SAF expansion (\$1.67 bn) ²¹
Market coordination and advocacy 	Shared guidance, demand aggregation and policy advocacy	- Investor coalitions - Cross-sector aviation / SAF alliances - NGOs and standard-setting platforms	Builds market confidence and improves investability	Project SkyPower: coalition focused on getting large-scale e-SAF projects to FID by 2030

Source: Systemiq and EDF

¹⁹ Deutsche Bank closes large project finance deal with SkyNRG to develop sustainable aviation fuel ([Deutsche Bank, 2026](#))

²⁰ Air France – KLM €1bn inaugural sustainability-linked bond ([Natixis, 2023](#))

²¹ DOE Announces \$1.67 Billion to Montana Renewables to Significantly Expand US SAF Production ([US DOE, 2025](#))

A large commercial airplane is parked on a tarmac. The image is taken from a low angle, looking up at the aircraft. The sun is low on the horizon, creating a strong orange and yellow glow that reflects off the metallic surfaces of the plane. The engine is prominent in the foreground, and the landing gear is visible. A small orange and white traffic cone is in the bottom left corner.

Part B

SAF due diligence toolkit

These due diligence questions help investors assess the risks and opportunities associated with SAF projects and strategies by testing them across three key dimensions: eligibility, bankability and integrity. Together, they help identify the evidence gaps and red flags that should inform further diligence, financing conditions and investment decisions.

The guide draws on investor and industry interviews and a roundtable held during London Climate Action Week (LCAW) in 2026. Engagement spanned the aviation-finance value chain, including commercial banks and infrastructure investors, asset managers and stewardship teams, SAF developers, and policy and civil-society experts. This helped test both the structure of the guide and the practical evidence investors need in diligence processes. Exhibit 8 summarises the principal engagement insights.

Exhibit 8: Selected stakeholder insights which shaped the investor due diligence toolkit



Insurance cannot fully absorb first-of-a-kind (FOAK) technology and performance risks across projects. Early lender engagement should test what insurers can realistically cover, price or exclude.

—
LCAW roundtable discussion



FOAK SAF projects will often require public risk-sharing to reach financial close. Guarantees, grants, export credit agencies and revenue support can bridge risks private capital cannot.

—
LCAW roundtable discussion



Mandates create demand signals, but not necessarily bankable project revenues. Projects still need durable premiums, credible buyers and willingness to pay.

—
LCAW roundtable discussion



Execution strategy and enabling infrastructure are critical filters for SAF projects. Investors should test engineering and construction capability, licenses, utilities, feedstock and logistics.

—
Project equity investor interview



Policy certainty directly affects investment models, offtake appetite and bankability. Investors should test durability, interpretation risk and exposure to policy change.

—
Investor / industry interviews



Investors need clearer comparisons across SAF pathways to improve diligence quality. Greater differentiation helps investors ask sharper questions and avoid overly broad analysis.

—
Credit investor / asset manager interviews



Feedstock integrity, eligibility and traceability require materially stronger investor diligence. Key concerns include certification quality, imported inputs, fraud and double counting.

—
Investor / SAF producer interviews

Note: Paraphrased and synthesised sample quotes from interviews with CVC investment managers, directors and principals; interviewees anonymised for confidentiality.

Source: Systemiq and EDF

B1. Toolkit architecture: from SAF pathway to investor action

Achieving long-term aviation decarbonisation will require both investment in currently bankable SAF solutions and targeted support for emerging pathways that are expected to play a critical role in delivering deep emissions reductions over time. The objective of this toolkit is to help investors distinguish among SAF opportunities by identifying

where technical, commercial and integrity risks are sufficiently managed to support investment, and where additional policy support, catalytic capital, strategic partnerships, long-term offtake agreements or other risk-sharing may be needed to make promising higher-integrity pathways investable.

The toolkit applies one repeatable diligence logic to SAF-related investment and engagement decisions: eligibility, bankability and integrity. These tests help locate

where an opportunity currently sits and what would need to change for it to progress toward deployment and scale. They are relevant to both core audiences identified in Part A, but they are used in different ways. For **project / asset-level capital**, the toolkit helps assess whether a SAF production project, fuel-infrastructure asset or related platform is financeable. For **issuer / portfolio-level finance**, it helps assess whether an airline, fuel supplier, or other aviation-sector company has a credible SAF strategy, procurement approach, policy exposure and evidence base. The logic therefore provides a shared evidence standard that can support lending and investment, as well as stewardship, portfolio assessment and escalation.

Eligibility asks whether the SAF pathway, project or company's SAF-related claim qualifies under relevant standards, certifications or regulations. For project / asset-level capital, this means testing whether the SAF pathway is certified, eligible under relevant policy regimes, technologically proven at the proposed scale and supported by traceable inputs. For issuer / portfolio-level finance, it means testing whether a company's SAF procurement, transition-plan or financing claim is based on eligible fuel, credible certification, auditable chain of custody and policy-compliant sourcing. If the fuel or claim is not eligible, the opportunity cannot be fixed through financial structuring alone.

Bankability asks whether the commercial case is credible enough to support financing or issuer-level transition credibility. For project / asset-level capital, this means testing offtake, pricing, counterparties, construction risk, technology risk, policy support, and risk allocation. Where risks are material, insurers should be brought into the conversation early to assess what can realistically be covered, priced or excluded. For issuer / portfolio-level finance, bankability means testing whether SAF procurement plans, capex needs,

cost pass-through, supplier relationships and policy exposure are credible enough to support the company's transition plan and credit or investment case. The question is not only whether SAF is strategically important, but whether the economics, contracts and risk-sharing arrangements are sufficiently robust to support action, and whether diligence identifies the specific interventions, risk mitigation measures, catalytic capital or additional policy and commercial support required to enable action.

Integrity asks whether climate, environmental and social claims can withstand scrutiny. Across both audiences, investors need evidence on lifecycle emissions, feedstock sourcing, non-CO₂ considerations, sustainability certification, double counting, labour standards, community impacts and environmental safeguards.²² For project / asset-level capital, integrity gaps can become financing conditions or reasons to decline. For issuer / portfolio-level finance, they can trigger evidence requests, stewardship escalation, voting action or changes to portfolio assessment.

The following sections move the diligence from broad assessment to a clear action path. They start with diligence questions across SAF pathways, then identify the evidence gaps and red flags that matter for each pathway, and link these to practical investor responses such as further evidence requests, conditions, escalation, de-risking support or declining to proceed. Part B is therefore designed to be decision-changing rather than informational.

“
The question is not only whether SAF is strategically important, but whether the economics, contracts and risk-sharing arrangements are robust enough to support action.

²² For more detailed guidance on SAF environmental integrity, including lifecycle emissions accounting, sustainability criteria, double counting and emissions-reduction claims, see EDF's [High-Integrity Sustainable Aviation Fuels Handbook](#).

B2. Due diligence questions across themes

This section sets out the due diligence questions for assessing SAF-related projects and company strategies. The six themes (Exhibit 9) are organised around the three gates from section B1: eligibility, bankability and integrity. These themes apply across SAF pathways, but the questions differ by investor audience (Exhibit 10). Project / asset-level questions focus on whether a specific project can be financed and delivered,

while issuer / portfolio-level questions test whether a company's strategy, procurement and disclosures are credible. The questions are not a test of short-term returns alone: bankability in particular should be assessed over the investment horizon, so that lower-readiness pathways with a credible route to scale are not screened out too early. The aim is to provide a common diligence structure while recognising that different investors have different forms of influence and decision needs.

Exhibit 9: Key themes for SAF-related investment and engagement diligence

	Eligibility		Bankability		Integrity	
Themes	 1. Technology, certification and delivery risk ▼	 2. Feedstock eligibility, sourcing and traceability ▼	 3. Commercial structure, offtake and revenue certainty ▼	 4. Policy support and regulatory exposure ▼	 5. Lifecycle emissions and non-CO₂ impacts ▼	 6. Safeguards <i>(labour, environmental and social standards)</i> ▼
Why it matters	Tests whether the SAF pathway is certified, deliverable at scale, and credible as a project or company claim	Assesses whether inputs are eligible, traceable and secure enough to support production, procurement and compliance claims	Determines whether cost pass-through, procurement commitments, and counter-parties support financing or issuer transition credibility	Tests whether mandates, incentives and eligibility rules create durable value or material exposure over the investment period/portfolio	Confirms whether claimed climate benefits are credible, verified and defensible	Checks whether environmental, labour and social risks are controlled across the company, project(s), or supply chain

Source: Systemiq and EDF

THE QUESTIONS

Exhibit 10: **SAF-focused due diligence questions across the 6 investment / engagement themes.**

Core / priority questions Enhanced questions

STEP A: Eligibility Diligence Questions

	Project / asset-level capital	Issuer / portfolio-level finance
 Theme 1: Technology, certification and delivery risk	- Is the SAF pathway ASTM²³ certified (i.e. meets relevant fuel safety/performance requirements), and if not, what is the certification date and what depends on it? - Has the full production chain been demonstrated at commercial scale, or does the project rely on first-of-a-kind integration of individually proven steps?²⁴ - Who is the EPC (Engineering, Procurement, and Construction) partner, what is their track record on comparable projects, and who bears performance risk if the plant underproduces or fails to meet fuel specifications?	- Which SAF pathways underpin the company's procurement or transition plan, and are they ASTM-certified or on a credible certification pathway? - What share of the company's SAF strategy depends on commercially proven supply versus first-of-a-kind or early-commercial technologies? - Are the SAF suppliers credible, and are their delivery timelines aligned with the company's targets?
	- Are the developer's stated front-end engineering design (FEED)²⁵ and construction timeline consistent with sector benchmarks and relevant mandate/offtake windows? - What are the key technical risks for this specific pathway (yield, efficiency, feedstock handling) and can they be mitigated through warranties or insurance coverage?	- Are the SAF technologies underpinning the company's plan commercially proven at the required scale, and what risks could delay delivery? - What contingency plan does the company have if preferred SAF technologies are delayed, underperform, or fail certification?
 Theme 2: Feedstock eligibility, sourcing and traceability	- Where do the feedstocks (bio/waste, renewable power, hydrogen, CO₂, or imported products such as methanol) come from, and is supply under firm contract or only Heads of Terms (i.e. preliminary agreement)? - Are feedstocks certified as sustainable and eligible under relevant policies (ReFuelEU / RFNBO, UK SAF, CORSIA, US Clean Fuel Credit), and for imported feedstock, can RFNBO compliance actually be demonstrated at origin? - Is chain of custody verified through physical delivery or mass-balance traceability, and where book-and-claim is used, through an auditable certificate or registry system?²⁶	- Which feedstock or input types underpin the company's SAF procurement, supply or transition plan, and are they eligible under the relevant policy regimes in the company's key markets? - How does the company verify feedstock origin, sustainability, chain of custody and double-counting controls, including mass-balance systems, book-and-claim certificates or registry-based claims where relevant? - Is the company's SAF strategy diversified across suppliers, pathways and geographies, or concentrated in scarce inputs, single suppliers or upstream assets that are not yet built?

²³ ASTM International, formerly known as the American Society for Testing and Materials, is the standards body whose aviation fuel specifications are used to determine whether jet fuel and SAF blends meet required safety and performance properties for use in aircraft.

²⁴ This dependence on the successful delivery/integration of linked assets is often referred to as "project-on-project risk".

²⁵ Front-end engineering design (FEED) is the detailed pre-construction phase used to define technical scope, cost, schedule and key risks sufficiently to support FID and EPC contracting. It broadly corresponds to Front-End Loading 3 (FEL-3), although stage definitions vary by company and sector.

²⁶ "Mass balance" is a chain-of-custody model that tracks certified feedstock or SAF volumes and sustainability attributes through a mixed physical supply chain, so claims are limited to the certified quantity moving through the system. "Book-and-claim" separates the sustainability attribute from physical fuel delivery: SAF is produced and used somewhere in the aviation system, while a buyer claims the associated emissions benefit through a certificate or registry.

Exhibit 10: **SAF-focused due diligence questions across the 6 investment / engagement themes.**

Core / priority questions Enhanced questions

	Project / asset-level capital	Issuer / portfolio-level finance
Theme 2: Feedstock eligibility, sourcing and traceability	- Are there competing uses (food, maritime e-methanol, other sectors), supply concentration, or input cost volatility risks that threaten security of supply or project economics? - What is the wider feedstock supply risk (e.g. scarcity, geographic concentration), and “project-on-project” risk where the SAF project depends on upstream feedstock production assets that are not yet built?	- Does the company disclose exposure to constrained or higher-risk feedstocks, such as used cooking oil, animal fats, crop-based ethanol, or imported fuels? - How exposed is the company’s SAF strategy to feedstock or input cost volatility, and how is this reflected in procurement planning, compliance cost forecasts and transition-plan delivery?
STEP B: Bankability Diligence Questions		
 Theme 3: Commercial structure, offtake and revenue certainty	- What share of capacity is covered by signed, binding long-term offtake, and is this sufficient to support the proposed debt financing? - What is the price formula (fixed, indexed, floating), does it recover the project’s cost base over the debt tenor, and is there sufficient margin or indexation to absorb capex, feedstock, electricity or other operating-cost increases? - How is compliance value allocated between producer and buyer, and what is the credit quality of the offtake counterparty?	- How material are SAF procurement costs, fuel premiums and related capex needs to the company’s credit profile, cashflow and wider capital allocation priorities, and how does management balance these against other investment needs? - Are the company’s SAF targets backed by binding procurement contracts or budgeted purchasing plans, or are they mainly aspirational commitments? - How does the company expect to absorb or pass through the SAF cost premium as blending levels rise, including through ticket pricing, corporate travel and cargo customers, and what are the implications for margins, demand and competitiveness across routes and markets?
 Theme 4: Policy support and regulatory exposure	- Which policy instruments underpin the project economics (e.g. tax credits, grants, guarantees, or revenue-support mechanisms), and are they binding, budgeted, or only signalled? - How exposed is the case to scheduled policy reviews within the financing window, including changes to mandate levels, eligibility rules, or incentive availability (e.g. the 2027 ReFuelEU review)? - What happens to project economics if mandate levels are delayed, reduced or eliminated, and has this been stress-tested?	- Are the company’s SAF suppliers or offtake counterparties credible, diversified and aligned with the company’s target dates and mandate exposure? - What happens to the company’s financial position or transition-plan credibility if SAF prices remain high, eligible supply is delayed, or procurement volumes fall short of stated targets?
	- Which policy instruments underpin the project economics (e.g. tax credits, grants, guarantees, or revenue-support mechanisms), and are they binding, budgeted, or only signalled? - How exposed is the case to scheduled policy reviews within the financing window, including changes to mandate levels, eligibility rules, or incentive availability (e.g. the 2027 ReFuelEU review)? - What happens to project economics if mandate levels are delayed, reduced or eliminated, and has this been stress-tested?	- Which SAF policies create material obligations, incentives or cost exposure for the company across its key operating markets? - Is the company’s SAF strategy aligned with binding policy requirements, or does it rely on voluntary commitments, expected future mandates or uncertain incentives? - How would changes to mandate levels, eligibility rules, incentive values or penalty enforcement affect the company’s SAF procurement plan, compliance costs, and transition-plan credibility?
	- Does the project rely on demand-side value, such as mandates, certificates or penalties, to support the investment case? - Are there contractual or structural protections against policy change (price adjustment, government guarantee, penalty-backed demand)?	Does the company have governance, monitoring and disclosure processes to track SAF policy changes and update procurement, budgeting and risk management accordingly?

STEP C: Integrity Diligence Questions

	Project / asset-level capital	Issuer / portfolio-level finance
 Theme 5: Lifecycle emissions and non-CO₂ impacts	- Which LCA methodology and boundaries were used, and does the assessment cover full value-chain (well-to-wake) and non-CO₂ emissions rather than combustion alone? - Have emissions claims been independently verified, with process and supply-chain emissions accounted for (e.g. hydrogen boil-off), and are there wider environmental trade-offs, such as land, water or biodiversity impacts? - For land-based feedstock, has ILUC²⁷ risk been screened and mitigated; and is the feedstock certified as low-ILUC under a recognised methodology (RSB or equivalent)? - Does the pathway or supplier claim carbon sequestration benefits (e.g. soil organic carbon, biochar, carbon capture and storage) to offset or net down an otherwise elevated ILUC or land-use risk; and where such claims are used, are they independently verified, additional and permanent, and reported separately from ILUC and land-use impacts rather than used to offset them?	- Does the company disclose the LCA methodology, emissions boundaries and carbon-intensity assumptions behind its SAF procurement? - Are SAF emissions claims based on pathway-specific and supplier-specific data, or on generic default values that may not reflect actual sourcing? - Are SAF-related emissions reductions independently verified, protected against double counting, and where relevant, supported by clear Scope 3 accounting and allocation of environmental attributes?
	- For imported or offshore inputs (e.g. hydrogen or methanol), is the carbon-intensity claim verifiable at origin, and based on contracted renewable electricity rather than assumed grid or curtailed power; and for hydrogen, does it account for leakage or venting and associated climate warming impacts²⁸? - For CO₂ inputs to e-SAF, has the project assessed the counterfactual use or fate of the CO₂, including whether it could otherwise be permanently stored, and the implications for the project's overall emissions benefit? - How are fuel-related non-CO₂ impacts assessed and evidenced, including the effects of soot formation, aromatics, sulphur content, and particulate emissions; and does the blending ratio preserve the claimed environmental benefits relative to conventional jet fuel?	- How does the company assess lifecycle risks across its SAF portfolio, including ILUC for bio-SAF and renewable electricity, hydrogen, methanol or CO₂ sourcing for e-SAF? - Where claims are made regarding non-CO₂ climate benefits, are these supported by evidence related to fuel composition (e.g. aromatics content, sulphur content, soot formation and particulate emissions), and are any associated benefits clearly distinguished from operational measures such as routing or altitude changes? - Does the company assess and manage contrail-related impacts through operational measures such as flight routing, altitude optimisation or flight planning; and how does it evaluate these measures alongside SAF deployment within its broader climate strategy?
 Theme 6: Safeguards <i>(labour, environmental and social standards)</i>	- Are environmental and social safeguards in place at the plant, feedstock-production sites and nearby communities, including at offshore supply origins? - Have safeguards been audited against a recognised standard (RSB-CORSA for SAF, or IFC, FSC, RSPO as applicable)? - Is there a transparent disclosure and grievance mechanism across the project and supply chain?	- Does the company have a clear safeguard policy covering labour rights, community impacts and environmental risks (e.g. IFC Performance Standards²⁹)? - Are SAF suppliers required to meet recognised environmental and social standards, and does the company disclose how compliance is verified? - Is there a grievance, audit or supplier-escalation process if safeguards are breached or evidence is incomplete?
	What is the track record on labour rights, community consultation and local environmental and health impacts near production sites?	Does the company disclose how safeguard risks affect supplier selection and procurement decisions?

Source: Systemiq and EDF

²⁷ ILUC (indirect land-use change) typically refers to emissions caused when crop-based fuel production displaces food/feed production, leading to land conversion elsewhere.²⁸ The global hydrogen rulebook challenge: Accounting for the emissions we don't see (EDF, 2026)²⁹ IFC's Performance Standards on Environmental and Social Sustainability (online)

B3. SAF pathway-specific evidence standards, risk flags and escalation pathways

The six themes from section B2 apply across SAF pathways, but the relevant evidence and red flags differ by route. This section translates the shared diligence questions into pathway-specific evidence standards and investor actions. The pathway-specific deep-dives focus on the three themes where the evidence is most relevant to individual pathways: (Theme 1) technology, certification and delivery risk; (Theme 2) feedstock eligibility, sourcing and traceability; and

(Theme 5) lifecycle emissions and non-CO₂ impacts. For more mature routes such as HEFA, diligence emphasis shifts towards feedstock traceability and lifecycle integrity; for less mature routes such as AtJ, BtL and e-SAF, technology integration, delivery risk and feedstock or energy-input certainty remain more material. Exhibit 11 provides an at-a-glance summary of the key diligence takeaways by SAF pathway, distinguishing where the implications differ for project / asset-level capital and issuer / portfolio-level finance.

Themes 3 (commercial structure, offtake and revenue certainty), 4 (policy support and regulatory exposure)

and 6 (safeguards) remain important but are largely common across routes, so they are covered once after the pathway-specific deep-dives rather than repeated. The final cross-pathway table (Exhibit 16) summarises the commercial and offtake, policy support and regulatory exposure, and safeguards evidence investors should test.

Exhibit 11: Pathway-specific SAF diligence takeaways for project and issuer-level investors

SAF pathway		Project/asset-level capital	Issuer/portfolio-level finance
Bio-SAF	HEFA	• Proven technology, limited feedstock: technology risk is lower, but financing should hinge on binding eligible feedstock supply and traceability. • Lifecycle integrity test: lenders should require third-party LCA and exclude or discount high-ILUC feedstock exposure before close.	• Scalability overclaim risk: company targets relying heavily on HEFA need evidence of traceable, sustainable UCO / waste-fat supply. • Claims need verification: issuer engagement should test carbon intensity, feedstock origin and whether HEFA claims rely on scarce or high-ILUC inputs.
	Alcohol-to-jet (AtJ)	• Yield risk matters: lenders should require independent yield validation for the specific alcohol feedstock and conversion route. • Ethanol is not neutral: crop-based routes require ILUC assessment, food / feed competing-use review and strong mandate-eligibility evidence.	• Targets may outrun supply: investors should test whether company SAF targets rely on uncertified or early-commercial AtJ capacity. • Feedstock choice matters: engagement should distinguish first-generation ethanol from lower-risk waste or cellulosic sources.
	Bio-to-liquids (BtL)	• Integration is key: project diligence should focus on gasification, syngas cleaning, Fischer-Tropsch integration and minimum viable scale. • Logistics challenges: financing should require binding residue / waste supply contracts, quality controls and credible aggregation plans.	• Pipeline risk material: investors should test whether BtL supply assumptions rely on proven commercial plants or early-stage projects. • Waste claims proof: issuer engagement should request feedstock origin, certification and chain-of-custody evidence for residue or waste-based volumes.
e-SAF		• FOAK and competitiveness risk: require independent review of electrolysis, RWGS and FT / MtJ integration, commissioning risk, and resilience if lower-cost eligible SAF supply undercuts expected e-SAF pricing. • Input and lifecycle integrity critical: require contracted renewable power, green hydrogen (hydrogen leakage impact quantified), and eligible CO₂ (counterfactual use assessed).	• Targets need realism: investors should test whether e-SAF commitments rely on certified pathways, FOAK projects or optimistic commissioning timelines. • Feedstock claims critical: require evidence on power-source assumptions, CO₂ origin (counterfactual use verified) and potential hydrogen leakage / warming impacts.

Source: Systemiq and EDF

HEFA

HEFA is built on hydroprocessing technology long used for renewable diesel, with a TRL of 9 and the lowest levelised cost of any route, with indicative market estimates of 2–2.5x the cost of conventional jet fuel.³⁰ It leads SAF production now and in the near term. Because the technology is proven, diligence weight sits on feedstock eligibility and lifecycle emissions and non-CO₂ impacts. Used cooking oil

and waste fats are scarce and contested; feedstock is the largest cost component and the main supply risk. Lifecycle integrity depends mainly on feedstock sourcing, although processing energy and hydrogen supply also impact carbon intensity: waste-derived HEFA delivers high GHG savings while virgin oils can exceed the fossil baseline once indirect land-use change is counted.

Exhibit 12: Investor diligence framework for HEFA

Theme	Critical evidence	Red/risk flags	Implications and actions	
			Project / asset-level capital	Issuer / portfolio-level finance
 1. Technology & delivery	- Conversion route ASTM certified - EPC with hydroprocessing track record and performance guarantees	- EPC contract contains no output yield or efficiency performance guarantees - EPC lacks references - Projected fuel yields not independently validated	- Require independent technical report and EPC reference checks - Make performance guarantees, liquidated damages and validated yield assumptions conditions precedent	- Request disclosure on supplier technology, commissioning status and delivery assumptions - If exposure is material, escalate engagement or reflect delivery risk in credit / portfolio assessment
 2. Feedstock eligibility	- Sustainability certification on feedstock - Mandate eligibility - Jurisdiction-appropriate waste classification for UCO and animal fat³⁰	- Supply contracts cover small share of capacity - Projected waste feedstock volumes face competing demand from other sectors - Single-source concentration / upstream production project risks	- Require feedstock-classification audit and binding supply contracts before close - Decline or require public / strategic support if eligible feedstock coverage is insufficient	- Press for disclosure of exposure to scarce UCO / waste-fat inputs and competing-use risk - Escalate if company SAF claims rely on volumes that are not traceable or scalable
 5. Lifecycle & non-CO₂	- Disclosed LCA boundaries - Verified carbon intensity - ILUC mitigated for any virgin-oil share^{31,32}	- Rely on high-ILUC feedstock - ILUC excluded from LCA - Non-CO₂ impacts not assessed separately - Claims unverified	- Require third-party LCA and carbon-intensity verification before financial close - Exclude high-ILUC feedstock from eligible supply, or apply pricing adjustment where emissions benefit is uncertain	- Request HEFA carbon intensity and third-party verification - Escalate stewardship or adjust portfolio assessment where claims are unverified or rely on high-ILUC feedstock

Source: Systemiq and EDF

³⁰ Global Feedstock Assessment for SAF Production ([IATA, 2025](#))

³¹ The High-Integrity Sustainable Aviation Fuels Handbook ([EDF, 2022](#))

³² The cost of supporting alternative jet fuels in the European Union ([ICCT, 2019](#))

AtJ (Alcohol-To-Jet)

AtJ converts fermented alcohols (primarily ethanol) into jet fuel through dehydration, oligomerisation and hydrogenation. The ethanol-to-jet route has a TRL of 7 to 8 with several projects advancing, but AtJ facilities remain less commercially mature than HEFA and levelised cost runs higher.^{30,32} Conversion technology and yield validation carry more weight than for HEFA, since the upgrading steps

beyond ethanol are less commercially proven and yields vary widely by feedstock. Feedstock risk splits sharply: first-generation sugar and starch ethanol is mature but competes with food, while cellulosic ethanol is commercially available only at limited scale today and remains comparatively expensive (despite potentially abundant residue feedstocks).³⁰ The higher cost base makes offtake and policy support more critical to bankability than for HEFA.³²

Exhibit 13: Investor diligence framework for Alcohol-to-Jet (AtJ)

Theme	Critical evidence	Red/risk flags	Implications and actions	
			Project / asset-level capital	Issuer / portfolio-level finance
 1. Technology & delivery	- Conversion route ASTM certified³⁰ - Commercial-scale demonstration or reference plant³⁰ - Yields validated for the specific alcohol and feedstock³²	- Uncertified conversion route modelled as near-term financeable - Technology or EPC provider has no commercial-scale reference - Fuel yield assumptions not validated beyond lab or pilot scale	- Require independent yield validation for the specific alcohol feedstock and conversion route - If only pilot data is available, apply downside yield assumptions or reduced debt sizing	- Request evidence on which AtJ technologies and suppliers underpin the company's SAF targets - Test whether targets rely on uncertified or early-commercial capacity; require contingency plans if AtJ supply is delayed
 2. Feedstock eligibility	- Long-term ethanol supply contracts - Documented feedstock sustainability and origin³⁰ - Mandate eligibility	- Ethanol feedstock competes directly with food supply chains - Reliance on scarce or costly ethanol - Single-source ethanol supply with no secondary arrangement	- Require binding alcohol supply contracts and mandate-eligibility confirmation before close - For crop-based ethanol, require ILUC assessment and food / feed competing-use review	- Request disclosure on alcohol feedstock type, origin and certification. - Press to distinguish first-generation ethanol from lower-risk waste or cellulosic sources - Escalate where claims rely on scarce or food-competing feedstocks
 5. Lifecycle & non-CO₂	- Disclosed LCA boundaries - Verified carbon intensity - ILUC mitigated for crop feedstock^{31,32}	- Reliance on high-ILUC crop ethanol with low net GHG savings - LCA excludes ILUC emissions / non-CO₂ impacts not assessed separately - GHG savings lack third-party verification	- Require third-party LCA covering full lifecycle (well-to-wake) emissions, ILUC and feedstock-specific carbon intensity before financial close - Exclude high-ILUC feedstock from eligible supply, or apply pricing adjustment where emissions benefit is uncertain	- Require disclosures to distinguish verified emissions reductions from generic pathway assumptions - Escalate stewardship or adjust portfolio assessment where AtJ claims depend on crop-based ethanol without ILUC mitigation evidence

Source: Systemiq and EDF

BtL (Biomass-To-Liquids)

BtL is a high-capex pathway where technology integration and feedstock logistics carry the most diligence weight.

Strong lifecycle performance is the route's clearest investment case, with residue and waste feedstock routes delivering some of the highest potential GHG savings of any pathway. The pathway gasifies solid biomass, agricultural and forestry residues or municipal solid waste into syngas, then converts it into jet fuel via Fischer-Tropsch synthesis.³⁰ The route has a

TRL of 6 to 8 but requires large, centralised plants to be viable, despite sustainable biomass and waste feedstocks often being dispersed and locally constrained, creating significant feedstock aggregation and logistics challenges. Technology risk centres on feedstock handling and syngas cleaning rather than the synthesis step itself, and waste variability has caused technical failures and project cancellations.^{34,30}

Exhibit 14: Investor diligence framework for Biomass-to-Liquids (BtL)

Theme	Critical evidence	Red/risk flags	Implications and actions	
			Project / asset-level capital	Issuer / portfolio-level finance
 1. Technology & delivery	- Conversion route ASTM certified³⁰ - EPC with gasification and syngas-cleaning track record - Plant at minimum viable scale³⁰	- EPC lacks gasification references - Plant sized below minimum viable scale for Fischer-Tropsch economics - Municipal solid waste handling and syngas cleaning undemonstrated at commercial scale	- Require technical report covering gasification, syngas cleaning and Fischer-Tropsch integration - If municipal solid waste handling is unproven, require performance guarantees or reduced debt sizing	- Request evidence on whether BtL supply assumptions rely on proven commercial plants or early-stage projects - Escalate if the company's SAF targets depend on facilities with unvalidated gasification or other technology
 2. Feedstock eligibility	- Long-term residue or municipal solid waste supply contracts - Mandate eligibility - Aggregation and logistics plan³⁰ - Documented feedstock quality and consistency³⁴	- Supply contracts cover small share of capacity - Municipal solid waste composition variability not reflected in yield or performance projections - Biomass aggregation logistics undemonstrated at the required volume - Health hazards from unmitigated release of air toxics	- Require binding residue or municipal solid waste supply contracts and a credible logistics plan before close - Add covenants for feedstock quality, eligibility, chain-of-custody reporting, and air-emissions controls	- Request disclosure on biomass / waste feedstock type, origin, certification - Escalate where SAF claims rely on poorly traceable or geographically concentrated feedstock supply
 5. Lifecycle & non-CO₂	- Disclosed LCA boundaries - Verified carbon intensity³² - Feedstock-specific lifecycle model, including methane measurement where biogas/ biomethane is used	- Lifecycle claims unverified - Carbon intensity relies on avoided-emissions credits (e.g. landfill methane avoidance, recycling credits) - Non-CO₂ impacts not assessed separately - Waste or residue origin lacks documented chain of custody	- Require third-party LCA using feedstock-specific assumptions and verified chain of custody for residues or waste, with avoided-emissions credits reported separately - Decline or discount volumes where waste origin or lifecycle boundaries cannot be verified	- Request pathway-specific LCA, carbon-intensity data and evidence of waste / residue origin for BtL volumes - Escalate stewardship or adjust portfolio assessment where lifecycle claims are unverified or chain of custody is weak

Source: Systemiq and EDF

e-SAF

e-SAF combines hydrogen from renewable-powered electrolysis with captured CO₂, converted via Fischer-Tropsch or methanol-to-jet. Unlike bio-routes, e-SAF is not constrained by scarce biomass feedstocks. **It has the potential for very high lifecycle emissions reductions**, subject to power, hydrogen and CO₂ sourcing. Scale, nevertheless, depends on sufficient eligible CO₂, abundant low-cost clean electricity, and water availability.²⁷

The pathway is at TRL 6-7, with limited commercial deployment. Under current economics, bilateral offtake alone may not be sufficient to support bankability, making durable revenue support or other forms of risk-sharing important for some projects. Current early-commercial e-SAF projects generally face very high production costs, with some

estimates as high as 5–8x the cost of conventional jet fuel.³⁵ These costs are driven by electrolyser capital and renewable electricity, which together represent the largest cost components, making contracted renewable power and hydrogen technology the central diligence topics and variables for sensitivity analysis.

Renewable electricity procurement spans from dedicated on-site generation with battery storage at one extreme (high infrastructure-driven price and round-the-clock utilisation) to grid-connected surplus electricity at the other extreme (low power price and low utilisation). Individual facility economics are further sensitive to factors including water procurement, electrolytic stack replacement, transport logistics, CO₂ sourcing and opportunities for integration with power and industrial systems.³³ Integrated configurations

and continued technology learning could materially reduce costs over time. Investors should therefore test the assumptions underpinning any claimed cost advantage or disadvantage, including whether low-cost or surplus electricity is genuinely available, deliverable and compatible with plant utilisation and applicable policy requirements.

Exhibit 15: Investor diligence framework for e-SAF

Theme	Critical evidence	Red/risk flags	Implications and actions	
			Project / asset-level capital	Issuer / portfolio-level finance
 1. Technology & delivery	- Conversion route ASTM certified³⁰ - EPC able to integrate electrolysis, reverse water-gas shift (RWGS) and Fischer-Tropsch (FT) / Methanol-to-Jet (MtJ) at scale³⁵ - First-of-a-kind execution plan	- e-SAF pathway not yet certified under ASTM - Power, hydrogen, and synthesis steps undemonstrated as an integrated commercial system - No FOAK delivery and commissioning plan validated by an independent engineer	- Require independent technical report covering electrolysis, RWGS, FT / MtJ integration and FOAK execution risk - If integration risk remains high, require contingency reserves, public risk-sharing or a lower debt share	- Request evidence on whether e-SAF supply assumptions rely on certified pathways or FOAK projects - Test whether company targets depend on unproven integrated systems or optimistic commissioning timelines
 2. Feedstock eligibility	- Contracted renewable power with additionality, temporal matching and geographic/ electrical deliverability - Reliable CO₂ source, biogenic or industrial³⁰ - Green-hydrogen supply secured and supply chain leakage audited	- Uncontracted or grid-average power - Fossil-origin CO₂ or regime-specific eligibility which may change over asset life - Renewable electricity additionality, temporal or geographic correlation not demonstrated under RFNBO rules	- Require contracted green hydrogen before close, with evidence of compliance - Make CO₂-origin verification and power-sourcing covenants part of financing	- Request disclosure on hydrogen and CO₂ sourcing behind e-SAF procurement claims - Press the company to distinguish contracted eligible supply from general market availability

³³ Intermittent production of electricity-based synthetic jet fuel as a demand-side management strategy for grid decarbonization (EDF, 2024)

Theme	Critical evidence	Red/risk flags	Implications and actions	
			Project / asset-level capital	Issuer / portfolio-level finance
 5. Lifecycle & non-CO₂	- Disclosed LCA boundaries - Carbon intensity reflecting actual contracted power³² - Consequential emissions of new renewable capacity quantified³² - Land-use screening for any dedicated renewable generation	- GHG calculation uses a renewable power intensity assumption not yet contractually secured - Hydrogen leakage risks not monitored - Other non-CO₂ impacts not assessed - Dedicated power generation sited on pristine or ecologically sensitive land (LUC risk)	- Require third-party LCA based on actual contracted power, hydrogen and CO₂ sources, not generic assumptions - Make verified carbon intensity and ongoing reporting a condition for labelled finance or crediting - Screen dedicated generation sites for LUC risk	- Request power-source assumptions and verification for e-SAF volumes - Escalate stewardship where lifecycle claims depend on uncontracted renewable power or unclear CO₂ sourcing

Source: Systemiq and EDF

Relevance across all pathways

Theme 3: Commercial structure, offtake and revenue certainty. Lenders size debt against contracted revenue, so the key test is whether binding offtake is sufficient to support the proposed debt structure over the debt tenor, at cost-recovering prices with creditworthy buyers. At this stage of market development, this may often mean 70–80% of capacity, but the threshold varies by pathway, technology maturity and capital structure.³⁴ This becomes harder as pathway costs rise: the higher the premium buyers must absorb, the harder bankable offtake is to secure. e-SAF is the clearest example, because at 5 to 8 times the price of conventional jet fuel, bilateral airline offtake alone is unlikely to close the financing gap.³⁵

Theme 4: Policy support and regulatory exposure. SAF economics depend on mandates and incentives remaining durable across the debt tenor, with project economics

stress-tested against mandate delay, reduced ambition or incentive expiry. Less mature, higher-cost pathways are more exposed to policy change, so a delay that a HEFA project can absorb may break an AtJ/BtL case. For e-SAF, durable revenue support—such as long-term bankable offtake, guaranteed strike-price contracts or other price-stabilisation mechanisms—is likely to be important to investment viability, rather than serving only as downside protection.³⁶

Theme 6: Safeguards. Across pathways, investors should require recognised environmental and social safeguards covering land use, labour and community rights, supported by a grievance mechanism. Red flags include no recognised certification, no grievance process and no evidence of community or labour-rights compliance. Lenders should require safeguards before close; stewardship teams should request evidence and escalate where the audit trail is absent.

³⁴ Financing Sustainable Aviation Fuels: Case Studies and Implications for Investment (WEF, 2025)

³⁵ Accelerating the take-off for e-SAF in Europe – Insights Report (Project SkyPower, 2024)

³⁶ Reducing the cost gap for SAF through policy intervention: A case study of the Netherlands (ICCT, 2026)

Exhibit 16: **Cross-pathway investor diligence framework**

Theme	Critical evidence	Red/risk flags	Implications and actions	
			Project / asset-level capital	Issuer / portfolio-level finance
 3. Commercial & offtake³⁴	• Binding offtake over debt tenor, covering >70-80% capacity • Fixed or indexed pricing • Creditworthy buyers	• Offtake non-binding at FID • Contract shorter than loan tenor • Large merchant portion	• Size financing on contracted revenue only, not assumed market demand • Make binding offtake, creditworthy counterparties and pricing formulae conditions precedent • Where offtake coverage is weak, require revenue stabilisation, public support, or higher equity contribution • Assess whether counterparty or delivery risks can be mitigated through insurance, guarantees or other risk-sharing mechanisms	• Request disclosure on SAF procurement contracts, expected premium exposure and cost pass-through strategy • Test whether SAF targets are budgeted and financially credible • Escalate where commitments remain aspirational, supplier terms are undisclosed or cost exposure is material but not reflected in transition plans
 4. Policy support and exposure	• Mandate and incentive support confirmed for the full debt tenor • Project economics stress-tested against mandate delay or incentive expiry	• Less mature economics highly sensitive to mandate delay or reduced support • No sensitivity analysis • No relevant certification	• Stress-test project economics against mandate delay, weaker penalties, lower certificate value, incentive expiry or eligibility changes • Include eligibility covenants and change-in-law protections where possible • If the project depends on policy support that is not secured, require public-finance confirmation before close	• Request management disclosure on policy exposure across key markets, including mandates, incentives, penalties and eligibility rules • Test whether procurement and capex plans remain credible under policy-change scenarios • Escalate or adjust credit / portfolio assessment where transition plans depend on uncertain rules or incentives
 6. Safeguards	• Environmental and social standards certified against a recognised framework covering land use, labour and community rights, and local air quality • Grievance mechanism in place	• No recognised safeguard certification • No grievance mechanism • No evidence of community or labour rights compliance • Unmitigated air-toxic emissions	• Require recognised environmental and social safeguard certification before close, covering land use, labour standards, community impacts and grievance mechanisms • Add ongoing audit and reporting covenants • Decline or delay financing where safeguards are absent, unaudited or materially exposed to community or labour-rights risks	• Request disclosure of SAF supplier standards, audit processes and grievance mechanisms • Test whether safeguard risks influence procurement decisions and supplier selection • Escalate stewardship where evidence is absent, standards are not independently verified, or company claims ignore land, labour, community or biodiversity risks

Source: Systemiq and EDF

B4. Case studies: applying the toolkit to practical investor situations

Note: these examples are illustrative and do not represent actual project or investment cases. They are based on parameters, cost drivers, diligence issues and risk patterns observed across comparable real-world case studies, public announcements and market benchmarks.

Study 1: Project / asset-level capital

A project / asset-level capital provider, such as an infrastructure or growth equity investor, is assessing a minority pre-FID development equity investment in a large first-of-a-kind e-SAF plant. The proposed capital would fund late-stage development work, including FEED, permitting, certification, offtake negotiations and input-supply contracting, rather than senior project-finance debt or corporate lending. The investment decision is whether to provide development capital now, and what evidence would be required before committing further capital or supporting a later FID-stage financing. The plant is ~50-70 ktpa, a typical first-wave European project size, using a Methanol-to-Jet (MtJ) pathway and an imported green-methanol model rather than on-site integrated hydrogen and CO₂ conversion. The plant sits at a major European industrial complex with access to established fuel logistics, targets FID in the late 2020s and operation in the early to mid-2030s and claims a material cost advantage versus comparable projects.

The proposition looks attractive: a credible cost advantage, an experienced team and a prime location. By asking the right questions, investors can test whether that initial assessment still holds. The answers show that the headline economics rest on assumptions that are not yet evidenced and on a feedstock model that moves the hardest risks offshore. The point of this example is that the questions determine the engagement outcome. The evidence standards, generic red flags and investor actions for each theme are set out on the next page.

Running these questions changes the engagement from "a low-cost project worth backing" to a project whose value depends on critical conditions that have not yet been met.

The key diligence points across the six themes are:

- 1. Technology, certification, delivery:** Certification is unresolved and the developer's timeline is roughly 2+ years too optimistic, so commercial operation may not be guaranteed on the stated schedule.
- 2. Feedstock eligibility:** The imported-methanol model trades price risk for RFNBO-compliance risk, and feedstock is contracted only at Heads-of-Terms stage.
- 3. Commercial structure and revenue:** Signed offtake covers capacity well below the 70 to 80% bankability threshold, and the cost advantage rests on a methanol cost assumption assessed as highly optimistic.
- 4. Policy and regulatory exposure:** The public support that the case relies on is signalled but not secured, and auction eligibility turns on the unresolved geography of imported feedstock.
- 5. Lifecycle emissions and non-CO₂ impacts:** Require third-party LCA, input traceability, RFNBO power criteria and double-counting controls before follow-on FID financing.
- 6. Safeguards:** Require plant and supplier safeguard audit, with certification, community / labour checks and grievance mechanisms before follow-on FID financing.

The better questions do not have to immediately block a deal. Good questions create conditions for a successful project: ASTM certification, firm RFNBO-compliant feedstock, offtake above the bankability threshold, and secured public finance become the conditions before committing capital. For this project / asset-level investor, the likely outcome is not an immediate 'yes/no' on full project finance, but a conditional development-equity decision with clear evidence gates before FID.

Exhibit 17: Study 1: SAF project diligence across key themes

Theme	Key diligence questions	Evidence received	Red flags	Investor action
 1. Technology & delivery	- Is MtJ certified? - Is the integrated chain proven at scale? - Is the timeline credible?	- Project's MtJ pathway awaiting ASTM approval, decision ~2027 - Tier-one licensor; steps certified but full integration novel - EPC contractors carry no significant flags	- Certification on the critical path - Stated FEED and build timeline appears shorter than sector benchmarks, implying operation 2+ years later than claimed	- Make ASTM certification a condition precedent to FID financing - Model on sector benchmarks, not the developer's timeline
 2. Feedstock eligibility	- Where does feedstock come from, on what contracts? - Can the imported methanol be demonstrated to meet RFNBO requirements?	- Large volumes of imported green methanol required - Supplier conversations underway across multiple geographies - Importing methanol reduces on-site grid-power need from several hundred MW to a small connection	- Non-EU RFNBO compliance has not yet been demonstrated; volumes may not count under ReFuelEU - Feedstock only at Heads of Terms (HoT) stage (i.e. not binding)	- Require firm contracts with suppliers and an RFNBO opinion as conditions precedent - Condition on supplier diversification
 3. Commercial & offtake³⁴	- How much offtake is signed, for how long? - Are the cost assumptions credible?	- HoT covering a minority share of capacity - Further discussions for more offtake reported; none converted to signed agreements - Assumes e-SAF €7,000-7,500/t, methanol €1,200-1,300/t	- Signed offtake far below the 70 to 80% bankability threshold - Low methanol cost with unclear feedstocks; RFNBO eligibility needs to be confirmed	- Make follow-on FID-stage financing conditional on signed long-term offtake, premium-recovery pricing and creditworthy counterparties. - Stress-test against the methanol assumption
 4. Policy support and exposure	Which policy support underpins the business case, and is it secured?	- Likely meets 2028 EU double-sided auction criteria; may miss 2027 Early Movers Coalition pilot on timing - Production-geography criterion unresolved given imports - National-level subsidy support has been signalled in the relevant jurisdiction	- Subsidy and auction access uncertain - Failure to secure DevEx or subsidy could delay FID	- Condition the ticket on, or actively secure, public finance - Align deployment with auction-eligibility windows
 5. Lifecycle & non-CO₂	- Is the lifecycle emissions analysis based on actual methanol (and its import/transport emissions), power and CO₂ sources? - Is renewable-power additionality and temporal and geographic correlation evidenced? - Are traceability and double-counting controls in place?	- Developer provides indicative LCA - Methanol supplier details not finalised - CO₂ source and power-matching evidence still pending	- LCA relies on generic assumptions - Renewable-power RFNBO criteria not evidenced - CO₂ origin, chain of custody and double-counting controls unclear	- Require third-party LCA using actual contracted inputs - Make follow-on FID financing conditional on methanol, power and CO₂ traceability
 6. Safeguards	- Are safeguards in place for the plant and upstream methanol supply? - Are labour, community and environmental risks independently assessed?	- Developer has corporate safeguard policy - Port permitting process underway - Upstream supplier audit evidence not yet available	- Imported methanol shifts environmental and social risk offshore - No supplier-level safeguard certification - Limited evidence on community, labour or biodiversity risk	- Require safeguard audit covering plant and upstream suppliers - Condition follow-on FID financing on disclosure and grievance mechanisms

Source: Systemiq and EDF

Study 2: Issuer / portfolio-level finance

An issuer / portfolio-level investor, such as a public-equity or credit investor, is assessing whether a major network airline's 2030 SAF strategy is credible enough to support its investment view and engagement approach. The airline has committed to materially increase SAF use by 2030 across a network spanning several regulatory markets, supported by a mix of signed offtake agreements, supplier partnerships and expected future procurement. Its strategy relies on several SAF pathways, including mature HEFA supply alongside volumes from less mature ATJ and e-SAF projects. The investment question is whether the target is sufficiently supported by contracted supply, credible suppliers, manageable price exposure and a realistic approach to recovering SAF premiums through ticket pricing, corporate travel and cargo customers, while balancing SAF expenditure against fleet renewal and other capital-allocation priorities.

The proposition looks credible: a clear 2030 target, early supplier relationships and exposure to markets with increasingly binding SAF requirements. By asking the right questions, investors can test whether that initial assessment still holds. The answers show that a material share of the target depends on supply that is not yet contracted or commercially operational, while the financial case assumes increasing customer willingness to absorb SAF premiums and consistent recognition of SAF across different policy regimes. The evidence, red flags and investor actions for each theme are set out on the next page.

Running these questions changes the engagement from “a credible 2030 SAF strategy” to a transition plan with material delivery, cost and integrity risks that still need to be resolved. The key diligence points across the six themes are:

1. Technology, certification, delivery: A material share of planned 2030 volumes depends on ATJ and e-SAF projects still under development, with limited contingency if suppliers are delayed.

- 2. Feedstock eligibility:** Evidence on eligibility and certification is incomplete across the supplier base, while book-and-claim volumes require clearer environmental-attribute and double-counting controls.
- 3. Commercial structure and revenue:** Only a minority of the 2030 target is backed by signed multi-year offtake, while premium recovery depends partly on future customer willingness to absorb higher SAF costs.
- 4. Policy and regulatory exposure:** The strategy spans markets with different SAF requirements and relies partly on future policy tightening and continued support, creating uncertainty around procurement volumes and costs.
- 5. Lifecycle emissions and non-CO₂ impacts:** Some volumes still rely on generic lifecycle assumptions, with limited clarity on Scope 3 accounting and insufficient treatment of contrail and other non-CO₂ impacts.
- 6. Safeguards:** Corporate policies are in place, but disclosure and independent evidence on environmental and social performance at upstream SAF / feedstock suppliers remain limited.

The better questions do not necessarily undermine the investment case. They identify where management needs to strengthen evidence, contracting and disclosure: credible supplier delivery, a clearer route from contracted volumes to the 2030 target, manageable cost exposure, policy resilience and robust lifecycle and safeguard evidence. For this issuer / portfolio-level investor, the likely outcome is not an immediate ‘buy/sell’ decision, but a clearer basis for engagement, credit or portfolio assessment, and escalation where material gaps remain unresolved.

Exhibit 18: Study 2: SAF project diligence across key themes

Theme	Key diligence questions	Evidence received	Red flags	Investor action
 1. Technology & delivery	- Which pathways / suppliers underpin the 2030 target? - What volumes depend on commercially proven supply? - Are supplier delivery timelines credible?	- Near-term procurement is weighted toward HEFA - A material share of planned 2030 volumes depends on AtJ and e-SAF projects still under development	- Several suppliers have not yet reached FID or commercial operation 2030 volumes assume developer timelines are met - Limited contingency if newer pathways are delayed	- Request supplier-level disclosure on pathway, project status and expected commissioning - Require a credible contingency plan for supply shortfalls
 2. Feedstock eligibility	- Which feedstocks underpin procurement, and are they eligible in key markets? - How are chain of custody and double-counting controlled?	- Sustainability certification and eligibility documentation available for some suppliers / volumes - Book-and-claim is expected to support some corporate-travel demand and claims	- Limited disclosure on waste feedstock origin and future input availability - Environmental-attribute and double-counting controls are not consistently explained	- Request supplier-level disclosure on feedstock origin, eligibility and certification - Clarify ownership and retirement of environmental attributes for book-and-claim volumes
 3. Commercial & offtake³⁴	- How much of the 2030 target is backed by binding procurement? - How material is SAF expenditure relative to other capital priorities? - Can premiums be passed through to customers?	- A minority of the 2030 target is covered by signed multi-year offtake - Management expects partial premium recovery through customers - Fleet renewal remains a major competing capital priority	- Large gap between contracted volumes and the stated 2030 target - Financial assumptions rely on future customer willingness to absorb higher SAF costs	- Request clear breakdown of how supply gap will be addressed - Stress-test SAF customer cost pass-through assumptions and other capital investment needs
 4. Policy support and exposure	- Which SAF policies materially affect the airline across its key markets? - How resilient is the plan to changes in mandates, incentives or eligibility rules?	- Material operations in EU and UK markets with binding SAF requirements - Management tracks major policy developments across core geographies	- Procurement assumptions rely partly on future policy tightening and continued incentive support - Limited disclosure on how policy differences across markets affect SAF allocation and costs	- Request market-by-market breakdown of mandate exposure and SAF requirements - Stress-test costs and target delivery against policy and eligibility changes
 5. Lifecycle & non-CO₂	- What lifecycle methodology and carbon-intensity assumptions underpin SAF claims? - Are claims based on supplier- and pathway-specific data?	- Airline reports estimated lifecycle emissions reductions from SAF procurement - Some contracted volumes have supplier-specific carbon-intensity information	- Material volumes still rely on generic assumptions with limited clarity on Scope 3 accounting and allocation - Contrail and other non-CO₂ impacts are not materially reflected in the SAF strategy	- Request supplier- specific lifecycle data for material SAF volumes - Escalate if material emissions claims remain unverified or exposed to double counting
 6. Safeguards	- Does the airline require SAF suppliers to meet recognised environmental and social standards? - What happens where safeguard evidence is incomplete or breaches occur?	- Corporate supplier policy covers environmental and social requirements - General supplier-audit and escalation processes are in place	- Limited disclosure on safeguard performance at individual upstream SAF feedstock sites - Reliance on certification without clear evidence of additional supplier-level review	- Test whether safeguard risks influence supplier selection and procurement decisions - Escalate where material risks lack independent verification

Source: Systemiq and EDF

Conclusion

Aviation's climate transition will require multiple levers, but SAF is the central near-term financing and engagement challenge. It cannot be assessed as a single undifferentiated opportunity. HEFA, AtJ, BtL and e-SAF differ materially in maturity, feedstock exposure, cost, scalability and lifecycle integrity, while policy frameworks create uneven combinations of demand, incentives and eligibility risk. Mandates and production support can strengthen the investment case, while less mature and first-of-a-kind projects may also require public or catalytic risk capital, subordinated finance or other risk-sharing mechanisms to crowd in commercial investment. These forms of support do not replace credible evidence on technology, supply, offtake, pricing, delivery and sustainability. Financial institutions should therefore match their diligence to the pathway, market and point of influence, whether providing project capital, financing an issuer or engaging through stewardship.

The practical test is whether a project or company strategy is eligible, bankable and credible enough to justify action, not simply whether it aligns with a growing SAF market. Investors should convert gaps in technology/certification, feedstock traceability, contracted revenue, policy support, lifecycle performance or safeguards into clear decisions: request evidence, impose conditions, resize exposure, escalate engagement, require public or catalytic de-risking, or decline to proceed. For early-stage and first-of-a-kind projects, a conditional investment with defined evidence gates may be more appropriate than a binary decision. Applied consistently, this framework can help capital support credible aviation transition outcomes while avoiding unsupported claims, stranded assets and overreliance on policy ambition alone.





Media contact:

Raul Arce-Contreras

rcontreras@edf.org

S Y S T E M I Q

Find out more at

www.systemiq.earth



EDF.org

Finding the ways
that work.