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I4CE INSTITUTE FOR CLIMATE ECONOMICS
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Ready for takeoff?

The French eSAF market between global lead and structural deadlock

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This paper originates from **I4CE's** report on French green reindustrialisation, *"Réindustrialisation verte en France : réalité, projection raisonnable ou mirage ?"*, published in French in April 2026, and has been translated and adapted to inform the ongoing European debate on ReFuelEU aviation.

With France as Europe's single largest eSAF project hub, with roughly 30% of the continent's planned capacity and some of its most advanced projects, what happens in France over the next 18 months will largely determine whether Europe will be able to meet build out the value chain for an emerging cleantech and meet its first blend-in mandates.

The barriers France faces are structural and shared, with no European large-scale project having yet reached a final investment decision. Understanding why France, despite benefiting from structural advantages, has not yet broken that deadlock is therefore essential reading for anyone working on eSAF at European level.

This case study examines France's emerging eSAF sector, the announced projects, market dynamics and public support schemes, and puts forward concrete recommendations to help the market take off before the window of opportunity closes.

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Our 40 experts engage with national and local governments, the European Union, international financial institutions, civil society organizations and the media. Our work covers three key transitions – energy, agriculture, forest – and addresses six economic challenges: investment, public finance, carbon pricing, development finance, financial regulation and carbon certification.

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EXECUTIVE SUMMARY

FRANCE'S BID FOR LEADERSHIP IN THE ESAF CLEANTECH RACE

France's aviation sector stands at a strategic crossroads – one that will determine whether the country establishes itself as a global leader in aviation cleantech and its associated value chains, or cedes that ground to others. In a volatile geopolitical environment, marked by energy supply disruptions and intensifying industrial competition, this question extends well beyond climate: it also engages France's energy and technological security. Anchored by Airbus, Air France, Safran and Thales and a dense supplier ecosystem, aviation generates significant employment and is a pillar of that sovereignty. Yet the sector faces a decarbonisation challenge that is both urgent and structurally complex: demand is expected to keep growing faster than efficiency gains can offset, meaning aviation's share of global emissions is set to rise rather than fall[1]. Crucially, once non-CO_2 effects (contrails, NOx and other impacts) are accounted for, aviation's total climate footprint may be up to three times larger than CO_2 figures alone suggest[2].

Sustainable Aviation Fuels (SAF) have emerged as aviation's only credible near-term technological decarbonisation pathway[3]. Unlike hydrogen or electric propulsion, which would require entirely new aircraft designs and ground infrastructure[4], SAF are chemically near-identical to conventional fossil kerosene and are fully compatible with existing fleets[5], but reduce lifecycle emissions by 80-90%[6]. They can be blended with fossil kerosene today, without significant modifications to engines, airplanes, or fuel infrastructure. SAF production falls into two broad categories: bioSAF, derived from biomass, which dominate current production; and eSAF, synthetic fuels produced from low-carbon or renewable electricity, electrolytic hydrogen, and captured biogenic or atmospheric CO_2. Between these two categories, ebioSAF pathways combine biogenic inputs with green hydrogen and are eligible for eSAF requirements under ReFuelEU; for simplicity, they are treated as synthetic fuels throughout this report.

While bioSAF dominate current production (over 98% of global supply[7]) and will be indispensable for meeting the first SAF mandates, they face hard intrinsic sustainability limits tied to finite sustainable biomass availability, which structurally constrains their ability to scale. Their development also relies heavily on imported feedstocks[8], limiting their contribution to energy independence. eSAF, by contrast, can in principle scale with available low-carbon energy and biogenic or captured carbon resources, significant reserves of which already exist.

Beyond their potential to eventually deliver large volumes, they represent a genuinely home-produced fuel source: in a context of geopolitical shocks bearing on oil supply chains, this sector is a major strategic lever for securing energy independence. Although first volumes

1. At the European level, aviation is expected to exceed pre-pandemic levels in 2025, reaching approximately 5% of total European emissions. In France, CO_2 emissions from commercial aircraft are also nearing pre-pandemic levels, with 22.1 Mt in 2024 (a 4% increase compared to 2023), cf. Ministry of Transport (DGAC), Les émissions gazeuses liées au trafic aérien en France en 2024, 2025.
2. Future Cleantech Architects, The Basics & The Gaps in Aviation, 2023; Kunkel & L López de la Osa García, Observatoire international des e-fuels 2025 ; and T&E, The eSAF market : Europe's head start and the road ahead, 2025.
3. T&E, The eSAF market : Europe's head start and the road ahead, 2025.
4. EASA, What are Sustainable Aviation Fuels ?
5. In 2023, Virgin Atlantic flight flew the first trans-Atlantic flight on 100% Drop-in SAF.
6. T&E, The eSAF market : Europe's head start and the road ahead, 2025 based on Ueckerdt et al., Potential and risks of hydrogen-based e-fuels in climate change mitigation, 2021.
7. EASA, ReFuelEU Aviation Annual Technical Report 2025, 2025.
8. T&E's 2024 SAF Observatory illustrates well that more than 20 countries have established SAF mandates or credit systems already.
9. Estimating the price for eSAF is a challenge before first volumes become commercially available. The price estimate developed by the European Agency for Aviation Safety (EASA) is often referred to as benchmark. It's most recent update from February 2026 estimates first volumes to be available at €7,520, largely consistent with prior estimate from its 2024 (€7,695/t) that is often cited as benchmark.

are currently projected to cost three to ten times more than fossil kerosene (with widely divergent price estimates[9]) and two to three times more than bioSAF, their value must therefore be assessed in light of their scaling potential and their contribution to energy security.

SAF today remain a marginal fraction of jet fuel consumption globally[10], but this is changing rapidly, driven above all by a supportive regulatory environment. France was an early mover, establishing a national SAF roadmap in 2021 with voluntary incorporation targets of 2% by 2025 and 5% by 2030, complemented by binding mandates through the TIRUERT aviation fuel stream. These national ambitions fed directly into the EU's ReFuelEU Aviation regulation, adopted in 2023 and in force since 2024. ReFuelEU Aviation replaces and harmonises Member States' targets and sets binding blending obligations for SAF rising from 2% in 2025 to 70% by 2050. What makes the EU regulation globally distinctive (shared only with the UK)[11] is its specific eSAF sub-mandate: starting at 1.2% of jet fuel supplied at EU airports in 2030-31 and scaling to 5% in 2035 and 35% by 2050. While legislation is driving SAF market development worldwide with mandates emerging across all continents, no other market has a regulatory framework so specifically supportive of eSAF; ReFuelEU's sub-mandate sends a uniquely strong demand signal for synthetic aviation fuels, in theory providing the regulatory incentive needed to unlock investment in a nascent industry.

The response to ReFuelEU has been striking. Following its adoption, the number of announced French eSAF projects and their combined output doubled in a single year (2024-2025)[12]. Today, Europe leads the developing global project pipeline, with 41 large-scale projects (meaning with a production capacity of >10,000 tonnes of eSAF per year) under development representing around 2 million tonnes of potential annual capacity, which represents over 60% of the globally planned capacity[13]. France alone accounts for approximately 30% of the European pipeline, far more than any other single country and on par with China. If all French projects were realised, France could in theory have sufficient capacity to meet the entire EU's 2030 eSAF mandate on its own[14] – an unlikely scenario, but a striking sign of cleantech industrial ambition. In the longer term, under favourable cost trajectories, eSAF could even represent 25-75% of global SAF production by 2040, according to IATA estimates[15].

Yet this leadership is not secured. Despite their dominance of global pipeline, no European project has reached a final investment decision (FID)[16]. The barriers are significant: eSAF production requires large upfront investment – €1-2 billion per large-scale plant – and therefore substantial equity and debt financing needs. Yet to access that financing, developers must demonstrate the economic viability of their projects, which above all requires signing long-term purchase contracts: without a firm buyer commitment of 10-15 years, no investor will engage. And those contracts are almost entirely absent, because potential buyers – airlines and fuel suppliers – are unwilling to take on the risks and cost premiums inherent to first-of-a-kind (FOAK) plants.

This creates a structural collective action problem. Airlines and investors are currently waiting for greater certainty about the maintenance of mandates and sub-mandates, and the entry into force of support mechanisms, before committing to offtake or capital; yet the gap between FID and production is at least three years even in optimistic scenarios, meaning delays today directly threaten compliance with mandates that start taking effect from 2030 on. If positive market signals fail to materialise before ReFuelEU's scheduled 2027 review (Art.17), political pressure could mount to delay or weaken its ambitions – particularly the eSAF sub-mandate – echoing the dynamics that have weakened climate action and industrial leadership through the EU's CO_2 standards for cars.

10. Globally, SAF production represented only around 0.5% of jet fuel use in 2024, while at EU airports the share reached 0.8%, cf. EASA SAF Market & EASA (2025) ReFuelEU Aviation Annual Technical Report.
11. Unlike the EU, the UK has opted for a "cap on bioSAF" rather than a specific eSAF sub-mandate. By limiting the contribution of traditional biofuels, the policy effectively mandates the development of "Development Fuels" like eSAF, for which the UK is currently designing bespoke revenue certainty mechanisms.
12. T&E, The eSAF market : Europe's head start and the road ahead, 2025, pp. 12-13.
13. EASA, What are Sustainable Aviation Fuels ?
14. T&E, The eSAF market : Europe's head start and the road ahead, 2025.
15. Project Skypower (2024) based on IATA, Aviation Net-Zero Transition Pathways – Comparative Review, 2024. 16. EASA, ReFuelEU Aviation Annual Technical Report 2025, 2025.
16. The only European eSAF project to have secured final investment decision is a small-scale project led by German developer INERATEC.

Europe and France, having pioneered the framework for the development of the eSAF sector, risk squandering their first-mover advantage precisely at the moment it matters most.

The following case study examines how France can translate its regulatory momentum and project pipeline into genuine industrial leadership. It identifies the policy, financial, and governance levers required to break the current deadlock and secure the investment decisions necessary to produce the first blend-in volumes.

This analysis is set in an international perspective, taking into account dynamics unfolding in other regions – notably China – and their potential impact on France's emerging sector, as well as the questions of market access, exports, and distribution infrastructure interoperability that will shape the scope and durability of French industrial leadership. By addressing the specific barriers facing French projects in this context, this case study traces a path from first-mover advantage to large-scale operational reality, before the window of opportunity closes.

SUMMARY OF RECOMMENDATIONS

- **Signal** to the market that eSAF remains a political priority for France in the face of calls to weaken European mandates (ReFuelEU), and deepen that support at national level by including specific action plans for eSAF in upcoming initiatives such as the Plan d'Electrification.
- **Provide** revenue certainty to support projects to reach FID, the crucial bottleneck for the eSAF sector, by supporting an ambitious double-sided auction at EU level through the First Movers Coalition, deploying the Garantie des Projets Stratégiques via Bpifrance, and using long-term CAPN energy contracts and accelerated permitting to improve the bankability and investor appeal of projects.
- **Transform** eSAF into a strategic pillar of France's energy sovereignty and defence infrastructure by leveraging the Société Anonyme de Gestion des Stocks de Sécurité (SAGESS) to incorporate eSAF into France's strategic fuels stockpile, and revising the military aviation bioSAF target upward to align it with ReFuelEU ambitions (35% eSAF incorporation by 2050).

CONTENT

I. MAPPING OF A NASCENT MARKET

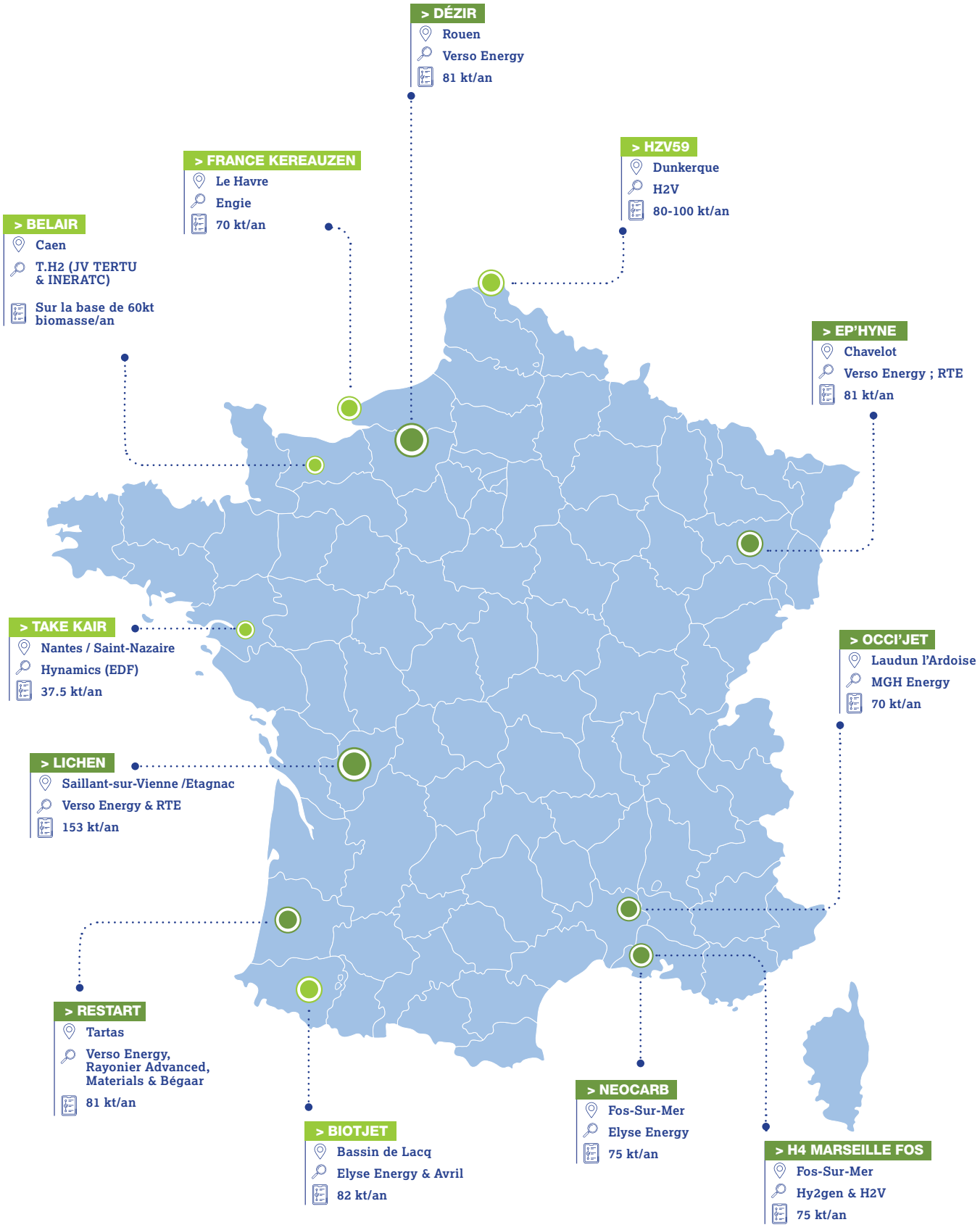
1. A surge in ambition: Europe and France emerge as global leaders in eSAF project announcement

The eSAF sector has witnessed a remarkable acceleration in project development since ReFuelEU Aviation came into prospect. While the technology remains pre-commercial at scale, the pipeline of announced projects has grown rapidly, and Europe has emerged as the global leader on eSAF announcements. As of mid-2025, out of 64 large-scale eSAF projects worldwide, 41 are under development in Europe, representing a combined potential capacity of up to 2.8 Mt per year, and accounting for ~60% of the global project pipeline[17]. The response in France has been particularly striking: in a single year (2024-25), the number of announced French projects and their combined projected output roughly doubled, driven by the combined effect of ReFuelEU's adoption and the launch of the national Carb Aéro support[18]. This momentum has continued, with new projects announced in France in spring 2026.

France now stands as the single largest national hub for eSAF development in Europe, with approximately 30% of total European planned capacity and 12 large-scale projects – in numbers, on par with China. If all announced French projects were realised, France would in principle have sufficient capacity to meet the entire EU's 2030 eSAF mandate on its own. This is an unlikely scenario as not all projects will succeed[19], but it is a triking sign of cleantech industrial ambition and a clear testimony to the power of clear regulatory signals for market development.

Within Europe, France's pipeline stands out not only for its size but for its relative maturity. While the large majority of European projects remain in early planning or pre-feasibility stages, France counts among its pipeline some of the most advanced projects – even if none of them are close to being online soon. At least one French project (Verso Energy's project DéZiR) is already undergoing front-to-end-engineering (FEED) studies, the detailed techno-economic feasibility study that precedes a final investment decision, and at least three others (Elyse Energy's BioTJet, Engie's France KerEAUzen, and Hynamics' TAKE KAIR) are actively preparing to do so, supported directly by dedicated government funding to cover the substantial costs of this stage. Assessing the relative maturity of the pipeline matters for determining whether volumes can realistically be delivered for the first blending mandates that take effect from 2030 on.

17. T&E, The eSAF market : Europe's head start and the road ahead, 2025, pp. 8-10.
18. T&E, The eSAF market : Europe's head start and the road ahead, 2025, pp. 12-13.
19. Nascent markets are volatile and it is highly unlikely that all announced projects will go online.


> DÉZIR
Rouen
Verso Energy
81 kt/an
> FRANCE KEREAUZEN
Le Havre
Engie
70 kt/an
> HZV59
Dunkerque
H2V
80-100 kt/an
> BELAIR
Caen
T.H2 (JV TERTU & INERATC)
Sur la base de 60kt biomasse/an
> EP'HYNE
Chavelot
Verso Energy ; RTE
81 kt/an
> TAKE KAIR
Nantes / Saint-Nazaire
Hynamics (EDF)
37.5 kt/an
> OCCI'JET
Laudun l'Ardoise
MGH Energy
70 kt/an
> LICHEN
Saillant-sur-Vienne /Etagnac
Verso Energy & RTE
153 kt/an
> RESTART
Tartas
Verso Energy, Rayonier Advanced, Materials & Bégaar
81 kt/an
> BIOTJET
Bassin de Lacq
Elyse Energy & Avril
82 kt/an
> NEOCARB
Fos-Sur-Mer
Elyse Energy
75 kt/an
> H4 MARSEILLE FOS
Fos-Sur-Mer
Hy2gen & H2V
75 kt/an
Fischer-Tropsch
Methanol-to-Jet
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2. What eSAF production requires – and why France is well-placed

To assess whether this pipeline can translate into actual production, it is necessary to understand what building an eSAF plant entails and what inputs the production process requires.

Unlike bioSAF, which can be produced by adapting existing oil refineries through established HEFA processes[20], eSAF production requires constructing entirely new industrial facilities for power-to-liquid synthesis (PtL). These convert green hydrogen (produced via water electrolysis) and sourced carbon into drop-in fuel using low-carbon electricity as the energy source[21]. A large-scale plant requires approximately €1-2 billion in upfront capital investment and, from the moment of final investment decision, a minimum of three to four years before first commercial output[22].

Cost of fuel production depends on the availability and price of the three fundamental inputs: low-carbon electricity, biogenic carbon, and water[23], which together account for 70-80% of production cost[24]. Their availability and price largely determine project viability and explain the emergence of geographical production hubs. Within Europe, planned project concentration strongly correlates with access to low-carbon, affordable power – the single largest input cost[25].

France enjoys meaningful structural advantages across all three inputs.

- **On electricity**, France's relatively decarbonised grid provides abundant power supply. RTE's latest assessment of the French power sector shows that clean power supply currently exceeds domestic demand[26], creating a window of opportunity for energy-intensive industrial uses such as eSAF production, in tandem with the urgent and rapid electrification of other sectors. Critically, France's low-carbon grid allows producers to bypass the EU's "additionality requirements" – rules that oblige producers in higher-carbon grid countries, such as Germany, to demonstrate that sufficient new renewable capacity has been installed at least 36 months ahead of production, which implies significant cost and permitting complexity. French projects can instead source directly from the grid via Power Purchase Agreements (PPAs), a meaningful competitive advantage. France's industrial power prices remain higher than in Scandinavia (where grids are over 90% renewable and producers can bypass PPAs altogether) but are relatively well-positioned within the broader European context.

- **On biogenic carbon**, France benefits from good domestic availability through existing industrial biomass processes, such as paper mills and other bioenergy facilities[27]. This is a significant advantage over other regions like the Middle East, where scarce biogenic carbon sources would force developers to rely on Direct Air Capture technologies, a technology that still needs to mature and remains very costly[28]. However, the picture regarding biogenic carbon availability is not entirely positive: dependence on individual industrial suppliers represents a supply risk should those plants face disruption or closure[29].

- **On water**, though droughts are multiplying and intensifying with climate change, availability is not expected to be a constraint to production. Planned eSAF plants are sited in industrial basins with good water availability[30] and production requires 6-7 tonnes of water per tonne of fuel, mostly used for hydrogen electrolysis. In comparison, the volumes of water needed per tonne of fuel are 100-500x higher for bioSAF than for eSAF[31].

Beyond these input advantages, France has built its eSAF ecosystem on a solid foundation; and the development of this sector could also benefit other cleantech industries in France. eSAF projects tend to be deeply embedded in their local industrial environments: developers

20. HEFA (Hydroprocessed Esters and Fatty Acids) is a mature SAF production pathway that converts waste oils and fats - such as used cooking oil or animal tallow - into jet fuel through hydrogen treatment. While it is currently the most commercially viable and widely used form of SAF, its scalability is limited by the finite supply of sustainable feedstock.
21. Innovative UK Business Connect, Sustainable Aviation Fuel: Power-to-Liquids, 2025.
22. T&E, The eSAF market : Europe's head start and the road ahead, 2025, p.10.
23. Unlike fossil CO_2 from geological stores, biogenic CO_2 from recent biomass recycles atmospheric carbon, enabling 80–90% lifecycle emission reductions versus kerosene. cf. Shift Project & Aéro Décarbo, Pouvoir voler sans pétrole : Quel approvisonnement énergtique pour le secteur aérien ?, 2026.
24. Project Skypower, Accelerating the take-off for eSAF in Europe – White Paper, 2024.
25. T&E, The eSAF market : Europe's head start and the road ahead, 2025, pp. 11-12.
26. RTE, Bilan prévisionnel 2023-2035, 2025.
27. Shift Project & Aéro Décarbo, Pouvoir voler sans pétrole : Quel approvisonnement énergtique pour le secteur aérien ?, 2026, pp. 74; 78.
28. So far, only three large-scale projects have been announced in the Middle East: two in Saudi-Arabia and one in Oman – likely due to the increased costs linked to poor biogenic carbon availability.
29. T&E, The eSAF market : Europe's head start and the road ahead, 2025.
30. Lesestre & Ali-Yahi, Observatoire international des e-fuels 2025 and Shift Project & Aéro Décarbo, Pouvoir voler sans pétrole : Quel approvisonnement énergtique pour le secteur aérien ?, 2026.
31. Shift Project & Aéro Décarbo, Pouvoir voler sans pétrole : Quel approvisonnement énergtique pour le secteur aérien ?, 2026, p. 75.

often cover several steps of the value chain themselves, from green hydrogen production on-site to the final Power-to-Liquid fuel synthesis, and site their plants within industrial hubs where suppliers, airports and fuel depots are close at hand.

Therefore, if eSAF projects were to succeed in reaching production and eventual scale, there is the potential for a virtuous cycle creating a demand pull for other cleantech sectors in France, such as hydrogen electrolysis, carbon capture, and even renewables and storage deployment to supplement nuclear baseload power; all crucial sectors for the wider decarbonisation of the industrial base.

This potential is, however, a double-edged sword. If key inputs (low-carbon hydrogen, biogenic or captured CO_2, and low-carbon electricity) cannot scale at the pace needed to meet demand, due to cost, regulatory or demand-visibility constraints, the expected cost reductions will stall and capacity growth will falter. Domestic eSAF production would then be limited to a very small fraction of national aviation fuel demand. This could either compromise decarbonisation progress in the sector, or leave the door wide open to importing molecules from non-European suppliers to meet SAF mandates.

However, these opportunities and risks associated with the long-term scaling of the sector in France will be immaterial if the first eSAF projects cannot get off the ground. As explored in the next sections, this is far from easy with production costs, unclear offtake and the prospect of international competition from China all weakening the investment case for projects in development.

3. From pipeline to production: why, despite ambition, the eSAF market is stuck

Despite a developing, large pipeline, no European eSAF project has yet reached final investment decision. Understanding why requires looking at the economics of a first-of-a-kind production, the structure of the actors involved – and assessing the collective action problem that is keeping the market frozen.

A. THE COST CHALLENGE

Today, eSAF remains extremely expensive to produce. Current cost estimates place production of first-of-a-kind plants at approximately 7,000-8,000 €/t, making them roughly 5-10 times more expensive than fossil jet fuel (~800 €/t) and 2-3 times more expensive than first-generation bioSAF[32]. These figures represent a significant upward revision from earlier projections of around 3,000-4,000 €/t of eSAF, due primarily to higher-than expected hydrogen costs and availability. The dominant cost driver, however, is the price of low-carbon electricity, the majority of which used for hydrogen electrolysis, making the projects sensitive to power price trajectories.

The longer-term cost perspective is considerably more optimistic – which makes the current wait-and-see stance all the more paradoxical. This optimism rests on two cost-reduction levers: learning effects in electrolysis and power-to-liquid synthesis as the industry scales from first-of-a-kind to nth-of-a-kind plants, and the ongoing decline in renewable energy costs. The bioSAF trajectory follows the opposite logic: costs there depend on access to physically finite biomass resources, for which growing pressure is expected to sustain or ven increase costs over time. The two pathways are thus on structurally diverging trajectories. That said, eSAF cost estimates remain particularly sensitive to assumptions about energy prices and the pace of green hydrogen and carbon capture deployment. This pricing uncertainty itself feeds the wait-and-see posture among potential buyers: anticipating lower future prices, they defer commitments, thereby slowing the deployment that would actually bring those prices down.

This demand should be supported by regulatory incentives. Under ReFuelEU, the cost of non-compliance with the SAF mandate would be approximately triple that of incorporating eSAF at mandated levels, due to the significant penalties imposed[33]. However, these penalties are heavily contested: several Member States have yet to transpose them into national law, and France, while having transposed the framework, has not yet finalised the implementing regulations. This creates space for industry to continue pressing on the level and design of the penalties – and in doing so, undermines the deterrent effect on which a significant part of the regulation's logic depends.

32. EASA's Technical Report on ReFuelEU's price estimate for eSAF is often cited as benchmark.
33. ReFuelEU foresees sanctions at twice the price difference between fossil kerosene and eSAF with an additional "catch-up" requirement for missed volumes. According to T&E, this would make missing the mandates three times more expensive than compliance: T&E, Implementing the EU's eSAF mandate—A first look at ReFuelEU penalties for fuel suppliers, 2024.

For end consumers, the near-term impact on ticket prices is expected to remain modest. Fuel is only one component of total ticket costs, and at the initial incorporation rates (1.2% in 2030 and 5% in 2035), the eSAF premium would translate to roughly a 3% increase in ticket prices for passengers. As mandates scale up the impact will grow, but its precise magnitude is hard to quantify: eSAF cost trajectories remain uncertain, and long-term estimates rest on widely varying assumptions. It is worth noting, however, that this price increase represents, in substance, a partial internalisation of aviation's carbon externality – a sector that has historically been under-priced for its environmental impact.

B. 'GREENFIELD SECTOR' BUILT BY FINANCIALLY CONSTRAINED START-UPS

The structural challenges for eSAF market development go beyond cost. ESAF production is an almost entirely 'greenfield' industry: there are (almost) no existing facilities that can be repurposed, supply chains must be newly developed, and, strikingly, the large fuel suppliers that dominate today's kerosene market and formally carry the obligation to ensure eSAF market availability under ReFuelEU are almost entirely absent. Transport & Environment's SAF Observatory finds that major oil companies have no large-scale commercial eSAF projects announced, and are missing from both binding and non-binding eSAF offtake agreements. Where oil majors engage with SAF at all, they overwhelmingly favour bioSAF: TotalEnergies, for instance, is developing at least two bioSAF projects in France but no eSAF project; and Shell's brief foray into eSAF – a joint project with Vattenfall called Hyskies – was cancelled in summer 2024.

Instead, the emerging eSAF project pipeline is dominated by start-ups and "newcomers" with limited capital, who must shoulder the first-mover risks inherent to building first-of-a-kind plants. In France, Verso Energy, an SME founded in 2020, alone accounts for roughly one-third of planned national output. Other developers include Elyse Energy, Hynamics (EDF's hydrogen subsidiary) and ENGIE. The absence of incumbent jet fuel providers has two compounding consequences. First, it deprives the sectors of actors that would, in principle, be best placed to finance and de-risk first-of-a-kind plants. Second, it leaves smaller, capital-constrained players to navigate the early investment and market risks alone, slowing the journey from project announcement to final investment decision.

C. THE FINANCING AND OFF-TAKE DEADLOCK

For a start-up developer, raising €1-2 billion in capital to build a first-of-a-kind plant is structurally difficult under any conditions. It requires not only strategic investors with long time horizons, but – critically – off-take agreements: long-term purchase contracts, typically running for 10-15 years, that provide the revenue certainty needed to make a project bankable and reach FID. Without a signed off-take agreement, no investor will commit capital at the scale required.

Firm eSAF off-take agreements, however, remain scarce despite ReFuelEU's clear demand signal. Of the three agreements signed globally between 2024 and 2025 – all by European airlines – only one involved a project within the European Economic Area (Norwegian airlines and Cargolux with Norwegian start-up Norsk e-fuel); the two others covered eSAF projects in the United States[34]. None covered a French project. More broadly, T&E documents that out of 77 airlines and airline groups, none has set a dedicated eSAF target, and eSAF accounts for less than 10% of total SAF offtake volumes[35], amounting to airlines "betting on the wrong type of SAF"[36]: a pathway that cannot scale to meet the long-term trajectory to decarbonise aviation.

Two structural factors explain airline hesitation and why it is so difficult to overcome. The first is the cost premium inherent to first-mover commitment. Committing to a long-term purchase contract with a first-of-a-kind plant means, for an offtaker, absorbing two types of risk simultaneously: the execution risk inherent to first-of-a-kind facilities, whose technical and economic viability has yet to be demonstrated at industrial scale; and the risk of being locked into high prices precisely when production costs are expected to fall sharply as the sector scales and second-of-a-kind supply – including potentially from third countries – comes online.

The second factor is a structural mismatch between supply-side needs and demand-side practices. ESAF producers need contracts of at least 10-15 years to secure project financing; airlines typically source fuel on spot markets or via short annual contracts. This mismatch is compounded by perceived regulatory instability – a self-reinforcing dynamic: as long as no FID is announced, doubts about the eSAF sub-mandate persist, which deepens buyer caution and delays the first investment decisions. The prospect of a 2027 ReFuelEU review that could lead to regulatory revision amplifies this: potential offtakers resist committing if they think mandates may be softened or delayed. The result is a pervasive wait-and-see attitude – buyers hold back either for others to move first, for more regulatory certainty, or above all in hopes of accessing lower prices later.

34. T&E, The eSAF market : Europe's head start and the road ahead, 2025, pp. 29-30.
35. T&E, The SAF Observatory. Is the aviation sector ready to transition to sustainable jet fuel, 2024.
36. T&E, The SAF Observatory. Is the aviation sector ready to transition to sustainable jet fuel?, 2024.

The French market illustrates this ambiguity of having both proximity and distance from a solution. Air France-KLM is ranked by Transport & Environment as the global leader on SAF procurement, though most of its commitments are for bioSAF[37]. In terms of eSAF, the airline has signed Memoranda of Understanding with four French eSAF developers; yet Memoranda of Understanding are expressions of intent, not bankable commitments. Converting these non-binding signals into firm, long-term offtake contracts is the necessary step to get projects off the ground.

Here the structural deadlock of the market crystallises: if every potential offtaker – fuel supplier or airline – waits, no producer can reach FID; if no producer reaches FID, no production comes online; and if no production comes online, costs do not fall. The European eSAF market finds itself in an impasse akin to a prisoner's dilemma, one that will not resolve without external intervention.

4. China, an emerging competitor: the risk of strategic dependency

France's strong position in terms of eSAF projects under development, striking as it is, should not be read as a guarantee of future success. A second geographical hub is emerging – China – and the nature of the competitive risk it poses for European eSAF development is more complex, and potentially more consequential, than a simple comparison of pipeline capacity suggests.

China is emerging as the world's largest second hub for announced eSAF capacity, with 11 large-scale projects currently under development representing approximately 20% of global announced capacity[38]. Most of these projects seem to be led by state-backed enterprises, which confers them a structural financing advantage that European producers cannot match. Information on the technical status and precise pathways of Chinese projects remains limited, but available data suggests several are being developed as Power-and-Biomass-to-Liquid facilities, most likely resulting in ebioSAF than fully synthetic eSAF. On a direct comparison of pipeline, China is thus a significant competitor but largely secondary to Europe's lead in announced capacity.

The more consequential risk, however, lies in China's broader e-fuel strategy and, more precisely, in the development of its e-methanol sector. China is the world's largest consumer of methanol, a legacy of its chemical industry's historical choice of a carbon-chemistry rather than a petrochemistry route, and has developed a globally dominant position in e-methanol production. Chinese projects account for approximately 50% of the global e-methanol pipeline, and critically, this pipeline is significantly more mature than the eSAF one: several Chinese e-methanol projects have already passed final investment decision[39].

This matters for French and European eSAF production for two reasons. First, the technological distance between e-methanol and eSAF is smaller than it might appear: the production processes share significant steps, learning effects from e-methanol scale-up are transferable, and, importantly, Methanol-to-Jet is gaining traction as a production route, particularly in the French pipeline[40]. Should Chinese producers receive a strong demand signal from the European market – precisely because Europe fails to meet mandates through domestic production – existing Chinese e-methanol capacity could be partially pivoted towards eSAF production with relatively limited process modifications, and significantly faster than any European facility could be built from scratch (once FID come in).

Second, and perhaps more immediately, Chinese e-methanol could be exported to Europe and converted into eSAF here, meaning only the final production step would occur on European soil. The port of Rotterdam is already emerging as a hub for this scenario, with several import agreements and conversion facility projects under development. This would formally satisfy ReFuelEU's supply requirements, which impose no local content requirements, while leaving the bulk of the upstream value chain outside Europe. Importing e-methanol would foreclose the demand-pull for upstream inputs described above, and create a structural dependency on Chinese supply. In a sector where French industrial leadership is a genuine possibility, this scenario would replicate a dynamic we have already seen – in solar and batteries – where failure to consolidate a nascent value chain generates future geopolitical risk.

37. T&E, The SAF Observatory. Is the aviation sector ready to transition to sustainable jet fuel, 2024, p.4.
38. T&E, The eSAF market : Europe's head start and the road ahead, 2025, pp.15-18.
39. Lesestre & Ali-Yahi, Observatoire international des e-fuels, 2025, p.19.
40. T&E, The eSAF market : Europe's head start and the road ahead, 2025, p.18.

The conditions that would make this scenario likely are, worryingly, already taking shape. As outlined in the previous sections, European eSAF projects are not developing fast enough to meet 2030 mandates through domestic production. French projects in particular are built around Methanol-to-Jet pathways compared to European peers, which also implies that French production would be especially exposed to competition from cheaper imported e-methanol if supply gaps open up.

The comparison with Battery Electric Vehicles is instructive and should serve as a warning. As outlined in the other two case studies on electric vehicles and green steel in I4CE's report on green reindustrialisation in France (from which this chapter is issued), despite a historically dominant automotive industry, France and Europe are today structurally dependent on Chinese battery and critical raw material imports – a situation that industrial policy is now scrambling to correct.

In eSAF, by contrast, France and Europe still have the opportunity to avoid repeating this trajectory. Many projects are already under development, the regulatory demand framework is in place, and – as this case study has shown – France in particular has the structural conditions to build a domestic value chain.

The window of opportunity for establishing leadership in eSAF is narrow. If the current investment deadlock persists and first-of-a-kind plants fail to reach a final investment decision (FID) in the near term, Europe risks a transition from technology developer to technology importer. Such a delay would not only marginalize the significant political and financial capital already committed to the sector but could also weaken the long-term credibility of France's broader cleantech industrial strategy. Moving from regulatory frameworks to operational reality is now the critical hurdle for maintaining this first-mover advantage.

II. THE REGULATORY FRAMEWORK FOR ESAF: WHAT IT HAS ACHIEVED AND WHERE IT FALLS SHORT

The previous section documented both the promise and the fragility of France's emerging eSAF market: a leading pipeline, driven by political will and regulatory ambition, but that has yet to translate into actual output. The observed gap reflects a structural mismatch between the instruments deployed so far and the specific barriers that are preventing projects from moving forward.

1. Strong on project announcement, weak on bankability: what France's policy framework has and has not delivered for eSAF

The emergence of Europe's – and France's – eSAF pipeline is, above all, the product of deliberate and well-calibrated policy choices. Faced with a sector that will not decarbonise sustainably without synthetic fuels and a market that will not develop them without regulatory intervention, the European Commission and the French government have done what sound industrial policy requires: create the demand signal that no private actor had an incentive to pursue alone. ReFuelEU's globally distinctive eSAF sub-mandate is a suited response to a sector where both decarbonisation is structurally challenging and industrial leadership is at stake.

France was a pioneer in building this framework. An "Engagement pour la croissance verte" signed in 2017 with Air France, Airbus, Safran, TotalEnergies and Suez led to a national aviation decarbonisation roadmap in 2021, establishing voluntary SAF incorporation targets that predated the European framework and informed what later became ReFuelEU. Across the Channel, the UK's SAF

scheme further reinforced the signal by capping the contribution of bioSAF to the UK's mandate, implicitly steering the market toward more scalable options. Together, these frameworks created a globally unique and growing potential offtake market for eSAF; one that becomes substantially larger as sub-mandates scale through the 2030s and beyond.

France's eSAF ambitions extend beyond the European framework to 2050. In its third national low-carbon strategy (SNBC3), the French government reaffirms the European SAF incorporation targets for 2030 while setting a higher level of ambition for 2050: the central scenario foresees an 85% SAF incorporation rate (vs. ReFuelEU's 70%), of which approximately 50% would be eSAF (vs. 35% for bioSAF). This trajectory aligns with the "acceleration" scenario in the aviation decarbonisation roadmap and constitutes a strong political signal for the long-term development of the eSAF sector on national territory. The SNBC3 acknowledges, however, that a portion of the synthetic fuels required may need to be imported, depending on domestic production capacity and low-carbon electricity availability – a caveat that underscores the importance of anchoring a national value chain now, before import dependency becomes structural.

The design of ReFuelEU makes compliance significantly cheaper than non-compliance, yet this logic has so far not fully translated into market behaviour. Penalties are designed in a highly dissuasive manner: set in France at two to five times the price gap between fossil kerosene and eSAF, with an additional catch-up requirement ensuring that missed volumes must be procured later (most likely at worse prices and under greater time pressure). In theory, this creates a strong incentive for early offtake and investment. In practice, the deterrent effect has been blunted by two factors. First, enforcement depends on Member State transposition, and implementation has been slow and remains incomplete (without the penalties) in most countries despite the formal deadline having passed end of 2024[41]: France, for instance, still had not fully transposed the sanction regime as of early 2026[42]. Second, the very scale of potential penalties has led many regulated actors to assume that authorities will not apply them in full, particularly if doing so threatens their viability[43]. As a result, neither significant eSAF procurement nor realistic penalty buffers are yet reflected in the financial planning of most potential off-takers[44].

Financial support instruments have partially compensated for this gap, but none has addressed its root cause. The **EU Innovation Fund**, financed through ETS revenues, can in principle cover up to 60% of the incremental costs of low-carbon technologies relative to their fossil alternative. ESAF projects are in principle eligible, but they compete against a wide range of more mature technologies that score better on the Fund's criteria of cost efficiency and financial maturity. Without signed offtake agreements or other forms of revenue certainty, the path to FID is unclear for first-of-a-kind eSAF plants, and they systematically underperform on these metrics. The **European Hydrogen Bank** offers support for operational costs through competitive auctions, but premiums awarded so far fall far short of what eSAF producers need given current hydrogen costs. The mechanism is also undermined by non-cumulability rules that prevent it from being stacked with other support mechanisms such as indirect CO_2 cost compensation or TURPE rebates, which significantly limits its effectiveness. The **EIB** has financed only one eSAF project, compared to six bioSAF projects, reflecting a structural preference for lower-risk, more mature technologies. **ETS SAF allowances** – 20 million free allowances for SAF uptake between 2024 and 2030 – are distributed ex-post on a first-come, first-served basis to commercially available SAF types, which, in practice, means the entire volume flows to bioSAF and provides no support for eSAF development.

The common thread across these instruments is that they address upfront costs like parts of capital costs and feasibility studies, without providing the revenue certainty over sufficiently long time horizons that eSAF project developers need to make their projects bankable and achieve FID. A grant that covers part of construction costs does not make a plant bankable if there is no long-term contract guaranteeing a revenue stream once the plant is built.

France's national instruments deployed under France 2030 stand out as particularly well calibrated to market needs and are a central reason why France's pipeline is more mature than those of most European peers. Upstream support for green hydrogen through ten-year contracts for difference addresses key segments of the eSAF value chain. The most decisive instrument, however, has been the Carb Aéro calls, in two phases: the first open to projects across different SAF types, and the second specifically targeting eSAF, allocating a further €100 million to cover up to 80% of FEED and pre-FEED study costs for four designated large-scale projects, awarded in spring 2025. These phases represent investments of €40-60 million that developers struggle to finance, with private capital rarely available at such an early stage. Carb Aéro's coverage of these costs has been widely described as exemplary for market development and is envied by other Member States;

41. T&E, Implementing the EU's eSAF mandate—A first look at ReFuelEU penalties for fuel suppliers, 2024.
42. As of early 2026, France has yet to finalise the necessary executive orders (arrêtés) to fully implement the sanction regime required by the ReFuelEU Aviation regulation. This delay is largely attributed to the technical difficulty of defining "deterrent" financial penalties amidst high price volatility for eSAF; since the regulation requires fines to be at least twice the price difference between fossil kerosene and SAF, the absence of a stable market price for synthetic fuels complicates the calculation of a fixed penalty that remains legally robust without stifling industrial investment.
43. T&E, Implementing the EU's eSAF mandate—A first look at ReFuelEU penalties for fuel suppliers, 2024.
44. T&E, The eSAF market : Europe's head start and the road ahead, 2025.

it is he primary reason why one French project is already in FEED and three others are actively preparing to begin.

Complementing these direct subsidies is the Garantie des Projets Stratégiques (GPS), a credit guarantee mechanism managed by Bpifrance that has become a vital tool for de-risking high-CAPEX industrial ventures[45]. Originally designed to support strategic autonomy and the green transition, the GPS allows developers to secure bank financing by covering a significant portion of the credit risk – a role the European Investment Bank (EIB) is often more hesitant to play at such early stages of technological deployment. It is worth noting, however, that the GPS does not cover development costs, which limits its leverage for projects still in the design or advanced engineering phase. Its use has been pioneered in an ebioSAF project – notably Elyse Energy, which secured a €70 million guarantee for its industrial projects[46] - it represents a powerful, low-immediate-fiscal-cost lever for eSAF.

Taken together, the EU regulatory framework and France's national support schemes have succeeded in building a dense eSAF project ecosystem, with France at the forefront. The challenge now is to bring these projects to a market that is structurally dominated by actors who, for the time being, are not engaging with the development of this nascent cleantech sector.

2. A race against the clock: why 206 market signals are make-or-break for the sector

The regulatory framework that underpins France's eSAF ambitions is scheduled for a review in 2027. Formally, the ReFuelEU review obliges the Commission to submit a technical assessment to Parliament and Council on market developments, which could result in a decision to maintain the regulation unchanged – or to open it to revision. In the current political environment, the latter possibility is not remote. Oil majors have begun publicly questioning the feasibility of eSAF development in Europe and drawing explicit parallels with the Commission's revision of CO_2 standards for cars, feeding uncertainty at precisely the moment the market needs certainty most, and suggesting the eSAF sub-mandate may be challenged, delayed, or weakened. Airlines and fuel suppliers, for their part, have little incentive to internalise compliance costs or penalty risk in their medium-term financial planning as long as regulatory backtracking remains a scenario. The review, in other words, is already generating the uncertainty it is supposed to resolve; and if no significant positive market signals materialise before 2027, the political conditions for a damaging revision will be in place.

The European Commission's Sustainable Transport Investment Plan (STIP), presented in November 2025, provides the most promising response to the investment deadlock yet proposed. The STIP's centrepiece for eSAF is a double-sided auction mechanism, modelled closely on the H2Global scheme for green hydrogen. This mechanism would act as a market intermediary, matching eSAF producers and buyers, aggregating demand, and providing long-term contracts for difference that deliver the revenue certainty producers need to reach FID. Well designed, it has the potential to address both the price gap between eSAF and fossil kerosene and the duration mismatch between the short contracts airlines are accustomed to and the long tenors investors require. It is, in principle, precisely the missing piece identified above.

The problem is timing. STIP's double-sided auctions require finding new sources of money – either through the next EU Multiannual Financial Framework or in the difficult negotiations around the review of the EU ETS; thus in both cases temporarily delayed. Given that moving from FID to commercial production takes a minimum of three years even under optimistic assumptions, auctions beginning in 2028 would come too late to enable plants to contribute meaningfully to the 2030 sub-mandate. More critically, they would come too late to provide the positive market signals needed before the 2027 review. The mechanism designed to save the market may arrive after the political moment that determines whether the market survives.

The 'Early Mover Coalition' – a group of eight Member States, including France, that have committed to piloting eSAF auctions ahead of the STIP – was conceived precisely to bridge this time gap. In principle, it is the right response: pilot auctions in 2026 could bring one (or, under optimistic assumptions, two) projects to FID, providing the proof of concept that the market needs before the review. In practice, only Germany and Luxembourg have so far signalled concrete intentions to fund pilot auctions, with discussions with DG Competition still ongoing. France has, however, made no financial commitments to such auctions. And even if pilots materialise, volumes will likely suffice to bring at most two European projects to FID, which may help the market in terms of signalling, but certainly insufficient to meet required volumes and to de-risk the broader pipeline.

45. Bpifrance, Garantie des projets stratégiques.
46. Renewables Now, Elyse Energy secures EUR 70m for biofuel projects in France, 2025.

A further complication arises from the likely design of national pilot auctions. If Member States funding pilot auctions include provisions to reserve supported eSAF volumes for domestic buyers, just as Germany's H2Global scheme does for hydrogen, France could find itself in an awkward position. Having invested substantially in developing a leading national pipeline through CarbAéro, its projects may advance to FID through German-funded auctions whose volumes would flow to German airlines, leaving French carriers still exposed to ReFuelEU compliance/penalty costs.

Looking across the Channel offers a useful counterpoint, as the UK has faced the same structural diagnosis of market blockage and crafted an instructive response. Its Sustainable Aviation Fuel Revenue Certainty Mechanism is a one-sided Contract for Difference funded by a variable levy on aviation fuel suppliers. It is calibrated so that the levy amount adjusts inversely with non-HEFA SAF prices: when SAF prices are high and airlines bear significant mandate compliance costs, the levy is minimal; as production scales and prices fall, the levy increases to maintain the strike price guarantee, while airlines' underlying fuel costs decline. The result is a 15-year revenue certainty guarantee for producers, financed without relying on general budget appropriations, and self-calibrating to avoid over- or under-funding. With the SAF Bill now having received Royal Assent and the first competitive auction planned for the end of this year, the UK could hold a two-year first-mover advantage over the EU if STIP only becomes operational in 2028.

The UK's contract-for-difference mechanism has become a reference point for many European eSAF producers, and the Renewable and Low-Carbon Fuels Value Chain Industrial Alliance (RLCF Alliance) has explicitly called for a similar mechanism at European level. Transposing it – whether at EU or national level – runs up against an unresolved question of funding, and is thus far from straightforward. At EU level, a new aviation fuel levy would likely fall under the Energy Taxation Directive and require unanimity among 27 Member States, making it politically improbable and certainly too slow for the current timeline. France could in principle establish its own national mechanism, potentially supported by the new European Clean Industrial State Aid Framework (CISAF), which opens new margins for this type of support. But in a severely constrained fiscal environment, mobilising resources for eSAF contracts for difference is not a realistic near-term option.

The consequences of failing to deliver positive market signals before 2027 extend well beyond a compliance shortfall. If no significant number of eSAF projects reaches FID by 2026, the ReFuelEU review risks becoming a de facto referendum on the eSAF sub-mandate itself. Faced with an absence of visible progress, vocal incumbent opposition, and a political environment in which climate target revisions have become normalised, policymakers may be tempted to relax or postpone targets – repeating the pattern observed in the car CO_2 standards process, and sending a devastating signal to investors.

Yet, the opportunity has not yet expired. If policy moves decisively in 2026 - by accelerating pilot auctions, ring-fencing eSAF support within existing instruments, and providing an unambiguous "no-backtracking" signal - Europe and France can still convert their current pipeline lead into a durable industrial reality. The window is narrow, and the first-mover advantage is still theirs to lose, but the path from regulation to shovels in the ground remains open if the deadlock is broken now.

III. RECOMMENDATIONS: THREE LEVERS TO BREAK THE DEADLOCK

France's eSAF sector faces a prisoner's dilemma. In spite of world-leading state support for the development of the value chain, no large-scale project can reach FID, with costs high and investors hesitant, seeing no concrete offtake to guarantee future revenues. Offtakers (fuel suppliers and airlines), who operate on short contracting timelines, are unwilling to commit to a solution which will only be economically viable in the medium term and could lock them into a competitive disadvantage. Instead of preparing for this, many are betting on the opportunity to weaken ReFuelEU in the 2027 review process, freeing themselves from the obligation to do so.

This paralysis could be terminal. With the first projects entering or coming into the end of the FEED stage, eSAF projects face a wall which, in the best case, cause production ramp-up to miss the 2030 deadline set out in ReFuelEU, and in the worst case open the door to Chinese competition and financial difficulties that will strangle the sector.

With so much political and fiscal capital already invested, France cannot afford for this to happen – to allow eSAF to become France's missed opportunity of the 2020s as Solar PV was for Germany in the 2010s.

Industrial policy is therefore crucial to overcome these risks and break the standoff. Three principal levers are needed to do so.

1. Hold the line: defend ReFuelEU and signal eSAF as national industrial priority

France remains committed to decarbonising its aviation sector, with eSAF as the clearest long-term technical route to doing so. The EU's RefuelEU regulatory framework formalises that commitment, with significant fines to be imposed for non-compliance. Unsurprisingly, the sector is lobbying to have these fines reduced or the timeline for incorporation made more gradual. The expected review in 2027 will see these efforts reach a peak of intensity, mirroring the efforts of the automotive industry to undercut the CO_2 standard for cars.

Caving to these demands would be politically incoherent, with eSAF a cornerstone of France's efforts towards reindustrialisation verte under France 2030. Failing to uphold the SAF mandate and associated fines would likely see the collapse of the sector (even with expanded fiscal support), and allow space for future demand (even if that be in the 2040s) to be met elsewhere. Fortunately, France has been a clear defender of the mandate to date.

France should continue and intensify its defence of ReFuelEU within the European Council ahead of the 2027 review, working through the Early Mover's Coalition to build a blocking minority against any weakening or delay of the eSAF sub mandate. This means not only defending maintaining the fixed level of fines but accelerating their transposition into national law to signal to both industry and investors that the sector has a future in Europe, and that the EU framework is credible and will be enforced.

2. Bridge the bankability gap: securing revenue certainty to unlock final investment decision

eSAF projects in France represent a strong pipeline with a maturing technology and the country's aforementioned structural advantages mean the industry is well-placed to scale. Yet FID is out of reach. Most institutional investors, who can provide the €1-2 bn needed, judge that the market is simply not there, weakening the business case. So far, French public support has focused mostly on the early development and FEED stage, which gives projects momentum but cannot clear this crucial hurdle. This needs to be addressed, or France risks missing out on the potential market and technology leadership that are the foundation of durable economic competitiveness.

Simply increasing the volume of public funding is, in the current context, unrealistic. France needs to find alternative means – financial or regulatory – to bridge the gap to FID.

To bypass budgetary constraints, France can leverage the EU's STEP programme by utilizing its remaining circa €11bn in uncommitted Cohesion Funds[47] to launch a dedicated funding window for eSAF. This public support should be coupled with derisking mechanisms to facilitate Final Investment Decisions (FID); while the EIB may hesitate due to current market risks, France's Garantie des Projets Stratégiques (managed by Bpifrance) offers a viable alternative. The 2025 €70m guarantee for Elyse Energy's biofuel project serves as a proven model that should be expanded to specifically target and scale eSAF production[48].

However, there is a risk that both of these options will be insufficient to allow the French eSAF pipeline to reach FID, given the uncertainty around the eSAF sub-mandate under ReFuelEU and the medium-term timeline on which demand is expected to evolve. Investors are still likely to bet on bioSAF in the current context, without clear revenue certainty for eSAF projects.

This is precisely what the two-sided auction mechanism proposed by the STIP, based on the H2Global model, aims to address: long-term contracts for producers, combined with short-term resale to end users at discounted prices. The design is currently under review, with proposals expected later this year. Key issue: the ques-

47. Based on an estimate of unspent Cohesion funds at the end of 2024: Osservatorio Balcani Caucaso Transeuropa, EU, delays in spending cohesion funds.
48. Renewables Now, Elyse Energy secures EUR 70m for biofuel projects in France, 2025.

tion of STIP funding has not yet been entirely resolved. The year 2026 will be decisive for both the design and the funding of this mechanism. If it is to be funded by earmarking ETS revenues from the aviation sector[49], the ETS review in the summer of 2026 will be a key moment; if STIP funding comes through the next Multiannual Financial Framework, negotiations will enter a critical phase at the end of 2026. In both cases, France must actively engage to secure an ambitious budget, "grants as a service" contribution mechanisms from Member States, and "Made in Europe" criteria to anchor the value chain within the EU.

Furthermore, France should leverage domestic tools to improve the investment case for eSAF. 10-year CAPN contracts for nuclear energy can give stability on the single most significant cost element in eSAF production, while accelerating regional permitting procedures in line with the EU's NZIA and IAA regulations can have a similar incentive effect.

3. Make defence an anchor customer: embedding eSAF in France's strategic energy sovereignty

In an increasingly volatile geopolitical context, France is joining NATO partners in upgrading its defence infrastructure, with fuel being a critical vulnerability. Aviation fuel represents the lion's share of this risk, accounting for 85% of the fuel consumption of the armed forces during high-intensity operations[50].

eSAF is of unique strategic interest because it offers a path toward energy sovereignty. Unlike bioSAF, which relies on increasingly scarce global feedstocks, and for production of which Europe already relies predominantly on imported feedstock[51], eSAF produced from European low-carbon electricity is far less vulnerable to supply chain disruptions. The French military, with its significant budget and existing logistics network, can therefore serve as the "anchor customer" for eSAF offtake.

A concrete step for 2026 would be to leverage the French *Société Anonyme de Gestion des Stocks de Sécurité* (SAGESS). By mandating the incorporation of decarbonized eSAF molecules into France's strategic petroleum reserves, the state can transform eSAF from an "infant industry" into a pillar of critical national infrastructure. This could provide the reliable offtake signal needed to de-risk commercial-scale production projects.

Furthermore, the Ministère des Armées must modernise its *Stratégie Énergétique de Défense*. The existing 2020 targets (5% bioSAF by 2030 and 50% by 2050) are no longer sufficient in the current security environment. In a 2026 update, the Ministry should bring military targets into alignment with - or ahead of[52] - the ReFuelEU 2050 roadmap: 70% total SAF incorporation by 2050, and a specific 35% sub-target for eSAF.

By taking these actions, France can utilise its current defence build-out to break the offtake deadlock. **This sends a clear signal to private investors regarding the strategic value of the sector, the permanence of state support, and the genuine prospect of industrial scale.**

49. As advocated for by Project Skypower: Green Air News, European aviation stakeholders urge priority policy support for eSAF in Clean Industrial Deal, 2025.
50. Hans Seidel Stiftung, SAF as a Key to European Defence Capability and Fuel Supply Sovereignty, 2025.
51. EASA's 2025 assessment of ReFuelEU implementation shows that 69% of feedstock for SAF supplied to the EU originated from non-EU countries, with China contributing 38% and Malaysia 12%.
52. In line with the most recent SNBC3 which showcases national eSAF ambition beyond ReFuelEU.

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