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FUELGAE

Policy Brief



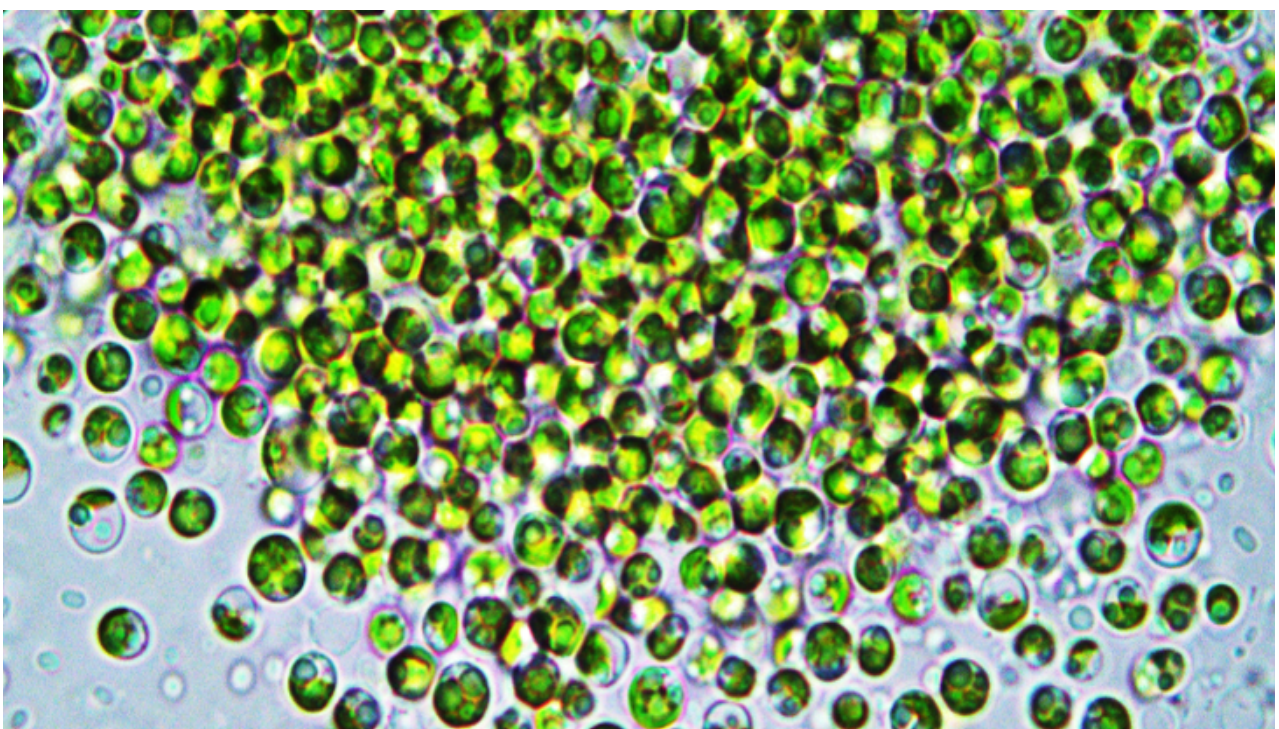
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Executive Summary

Europe has created a strong demand signal for Sustainable Aviation Fuels through ReFuelEU Aviation, but scaling advanced, waste- and residue-based fuel pathways will require more than mandates. This brief argues that Europe needs

- clearer and more stable policy implementation,
- better mapping and mobilisation of sustainable feedstocks,
- stronger support to move promising technologies beyond pilot and demonstration scale,
- more robust rules for life-cycle assessment, certification and biogenic CO₂ accounting.

Without these enabling conditions, SAF deployment risks being slowed by feedstock constraints, investment uncertainty and unclear recognition of circular carbon benefits.



From SAF Targets to SAF Supply

The Case for Action

Aviation is a hard-to-abate sector: aircraft efficiency, operational improvements and demand-side measures can contribute to emissions reduction, but liquid fuels will remain essential for most commercial aviation for decades. This makes SAF and related advanced fuel pathways central to Europe's climate, industrial and energy security objectives.

ReFuelEU Aviation creates binding demand for SAF in Europe, but the supply side remains uncertain. EASA estimates that current and under-construction EU production capacity could reach around 3.2 million tonnes by 2030 under a realistic scenario, enough to meet the estimated 2.8 million tonnes needed for the 6% mandate. Yet this projection depends on rapid project delivery, strong investment confidence and continued access to sustainable feedstocks. It also does not solve the longer-term challenge: production must scale much further after 2030 as mandates rise.

The KOS2026 panel discussion highlighted that Europe's advanced fuel challenge is broader than SAF volumes alone. It concerns circularity, carbon accounting, feedstock mobilisation,

technology scale-up and the use of biogenic CO₂ and waste streams as resources rather than liabilities. The opportunity is to convert waste biomass, algae, biogenic gases and captured carbon into higher-value fuels and materials. The risk is that fragmented rules, uncertain accounting and insufficient investment support delay deployment and weaken Europe's industrial position.



70%

EU SAF mandate by 2050

Current Challenges

1

Feedstock availability and mobilisation as constraints

Advanced Sustainable Aviation Fuel (SAF) pathways depend on sustainable feedstocks such as waste oils and agricultural residues, which are challenging to mobilize due to uneven distribution and logistical issues. Europe faces competition for key feedstocks like used cooking oil for HEFA production, potentially driving up prices and limiting supply. Thus, it is essential for European producers to map, mobilize, and diversify domestic feedstocks.

2

Advanced technologies face a scale-up and bankability gap

Many advanced fuel technologies are not ready for large-scale use. Projects like ICARUS are exploring alternatives such as hydrothermal liquefaction and isobutanol-to-jet, which could diversify Europe's feedstock beyond lipid-based fuels. However, these methods require further development, certification, and investment to meet 2030 and 2050 targets. The main challenge is transitioning from pilot projects to viable industrial plants, necessitating stable policy signals and investor confidence.

3

Unclear sustainability assessment and certification rules

Life-cycle assessment is essential for SAF eligibility and credibility, but current methods still struggle with uncertainty, system boundaries, allocation and verification. This is especially challenging for circular algae-based fuels and integrated biorefineries, where multiple products, co-products, waste streams and energy inputs interact. Clearer rules and better data infrastructure would improve certification quality and help avoid shifting environmental burdens across sectors or borders.

4

Unclear biogenic CO₂ accounting

Biogenic CO₂ and waste streams can be valuable resources for fuels, biomethane, algae cultivation, biochar and other products, but their climate benefit depends on how the captured CO₂ is ultimately used or stored. Current policy does not yet provide clear enough rules on how biogenic CO₂ is counted, certified and rewarded. Without clearer accounting, circular fuel projects may struggle to prove their climate value and attract investment.

Policy Recommendations

1

Provide stable, simple and predictable SAF implementation rules

Implement ReFuelEU Aviation, RED III, EU ETS, CORSIA-related obligations and carbon management rules coherently, with clear guidance and without frequent changes that undermine investor confidence.

2

Map and mobilise sustainable feedstocks

Identify and mobilise Europe's waste, residue, algae, sludge and non-food biomass streams, including their availability, quality, logistics and sustainability risks.

3

De-risk first-of-a-kind plants for advanced SAF pathways

Support advanced SAF pathways with grants, loan guarantees, contracts for difference and offtake-backed tools to bridge the demonstration-to-commercialisation gap.

4

Improve LCA and certification for circular fuel systems

Strengthen LCA rules, uncertainty reporting, verification and data infrastructure so circular fuel systems — including algae-based fuels, biorefineries and CO₂ utilisation chains — can be certified credibly and consistently.

5

Clarify circular CO₂ accounting

Set clear rules for how biogenic CO₂ use, storage and fossil carbon substitution are counted, certified and rewarded, so circular fuel projects can prove their climate value.

From Targets to Implementation

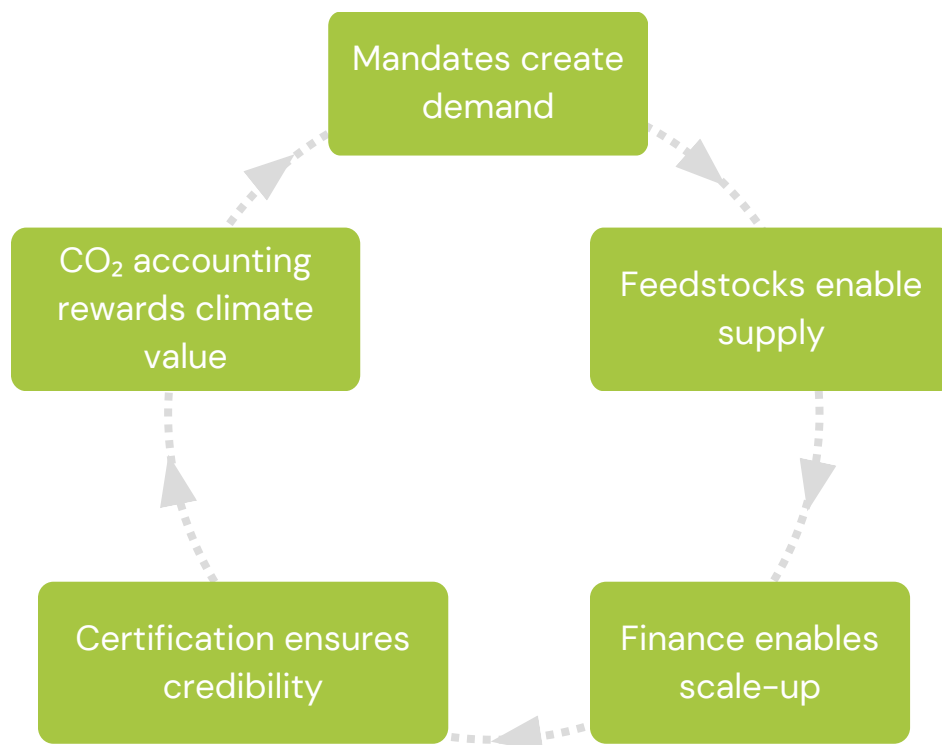
Europe has SAF targets. The priority now is implementation.

To deliver advanced aviation fuels at scale, policymakers must:

1. **Create certainty:** Stable rules are needed to unlock investment.
2. **Secure resources:** Sustainable feedstocks must be mapped, mobilised and traced.
3. **Reward real climate value:** LCA, certification and CO₂ accounting must recognise circular carbon benefits credibly.

Next step:

turn SAF ambition into bankable, sustainable and circular fuel value chains.

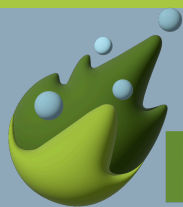


Bibliography

1. European Commission, ReFuelEU Aviation, Mobility and Transport policy page, accessed July 2026.
2. European Union Aviation Safety Agency, State of the EU SAF Market in 2023 and Sustainable Aviation Fuels chapter, 2024–2026.
3. Directive (EU) 2023/2413 on the promotion of energy from renewable sources (RED III).
4. Commission Delegated Directive (EU) 2024/1405 amending Annex IX to Directive (EU) 2018/2001 as regards additional feedstocks for biofuels and biogas.
5. International Civil Aviation Organization, CORSIA sustainability criteria and lifecycle emissions methodology for eligible fuels.
6. European Commission, Industrial Carbon Management Strategy, COM(2024)62.
7. FUELGAE KOS2026 panel discussion transcript, AI-generated transcript provided by RTDS Group.
8. ICARUS Deliverable D1.5, Policies Overview for SAF, 2024.
9. ICARUS Deliverable D1.7, SAF Policies 2025 Update, 2025.
10. ICARUS Deliverable D3.5, SAF Market Development, 2025.
11. ICARUS Deliverable D3.2, Economic Analysis of Selected SAF Options, 2025.
12. CRONUS policy brief and project policy review materials on carbon capture, utilisation and bioenergy value chains.



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INTERNATIONAL COOPERATION FOR
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