Features

Delivering bankable SAF projects at scale

As global efforts to decarbonise aviation intensify, sustainable aviation fuel has emerged as a leading solution.

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Fueling Air Plane. © Suga Ray Machuri | Dreamstime.com

With synthetic paraffinic kerosene (SPK) lifecycle emission reductions of up to 80% compared to conventional jet fuel,[1] the aviation industry has highlighted the critical role of sustainable aviation fuel in reducing the sector's overall carbon footprint. However, realising its potential requires more than regulatory ambition. Delivering at scale demands significant investment, advanced engineering, and long-term policy certainty. Reaching final investment decision for an SAF facility, particularly one at industrial scale, remains one of the most critical milestones.

DG Fuels' SAF project in Louisiana is among the largest and most advanced of its kind, taking advantage of a technology platform that leverages flexibility in feedstock sourcing and combines this with the company's own rigorous approach to lifecycle emissions management. The company's experience in moving towards FID offers valuable insights into the practical requirements for scaling SAF projects and the underlying importance of resilient engineering partnerships and policy support.

Aligning technology with scale

SAF producers are constrained by the limitations of some production methods. HEFA, based on used cooking oil and animal fats, accounts for most of the SAF currently available. However, HEFA feedstocks can be limited in volume, often imported to achieve scale, and subject to price volatility. Ethanol-based or alcohol-to-jet routes, while potentially scalable, raise concerns about land use and food competition in some regions.

DG Fuels has taken a different route, using gasification and Fischer-Tropsch (FT) synthesis to convert waste biomass into synthetic crude. This is then upgraded into SPK, which is blended into SAF. For its Louisiana project, DG Fuels selected Johnson Matthey's and BP's FT CANS technology for the FT synthesis step, which allows for a wide range of feedstocks while optimising both process efficiency and yield. The FT CANS system uses a radial flow reactor design, advanced catalyst formulation and superior heat integration to maximise conversion and minimise losses.[2]

"The FT route is harder upfront," says Michael Darcy, chief operating officer at DG Fuels. "But once the facility is operational, it gives you scale, lower carbon intensity and much better long-term economics. We have designed our system around this because we believe it is the only truly scalable option."

The FT CANS technology works alongside Johnson Matthey's HyCOgen system, forming a fully integrated platform that improves overall process efficiency and capital economics. HyCOgen technology produces syngas from CO and hydrogen, which aligns with the FT process requirements. This integration is not only central to reducing costs and emissions but is also instrumental in enabling the production of e-SAF (known as Power-to-X), particularly for export markets.

The Louisiana plant is designed to process up to 1m dry tonnes of biomass annually, producing 13,000 bbl/day of SPK. It is expected to become the largest SAF facility in the world using the FT route. The choice of technology has been fundamental to enabling this level of throughput. As Darcy pointed out, the engineering was deliberately sized to sit in the efficiency "sweet spot", avoiding impractical oversizing while ensuring economic feasibility.

"We are already optimised," he said. "If someone asked us to double the size of the facility, it would not be a simple scaleup. We would be building two units side by side."

Feedstock integration

Feedstock sourcing remains one of the defining variables in SAF production. DG Fuels has adopted a geographically sensitive approach, tailoring its inputs to local agricultural residues. In Louisiana[3], the plant is expected to utilise a blend of available feedstocks such as timber waste, bagasse pellets, and corn stover pellets,

with the final mix depending on forthcoming feedstock agreements and logistics. Similar flexibility applies to other project sites, where feedstock sourcing strategies will be adjusted based on regional availability and supply arrangements.

Chris Chaput, president of DG Fuels, notes that political interest in the company's model has increased significantly due to its agricultural alignment.

"The turning point came when governors and local leaders realised this is not about displacing food crops or importing exotic oils. We are creating economic value from agricultural waste that farmers previously paid to remove. That changes the conversation entirely."

Using non-woody biomass can present specific challenges. For example, bagasse and corn stover require preprocessing to achieve the moisture and density characteristics necessary for gasification. DG Fuels is addressing this through partnerships with local suppliers and pretreatment facilities but recognises the need for careful planning and investment in logistics.

"By the time you process and pelletise corn stover, the cost difference compared to wood is less than people expect," Darcy said. "But you have to engineer the system to accommodate those feedstock characteristics from day one."

DG Fuels has announced two additional SAF facilities in Phelps County, Nebraska[4], and in Moorhead Minnesota[5], marking the company's expansion into the US Midwest, although the company is yet to confirm technology partners for these projects. The Nebraska site was selected for its proximity to robust agricultural infrastructure, access to rail transport, and abundant availability of corn stover, while in Minnesota, the value proposition to SAF producers includes abundant and diverse feedstocks, clean electricity and mature rail networks. These plants are expected to replicate many of the design efficiencies established in Louisiana while leveraging regional feedstock advantages and strong state-level support. The projects have garnered attention from both policymakers and the agricultural community as a model for rural economic development and energy transition.

Alongside Louisiana, both Nebraska and Minnesota have emerged as critical political and stakeholder supporters of DG Fuels' vision. While Nebraska represents a major operational focus, Minnesota's engagement at the political level has significantly contributed to momentum. Together, these states highlight the kind of regional support needed to accelerate SAF deployment and infrastructure development.

Reaching FID

Despite its technical readiness and clear commercial logic, DG Fuels has yet to reach FID in the Louisiana project. The company is now targeting a decision in late 2025. Financing is the final piece of the puzzle. With a capital requirement of approximately US$5bn, the project is not viable without access to long-term, low-cost debt.

DG Fuels sees long-term policy certainty and support mechanisms to guarantee finance as critical enablers. It is currently engaged in the evaluation of several options that can provide guarantees for loan financing and drive investor confidence to reach FID. Finalising these agreements is key to attracting investors.

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"Our entire equity round depends on that commitment," Chaput stated. "Without it, we are unlikely to reach financial close. With it, we are confident the numbers are strong enough to attract the institutional capital we need."

The process has also revealed the interdependence between financing, engineering completion and offtake agreements. DG Fuels must complete its Front-End Loading Phase 3 engineering, a highly detailed and iterative design phase involving multiple technology providers. Each supplier, from gasification equipment to catalysts, feeds data into a collaborative model led by Black & Veatch, the construction engineering company. Delays in any one element create ripple effects, making schedule management a key part of risk mitigation.

On the policy side, the project aligns well with national priorities, supporting domestic fuel security, significant job creation, and economic revitalisation in rural agricultural communities. The initiative is projected to deliver over US$55bn–US$60bn in present value gains to state and local GDP, generate substantial tax revenues, and improve the US balance of trade through its SAF export potential. These outcomes directly support broader governmental goals for energy independence and rural economic empowerment.

The project's emissions strategy is built around using blue hydrogen, produced from natural gas paired with carbon capture and storage. This approach was selected after regulatory changes in late 2023 made it less feasible for the Louisiana plant to purely use green hydrogen. DG Fuels has since integrated a sequestration plan into the project's design, ensuring compliance with US lifecycle carbon intensity thresholds.

Still retaining a view on potential EU export markets, DG Fuels plans to incorporate approximately 200MW of water electrolysis capacity to produce e-SAF eligible under European standards. This will generate the renewable hydrogen needed to meet e-SAF criteria, positioning the project to command premium pricing in compliant export markets. The company is currently evaluating electrolyser deployment strategies and partnerships to deliver this capacity alongside its existing blue hydrogen system. e-SAF commands a significantly higher market price than conventional SAF, enhancing the project's overall commercial prospects.

To strengthen its overall emissions profile, DG Fuels is supplementing its hydrogen production with a portion of renewable natural gas and advancing carbon sequestration agreements local to the Louisiana site. These measures aim to reduce the plant's lifecycle carbon intensity and ensure compliance with US regulatory thresholds.

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Lessons for developers

The experience of DG Fuels offers several broader lessons for developers pursuing large-scale SAF and sustainable infrastructure projects. The first is the importance of aligning technology choice with long-term commercial strategy. FT-based SAF production offers material advantages in feedstock flexibility, yield and emissions compliance, particularly when supported by proven process partners.

Johnson Matthey's role as both technology licensor and engineering partner has also been central to maintaining momentum. The FT CANS system not only reduces catalyst volumes and operating costs but has proven critical in scaling the process efficiently. Its ability to maximise conversion of feedstock carbon into synthetic crude further supports project bankability.

The second lesson is around public-private coordination. Developers must engage early with policymakers and national governments, not just for permitting but to ensure alignment with funding frameworks. Access to blended finance tools is key for project success internationally; without such support mechanisms, projects in all jurisdictions may struggle to secure sufficient capital.

Finally, success demands adaptability. Chaput and Darcy repeatedly stressed the importance of remaining flexible across technical, commercial and policy domains.

"You need to have a Plan C for everything," said Darcy. "Things will change. If you are not willing to adapt, you will not get to FID."

Chaput agreed. "We've had to reprice, re-engineer and reposition this project several times. But we have never lost sight of the outcome. Getting SAF to market at scale requires long-term thinking and resilience."

Reaching FID for a SAF project certainly requires demonstrating strong economics and selecting the right technologies. DG Fuels' experience shows that success also depends on building an integrated delivery framework that combines feedstock availability, process performance, financing strategy, policy alignment and the right technical and commercial partners. If successful, the Louisiana project may provide a blueprint for delivering next-generation SAF facilities at industrial scale, unlocking the potential for advanced engineering platforms like FT CANS and HyCOgen to support viable, investible projects that can meet the aviation industry's long-term decarbonisation targets. ■

Footnotes

1 – https://www.iata.org/en/programs/sustainability/sustainable-aviation-fuels/

2 – Johnson Matthey Technology Review, Volume 65, Issue 3, Jul 2021, p. 395 - 403

3 – https://louisiana.dgfuels.com/

4 – https://dgfuels.com/2024/08/07/phelps-county-selected-for-dg-fuels-first-midwest-sustainable-aviation-fuel-plant/

5 – https://dgfuels.com/2024/11/07/announcement-of-new-minnesota-saf-plant-advances-strategy-to-lead-the-world-in-decarbonizing-air-travel/