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Haffner Energy targets lower-cost SAF with solid biomass-to-HEFA technology

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The new pathway converts solid biomass directly into thermolysis oil, bypassing the conventional syngas route and targeting up to 50 per cent lower production costs for renewable diesel and sustainable aviation fuel

Haffner Energy
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Haffner Energy is betting that the economics of renewable diesel and sustainable aviation fuel (SAF) can be materially improved by changing what happens before conventional fuel upgrading begins. The French energy technology company has unveiled SB-HEFA, or Solid Biomass to HEFA, a new pathway designed to convert solid biomass directly into liquid thermolysis oil before upgrading it through established hydrodeoxygenation technology used in the HEFA industry.

Haffner estimates that the approach could reduce the cost of renewable diesel and SAF by around 50 per cent while substantially lowering capital requirements compared with conventional biomass-to-liquids pathways. The central change is the removal of the conventional syngas route. Instead of first gasifying solid biomass and converting the resulting syngas into liquid fuels, SB-HEFA is designed to transform the biomass directly into an intermediate liquid oil that can subsequently be upgraded into fuel.

Cutting the process chain

The economics of biomass-derived fuels are heavily influenced by both feedstock costs and the complexity of conversion technology. Haffner's SB-HEFA process is designed to address both.

The pathway starts with solid biomass, particularly low-cost residual biomass, and converts it into liquid thermolysis oil. The oil is then rapidly cooled, stabilised and filtered before undergoing hydrodeoxygenation. That final upgrading step relies on established HEFA industry know-how rather than requiring an entirely new downstream fuel-processing architecture.

By removing the syngas stage, Haffner says the process can shorten the industrial conversion chain while improving energy efficiency. The company estimates that its feedstock costs can also be substantially lower than those associated with conventional HEFA production. According to Haffner, residual biomass can be priced at roughly one-fifth the cost of typical HEFA feedstocks such as used cooking oil.

That differential is potentially significant because feedstock represents one of the largest cost components in renewable fuel production.

A different feedstock equation

The technology is built around a category of biomass that is generally less expensive than the waste oils and fats traditionally associated with HEFA production. Using residual solid biomass could therefore broaden the feedstock base available to

renewable fuel producers while reducing exposure to competition for established HEFA feedstocks. The proposition is particularly relevant as demand for renewable diesel and SAF expands and competition intensifies for limited volumes of used cooking oil and other lipid-based feedstocks.

Rather than competing solely for those established feedstocks, SB-HEFA seeks to bring a different resource base into the liquid-fuels market. The technology's commercial case, however, will ultimately depend on the availability, quality and logistics of suitable residual biomass at individual project locations, as well as the performance of the conversion process at industrial scale.

Lower capital intensity

Haffner is also targeting the capital side of the renewable-fuel equation. The company estimates that SB-HEFA plants could require around one-third of the capital expenditure associated with comparable biomass-to-liquids routes. The potential reduction comes alongside the shorter process chain and the use of established HEFA upgrading technology, creating a pathway that Haffner believes could be more efficient to build and operate. The company is initially focusing industrial deployment on renewable diesel, including projects planned within multi-energy hubs in Canada.

SAF production is expected to follow as market conditions mature, with Haffner already engaging with aviation stakeholders over potential large-scale adoption.

From renewable diesel to SAF

The sequencing reflects the different commercial maturity of the two markets. Renewable diesel provides an initial industrial application for the technology, allowing Haffner to target projects where the fuel pathway can be deployed before expanding into aviation applications. SAF represents the larger strategic opportunity but also comes with more demanding requirements around fuel qualification, certification, supply-chain traceability and airline adoption.

Haffner's approach is therefore to establish the industrial pathway first and build towards aviation applications as the market develops. The company is already in discussions with aviation stakeholders about large-scale deployment, signalling its intention to position SB-HEFA as more than a niche biomass conversion technology.

Rewriting the biomass-to-fuel equation

SB-HEFA reflects a broader shift in renewable fuels: the competition is increasingly about finding abundant, affordable feedstocks and designing conversion pathways that can turn them into fuels without adding unnecessary processing costs. Haffner's proposition combines three levers—lower-cost residual biomass, a shorter conversion pathway and established HEFA upgrading—to challenge the economics of conventional biomass-to-liquids production.

Whether the projected 50 per cent cost reduction can be achieved consistently at commercial scale will depend on project design, feedstock availability, operating performance and downstream fuel economics.