



SAF PRODUCTION: HAFFNER ENERGY LAUNCHES A GAME-CHANGING SOLUTION

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Haffner Energy launches SAFNOCA, an integrated solution that unlocks the pathway for the massive production of competitive sustainable aviation fuel. Its patented technology of renewable synthetic gas production from diversified biomass and organic waste will play a decisive role in the decarbonization of aviation. Haffner Energy is in discussions with leading industry players to deploy SAFNOCA.

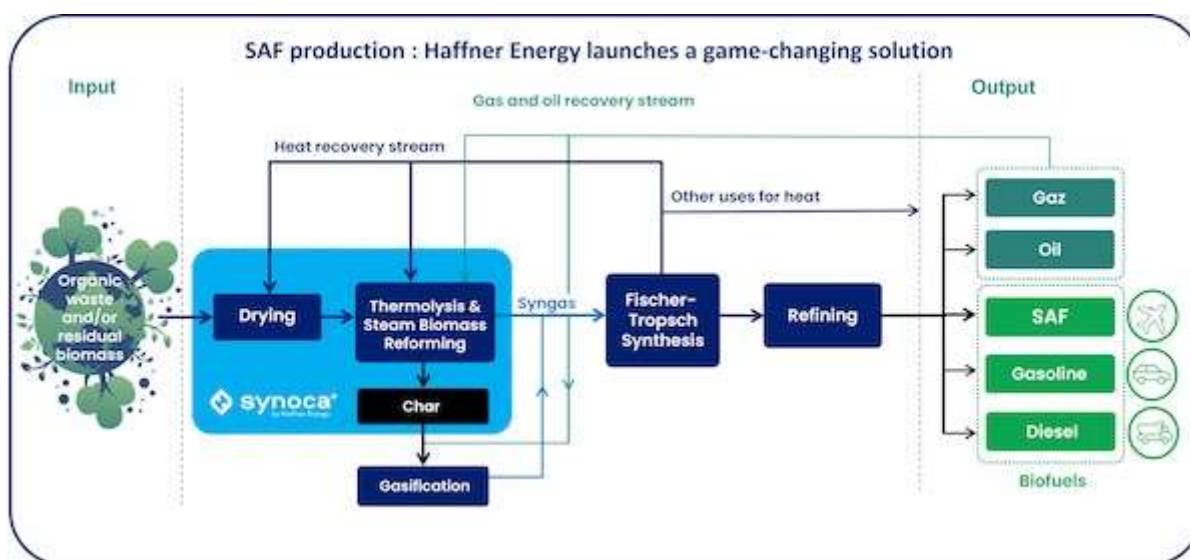
Haffner Energy is targeting SAF production units from 2025 with a capacity over 35,000 metric tonnes per year, in line with aviation sector decarbonization plans. For example, Geneva International Airport in Switzerland consumed 410,000 tonnes of fossil kerosene per year in 2022, for 14 million passengers (the same amount of passengers as New-York Laguardia in 2022). A SAF production unit of 41,000 tonnes per year would cover 10% of the airport's needs.

Philippe Haffner, Chairman and CEO of Haffner Energy, commented: "Today, civil aviation remains almost entirely dependent on fossil fuels, and that decarbonizing is a crucial challenge, though more complex than for road mobility. Through its SAFNOCA solution, Haffner Energy is in

a position to make a massive contribution to the decarbonization of aviation, by providing the missing link in the value chain that will enable the production of competitive, abundant carbon neutral SAF"

SAF is essential to the decarbonization of aviation. Its production requires a combination of renewable hydrogen and biogenic carbon. Only sustainable biomass and renewable organic waste can currently provide this biogenic carbon in a significant way. Although biomass deposits are significant, their dispersion, seasonal and interannual variations strongly favor processes that are agnostic to the type of biomass exploited.

This is a key differentiating factor of the technology developed by Haffner Energy. Its process is particularly efficient in converting all available seasonal sustainable biomass residues effectively with virtually no restrictions. This includes organic waste. Being agnostic to biomass and waste removes the main barrier to massive access to biogenic carbon, while securing supply. This advantage is further enhanced by the fact SAFNOCA has a virtually neutral carbon footprint in a full life-cycle analysis, reducing the resulting SAF CO₂ emissions by over 90%.



Why is SAF essential, and how can it be produced?

SAF is a bio-kerosene clean-fuel with a reduced carbon footprint. It is the only significant way to decarbonize air transport in the short and medium term, without having to replace the 26,000 aircraft currently in daily operation, as well as any new aircraft that are expected to double global air traffic by 2050. Other decarbonization options are being considered for the longer term, such as hydrogen, but will remain inaccessible for long-haul flights.

To date, SAF production covers just 0.3% of the world's aviation kerosene consumption. It is almost exclusively produced by the HEFA process, which uses oleochemical and lipid-based intrants. Vegetable oils, animal fats and used cooking oils are targeted. However, this process is likely to play a limited role in the future due to the limited availability of these oleic biomasses.

Technologies that convert residual solid biomass and organic waste, using the thermochemical Fischer- Tropsch process will lead. It is in this category that the technological brick mastered and supplied by Haffner Energy falls: SAFNOCA.

Haffner Energy has 30 years' experience in the production of renewable energy from biomass, with 40 projects completed and almost 600 MW installed capacity. From 2010 it developed SYNOCA® and HYNOCA®, technologies protected by 15 patent families enabling the production

of renewable hydrogen and renewable synthetic gas whose physico-chemical properties are perfectly suited to a Fischer-Tropsch¹.

A legislative framework favorable to the deployment of SAF in the United States and Europe

The mass production and use of SAF is a priority for civil aviation. New legislative frameworks implemented in many parts of the world are one of the main key factors favoring the use of SAF. In the European Union, at least 2% of aviation fuels must be sustainable by 2025. This share will increase every five years: 6% in 2030, 20% in 2035, 34% in 2040, 42% in 2045 and 70% in 2050.

The United States has greater ambitions. The Clean Hydrogen Strategic Roadmap published on June 5, 2023 sets a target of producing 3 billion gallons of SAF from biomass and waste per year by 2030, and 35 billion gallons by 2050. The goal by 2050 is to supply sufficient SAF to meet 100% of aviation fuel demand and to put the aviation sector on a pathway to full decarbonization. The US SAF Grand Challenge estimates a 600-fold increase in SAF production by 2030 compared to 2021, with a need for more than 400 biorefineries by 2050.

The Department of Energy identified a deposit of 1 billion dry tons of residual biomass per year. The Inflation Reduction Act offers substantial incentives for the production of SAF by introducing a tax credit of up to \$1.75 per gallon of SAF, depending on its carbon footprint. SAFNOCA should achieve the maximum tax credit, thanks to its very low carbon footprint.

Meet Haffner Energy in Houston on July 24

Haffner Energy will be in Houston from 24 to 30 July 2023 to present SAFNOCA solution. Marcella Franchi, SVP North America, will be speaking at the RNG & SAF Capital Markets Summit. Haffner Energy will be in Houston again for the Sustainable Aviation Futures North America Congress from 2 to 4 October 2023.

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