The Global Methane Pledge and SAF
Are we missing a Significant Opportunity?

EMERGING FUELS TECHNOLOGY

The United States and the European Union recently announced the "Global Methane Pledge," an initiative to reduce global methane emissions by at least 30% by 2030. [1]

Of all the potential strategies to deal with methane released into the atmosphere, we propose that converting that methane into Sustainable Aviation Fuels (SAF) would have the greatest overall impact with the lowest overall cost.

Why? Because the resulting fuel would be CARBON NEGATIVE.

How can that be? Because flaring is never 100% efficient. All flares vent some portion of methane due to incomplete combustion caused by a variety of factors. This unburned methane, known as "methane slip," typically varies from 3% to more than 10% in many countries. According to the IPCC Fifth Assessment Report, methane has 84 times the Global Warming Potential (GWP) of CO_2 (on a mass basis) on a 20-year timescale and 28 times on the 100-year timescale.

Using process efficiency data for Emerging Fuels Technology's (EFT) Gas to Liquids (GTL) process and California's Carbon Intensity (CI) calculation method (which gives credit for avoided methane emissions) under the Low Carbon Fuel Standard (LCFS), an independent evaluation of CI for synthetic fuels made from flares with 3% slip would be in the range of -36 to -40. For 10% slip the range is between -106 and -131 (final number depends on location specific factors and GWP). These calculations assume the lower 100-year GWP for methane.[5]

Furthermore, flare reduction/GTL/SAF projects should qualify under the European Union Emissions Trading System (EU ETS), the EU Fuel Quality Directive (FQD) and the EU Upstream Emissions Reduction (UER) program. The credits generated should also be available for use in ICAO's CORSIA program and provide an option to achieve mandatory compliance requirements for all international flights.

In many non-OECD countries (where there is very little hard data), methane slip is much higher, 10% or more. Anecdotally, some operators deliberately vent rather than flare, potentially to avoid easy detection from the current satellites that monitor visible flaring. In response, new satellites are being deployed that are designed to detect methane emissions. (See https://www.methanesat.org/ , https://ghgsat.com/en and https://www.projectcanary.com/)

Because of these satellite tools and other available tools determining the actual methane slip would not be difficult (and therefore the appropriate carbon credits) at any flare site being considered for a SAF fuel production project.

How big is this opportunity?

According to the World Bank, about 150 billion cubic meters (BCM) of gas was flared in 2019[2] (equal to 5,298 BCF/year or 14.5 BCF/day). This gas, if captured and used, could make 1,450,000 Barrels per day (2.22 Billion gallons per year) of synthetic fuels. At 80% conversion to SAF, that would create 17.78 billion gallons of SAF per year, enough to supply roughly 19% of the commercial aviation industry's 2019 consumption of 95 billion gallons.(3)

If the 30% target reduction by 2030 all resulted from conversion to synthetic fuels that would equal 435,000 Barrels per day. At 80% conversion to SAF, that would create 5.3 billion gallons of SAF per year, enough to supply roughly 5.5% of the commercial aviation industry's 2019 consumption.

How does this Compare to Current SAF projections?

The International Civil Aviation Organization (ICAO) reports that commercial production of SAF increased from an average of 76,600 gallons per year (2013-2015) to 1.7 million gallons per year (2016-2018). Additionally, up to 2.11 billion gallons per year of SAF production capacity may be available by 2032[4].

2.11 billion gallons per year (138,000 BPD) is barely 2% of the 95 billion gallons the industry consumed in 2019. The bulk of this fuel is made from fats, oils, and greases (FOG) and has an average CI in the range of +31 to +65 (depending primarily on feedstock CI used). The availability of these feedstocks to support this growth will be hindered by the growth in renewable diesel facilities who compete for these feedstocks.

A gallon of Carbon Negative SAF (-36 to -131) would provide 3 to 6 times the GHG benefits of a gallon of SAF from current sources depending on the feedstock and process used to make it. Carbon Negative Jet fuel made from flared gas also has the best chance of being made in large quantities and competitive with fossil jet without subsidies. If you consider the GWP of methane in the short term (84 times CO_2), the GHG benefits of a gallon of SAF from flared gas are 9 to 18 times more than SAF from FOG.

We believe that SAF from flared gas could play a critical role in the Aviation Industry's ability to meet it's emissions commitments in the next decade.

How do we turn this macro data into something actionable?

EFT's smallest Gas to Liquids (GTL) plant, will convert a 5 million standard cubic feet per day (SCFD) flare into 500 BPD (7.6 million gallons per year) of fuels, (80% SAF) with a CAPEX of $30 to $40 million,

depending on location. In most cases, the value of the fuel produced would provide a reasonable return on the capital invested. UER credits under the RED should provide sufficient incentive value to sell the fuel to airlines at the prevailing price of petroleum jet.

Strategy for SAF

Meeting GHG reduction targets for transportation, particularly aviation where electricity and hydrogen will not be options for large planes, will be challenging. Many air carriers want carbon neutral transport; however, the supply of SAF from waste products will be limited. Purchasing carbon offsets that are unrelated to the production of fuel is less attractive than purchasing a carbon negative fuel. Air carriers currently purchase SAF from fuel producers that benefit from GHG reduction programs such as the EU's Renewable Energy Directive (RED), EUR, LCFS, and RFS while being able to claim carbon neutral flight. Similar claims of carbon neutrality should be possible with SAF that is derived from flared gas.

The Global Methane Pledge could be that extra Incentive we need to help solve two problems at once, methane mitigation and the need for more, lower cost SAF.

References:

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2) About GGFR (worldbank.org)
3) https://www.statista.com/statistics/655057/fuel-consumption-of-airlines-worldwide/
4) https://www.icao.int/environmentalprotection/Pages/SAF.aspx#:~:text=The%20first%20ICAO%20Stocktaking%20Seminar%20toward%20the%202050,SAF%20production%20capacity%20may%20be%20available%20by%202032.
5) Special thanks to Stefan Unnasch of Life Cycle Associates for providing the CI calculations and editing assistance

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