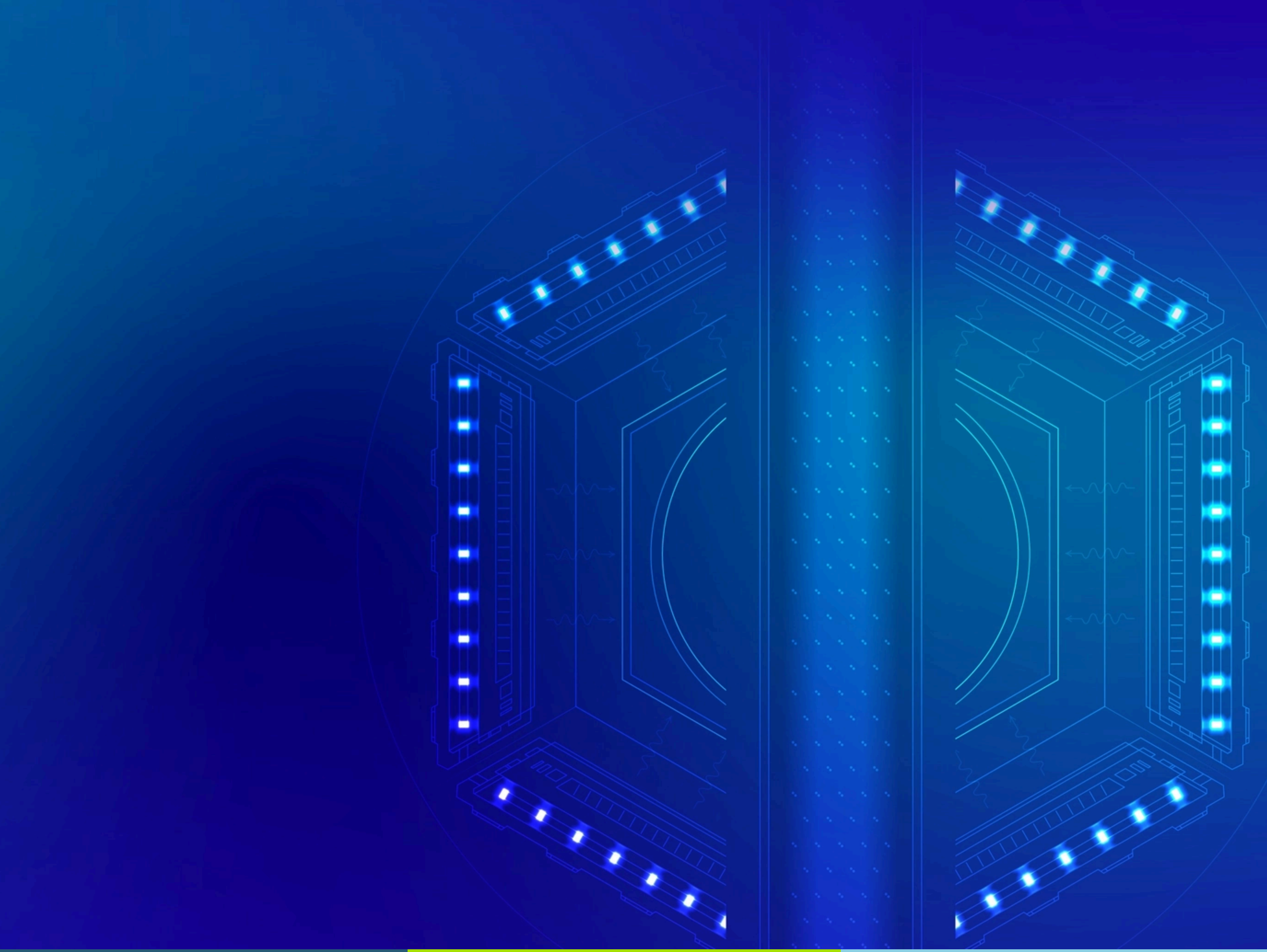


Syzygy Plasmonics

Sustainable Aviation Fuel Industry

BOUNDLESS
IMPACT RESEARCH & ANALYTICS

Environmental Impact Report

May 2024

Confidential, v2024-05-10

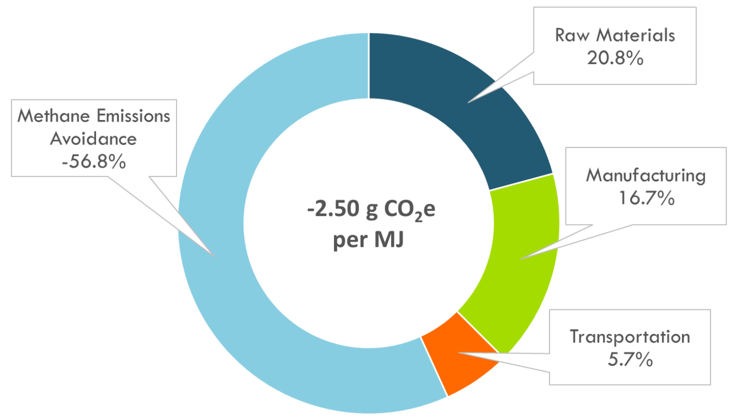
Company Description

Syzygy Plasmonics (Syzygy) is a manufacturer of all-electric chemical reactors which use light energy, rather than combustion, to help decarbonize hydrogen and clean fuels production. Their innovative process to produce sustainable aviation fuel (SAF) via combined dry methane reforming and steam methane reforming alongside a Fischer-Tropsch process seeks to reduce the environmental impacts of conventional Jet A aviation fuel. Syzygy's production process uses minimal inputs, including captured carbon dioxide and methane from landfill gas. Syzygy's technology allows for landfill gas to be repurposed into an impactful product and limits the environmental impacts within the aviation industry.

Results provided in this report are based on theoretical manufacturing and performance data supplied to Boundless by Syzygy, which were reviewed and validated by an industry expert.

Headquarters	Houston, TX, U.S.
Founded	2018
Business model	C-Corp
Employees	~120
Website	plasmonics.tech
Headquarters	Houston, TX, U.S.

Syzygy GHG Footprint*



*GHG Footprint is based on a well-to-wake system boundary.

Alignment with the United Nations (UN) Sustainable Development Goals (SDGs)

7 AFFORDABLE AND CLEAN ENERGY — Affordable and Clean Energy

13 CLIMATE ACTION — Climate Action

Boundless Analysis

- This report compares Syzygy's SAF technology against conventional Jet A aviation fuel, Power-to-Liquid (PtL) SAF, and ethanol-based Alcohol-to-Jet (ATJ-e) SAF.
- This report evaluates a well-to-wake system boundary, encompassing all upstream and downstream impacts from raw material extraction and transportation to fuel production and combustion.
- Boundless evaluated the environmental performance of Syzygy's SAF product, alongside the competing aviation fuels, specifically associated with their Greenhouse Gas (GHG) Footprint and Water Footprint.
- Syzygy's SAF has a GHG Footprint of -2.50 grams of carbon dioxide equivalent (g CO_2e) per megajoule (MJ), which is 103% lower than conventional Jet A aviation fuel.
- Syzygy's SAF has a Water Footprint of 0.0253 liters (L) per MJ, which is 59.1% lower than conventional Jet A aviation fuel.
- Considering market penetration and an estimated production rate of 38.74 million MJ of SAF per year, utilizing Syzygy SAF in lieu of Jet A can lead to a total estimated GHG emissions reduction of over 24.8 kilotonnes of CO_2e from 2024 through 2030.

Management Team

- Trevor Best, Founder & CEO: Trevor Best is the CEO and Co-Founder of Syzygy. Before starting Syzygy, Trevor worked for the oilfield services company Baker Hughes. There he held a variety of management positions and gained expertise in technology development, project and personnel management, quality assurance, and regulatory compliance. He is originally from Midland Texas and is a graduate of Texas Tech University.
- Suman Khatiwada, Founder & CTO: Dr. Suman Khatiwada is a co-founder, chief technology officer (CTO), and board director at Syzygy. Dr. Khatiwada earned his PhD in Materials Science and Nanoengineering from Rice University and his bachelor's degree in Physics from Morgan State University. While at Rice, he co-founded Big Delta Systems, now enPower Inc, to commercialize spray-paintable Li-ion batteries. After Rice and before co-founding Syzygy, he worked at Baker Hughes as a research scientist for 3 years. Dr. Khatiwada holds 19 patents granted in the United States and other jurisdictions worldwide. In 2020, he was selected as one of the nation's brightest early career engineers by the National Academies of Engineering's U.S. Frontiers of Engineering program.
- Ben Smith, CFO: Mr. Smith joined Syzygy in 2021 as CFO, having spent his 15 year career helping grow early and mid-stage energy businesses, as an advisor, investor, and business leader. He most recently served as CFO, and later CEO, of GEODynamics, a manufacturer of specialty-material tools and equipment, which the team successfully grew and exited to a public acquirer in 2018. Ben began his career at the energy investment bank Simmons & Company, before joining Lime Rock Partners, a global energy-focused growth equity investment firm. At Lime Rock, he worked with a variety of energy production, service, and manufacturing companies, helping to guide business strategy, growth, fundraising, and M&A. He holds a B.S. from the Stern School of Business at New York University.
- Murtuza Marfani, SVP Development: Murtuza Marfani currently serves as Syzygy's Senior Vice President of Development overseeing commercialization, business development and corporate development activities. With a background in traditional finance and economics, he has previously worked as a derivatives trader covering commodities and financial derivatives at Belvedere Trading and as an investment banker covering the energy sector at Goldman Sachs prior to joining Syzygy. He holds a BA in Mathematical Economic Analysis and MBA, both earned at Rice University.

Technology

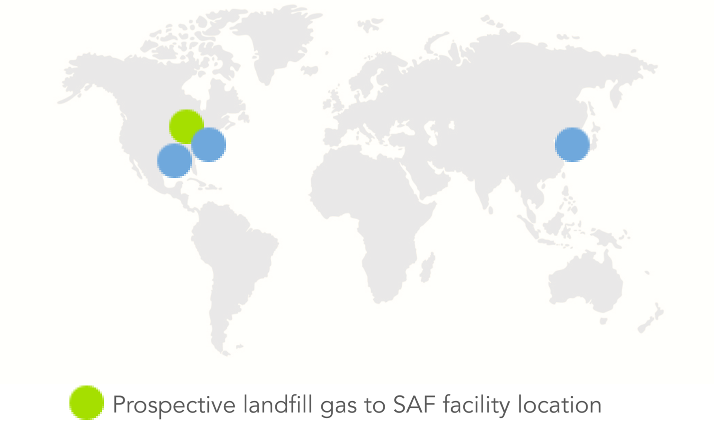
- Syzygy is planning to develop a SAF production facility with landfill gas collection and utilization to displace the environmentally-degrading Jet A fuel, which is derived from petroleum crude oil. Currently, SAF accounts for less than 0.1% of all aviation fuels consumed today.[1] Therefore, there is extensive room for market growth and the resulting decrease in carbon emissions.
- Syzygy's landfill gas based SAF will be produced via all-electric reactors using a combined dry methane reforming and steam methane reforming process to produce syngas. The syngas will then be fed to a Fischer Tropsch unit to produce a fuel distillate that can then be further refined into SAF.
- Syzygy's technology will be able to use carbon dioxide and methane from a variety of sources such as conventional natural gas (CNG), renewable natural gas (RNG), landfill gas, and directly from the air via direct air capture (DAC).
- Syzygy's technology produces kerosene, which can be further refined via standard industry processes into SAF, as well as co-products of naphtha and diesel alongside the SAF.

[1] IEA. (n.d.). Aviation. Retrieved April 11, 2024, from https://www.iea.org/energy-system/transport/aviation.

Operations and Milestones

- Syzygy is headquartered in Houston, TX, U.S.
- The theoretical SAF and landfill gas operation is assumed to be in the Great Lakes Region.
- USD$115 million funding raised.
- Syzygy is currently running a pilot-scale reactor bank at RTI in North Carolina and has successfully demonstrated production of synfuels from methane and CO_2, has operated its commercial-scale reactor, Rigel, for over 2,000 operating hours at its headquarters in Texas, and has a field trial underway to test a Rigel reactor at a Lotte Chemical facility in South Korea.

Current Operations



Environmental Highlights

Summarized below are the most relevant impact categories and codes that refer to the United Nations Sustainable Development Goals. The present section highlights the most important factors that explain how this technology impacts the environment and society.

Accelerating Growth of Sustainable Fuels

UN SDG 7 Target 7.2 states the need to "increase substantially the share of renewable energy in the global energy mix" by 2030. Utilizing carbon dioxide sourced from landfill gas and solid sorbent DAC and methane sourced from landfill gas and RNG as main feedstocks, Syzygy is creating another source for SAF in the aviation industry. To align with the International Energy Agency (IEA) Net Zero Scenario, SAF will need to supply 10% of the aviation market demand in 2030.[2] However, substantial investment dollars and rapid increase in production capacity will be required to meet this goal. Syzygy is providing a future source for SAF that will add to this growing need in the aviation industry.

Relevant code: SDG 7, Affordable and Clean Energy.

Decarbonization

Syzygy's SAF has a GHG Footprint of -2.50 g CO_2e per MJ, which is 103% lower than the competing, conventional Jet A aviation fuel. Syzygy's SAF technology decarbonizes the aviation industry while promoting the growth of renewable fuel sources. In 2019, pre-pandemic, aviation accounted for approximately 2.64% of global energy-related CO_2 emissions.[2] To align with climate initiatives and mitigation targets, a rapid transition to low-carbon aviation fuel sources will be required. Syzygy addresses the increasing demand for SAF technologies through their innovative SAF production process.

Relevant code: SDG 13, Climate Action.

[2] IEA. (n.d.). Aviation. Retrieved April 11, 2024, from https://www.iea.org/energy-system/transport/aviation.

Environmental Key Performance Indicators

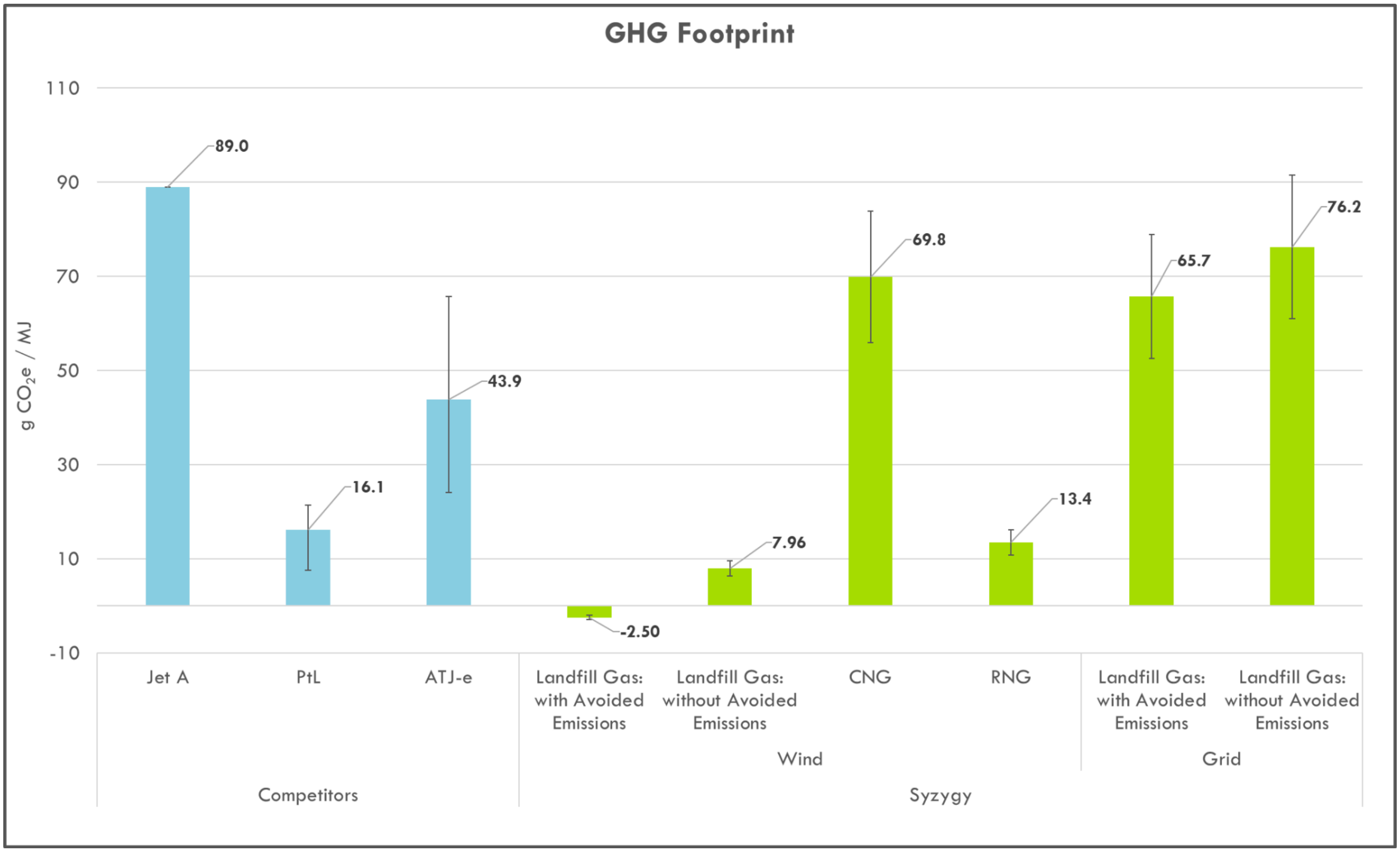
Boundless compared Syzygy's SAF technology to competing aviation fuels, including Jet A, PtL, and ATJ-e. The environmental performance reflects all upstream and downstream impacts from raw material extraction and transportation to fuel production and combustion. This assessment does not account for environmental impacts from Syzygy's facility infrastructure or product packaging, following alignment with industry standard Life Cycle Assessment (LCA) methodology. This section presents a description of each EKPI addressed and a review of Syzygy's environmental performance relative to its competition. The impact metrics are reported graphically using bar charts to illustrate a baseline result value, along with sensitivity bars reflecting a range of possible results due to data variability found in various sources.

Syzygy's intermediate product, kerosene, is assumed to follow an industry standard refinement process into SAF; data from the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model was used to isolate the environmental impacts of the refinement process of crude oil to conventional jet fuel to incorporate into Syzygy's SAF production footprint.

Greenhouse Gas Footprint

GHG Footprint is a measure of the well-to-wake GHG emissions resulting from the production and combustion of aviation fuel; it is reported in g CO_2e per MJ.

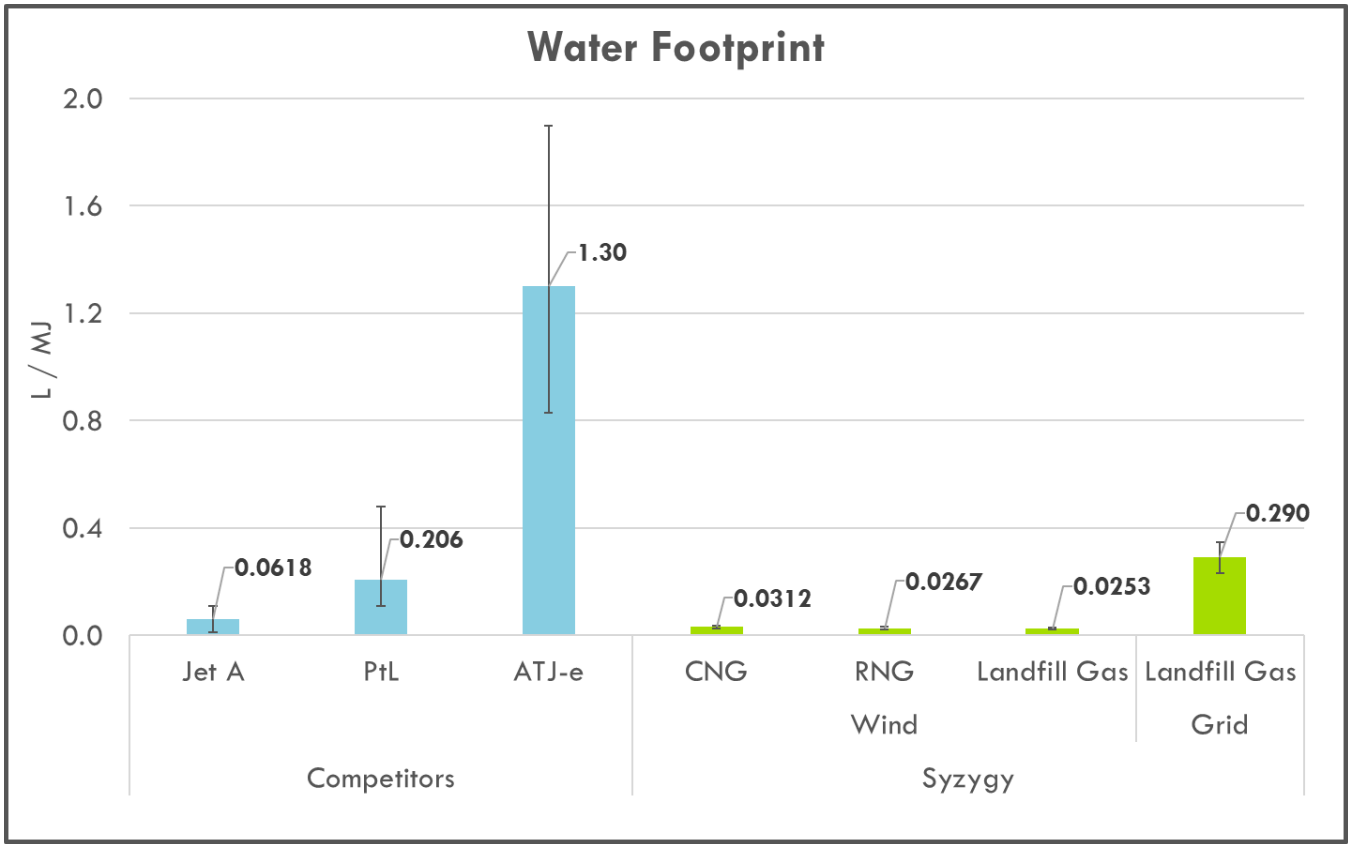
- Syzygy's SAF has a well-to-wake GHG Footprint of -2.50 g CO_2e per MJ when wind energy and landfill gas sourced carbon dioxide and methane are used and avoided methane emissions are accounted for, which is lower than the competing, fossil carbon-derived Jet A aviation fuel as well as PtL and ATJ-e SAFs..
- Landfill gas and renewable natural gas production systems are assumed to be colocated with Syzygy's SAF production technology and therefore transportation of these gas inputs are discounted from Syzygy's GHG Footprint.
- The GHG Footprint incorporates avoided emissions associated with utilizing methane that would have been released due to inefficiencies in the landfill gas flaring process. The associated carbon is ultimately released as carbon dioxide during fuel combustion, which holds a lower global warming potential compared to fugitive methane. There is current discourse within the LCA and SAF industries on whether these avoided emissions should be accounted for and to what extent. Therefore, an additional, zero contribution scenario is incorporated.
- Syzygy's GHG Footprint is adjusted to account for co-product allocation, via energy allocation, associated with the production of naphtha and diesel. Syzygy's production process produces 40% kerosene, 16% naphtha, and 44% diesel.
- Syzygy has a GHG Footprint that is 103% lower than the competing, conventional Jet A aviation fuel when using the wind energy, landfill gas, and avoided emissions scenario.
    - The GHG Footprint of the competing Jet A fuel is sourced from the International Civil Aviation Organization (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) Life Cycle Assessment Methodology.


GHG Footprint
g CO_2e / MJ
110
90
70
50
30
10
-10
89.0
16.1
43.9
-2.50
7.96
69.8
13.4
65.7
76.2
Jet A
PtL
ATJ-e
Landfill Gas: with Avoided Emissions
Landfill Gas: without Avoided Emissions
CNG
RNG
Landfill Gas: with Avoided Emissions
Landfill Gas: without Avoided Emissions
Wind
Grid
Competitors
Syzygy

Water Footprint

Water Footprint represents the water consumption required for production and combustion of SAF; it is reported in L per kg of product.

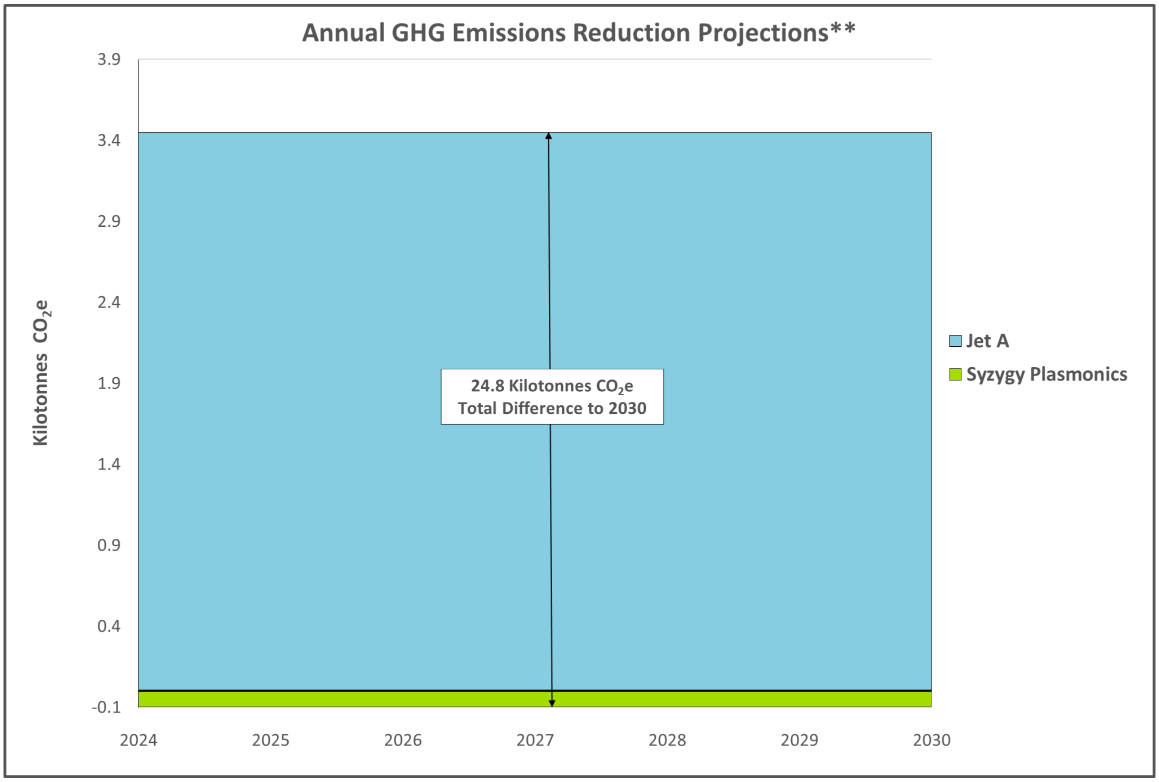
- Syzygy's SAF has a well-to-wake Water Footprint of 0.0253 L per MJ when wind energy and landfill gas sourced carbon dioxide and methane are used, which is lower than the competing, fossil carbon-derived Jet A aviation fuel as well as PtL and ATJ-e SAFs.
- Landfill gas and renewable natural gas production systems are assumed to be colocated with Syzygy's SAF production technology and therefore transportation of these gas inputs are discounted from Syzygy's Water Footprint.
- Syzygy's SAF Water Footprint is 98.1% lower than that of ATJ-e SAF.
- 74.2% of Syzygy's Water Footprint is due to manufacturing, with electricity being the largest driver within the manufacturing process.



GHG Emissions Projections

Boundless evaluated the GHG emissions projections through 2030 for Syzygy's SAF and baseline scenario. The baseline scenario used considers the use of Jet A aviation fuel. The results of the GHG Emissions Projections are based on production data provided to Boundless by Syzygy for their projected, annual production rates for SAF through 2030. Based on data provided by Syzygy, this assessment assumes 100% of the SAF Syzygy produces will directly displace Jet A.

- At a 100% displacement rate, limited to Syzygy's production capacity, Syzygy's SAF showcases total GHG emissions reductions of over 24.8 kilotonnes of CO_2e from 2024 through 2030, or 3.54 kilotonnes per year, which is the equivalent of removing over 5,900 gasoline-powered passenger cars from the roads for one year.[3]



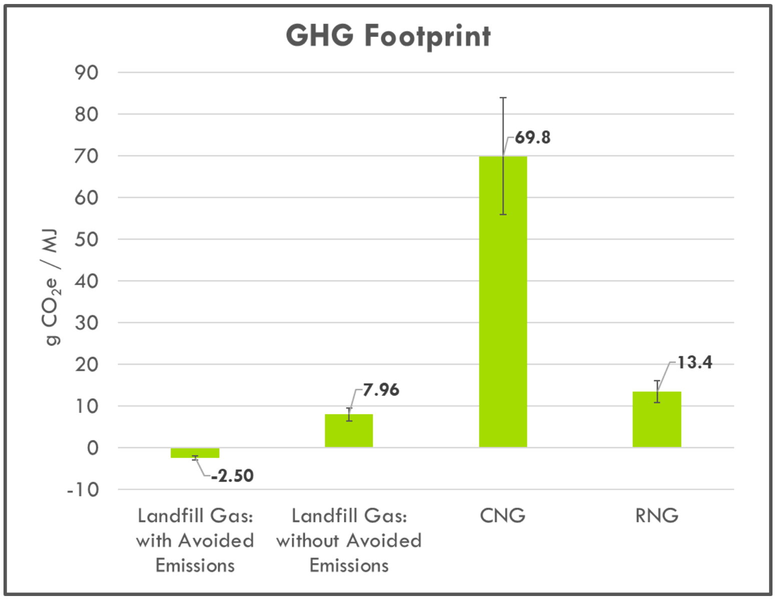
** Assuming an illustrative production start date of 1/1/2024.

[3] USEPA. (2022). Greenhouse Gas Equivalencies Calculator. https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Carbon Dioxide and Methane Sourcing Scenario Analysis

Boundless evaluated the GHG Footprint associated with two sources of carbon dioxide and three sources of methane for Syzygy's SAF technology. The carbon dioxide sources include landfill gas produced onsite and from solid sorbent DAC technology. The methane sources include landfill gas collected onsite, RNG from landfill gas collected onsite, and CNG. DAC sourced carbon dioxide is paired with CNG and RNG sourced methane. The results are reported in g CO_2e per MJ of SAF.

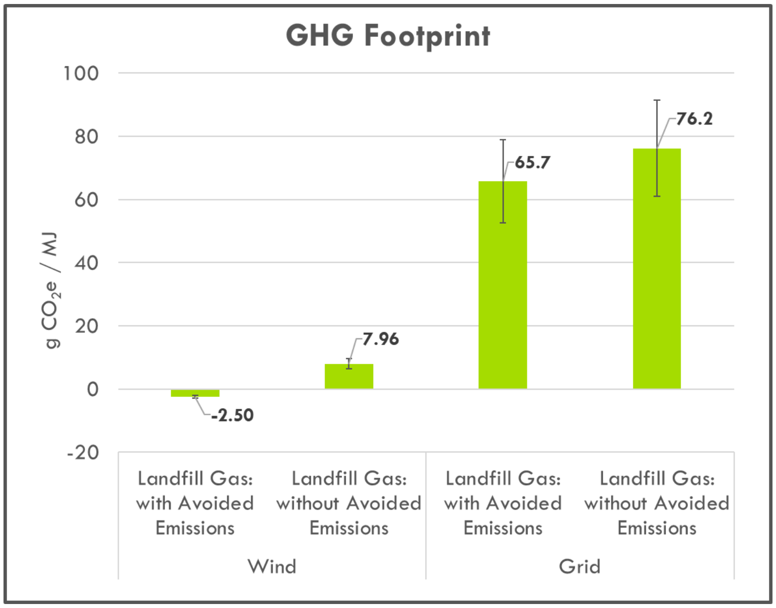
- Syzygy's GHG Footprint is reduced when utilizing landfill gas as the source of carbon dioxide and methane, decreasing by 119% if avoided emissions are accounted for and 40.6% if not, when comparing to the RNG sourced methane and DAC sourced carbon dioxide scenario.
- Utilizing landfill gas as the source of carbon dioxide and methane decreases the GHG Footprint by 104% if avoided emissions are accounted for and 88.6% if not, when comparing to the CNG sourced methane and DAC sourced carbon dioxide scenario.
- CNG leads to the largest GHG Footprint at 69.8 g CO_2e per MJ of SAF, with combustion accounting for 81.7% of the GHG Footprint.



Electricity Sourcing Scenario Analysis

Boundless evaluated the GHG Footprint associated with two electricity sources, onshore wind and the conventional electricity grid within Syzygy's projected production location (ReliabilityFirst Corporation [RFC]). The results are reported in g CO_2e per MJ of SAF.

- Syzygy's GHG Footprint decreases by 104% when onshore wind is utilized over conventional grid electricity if avoided emissions are accounted for, and 89.6% if avoided emissions are not accounted for.
- While Syzygy's GHG Footprint is lower when using wind energy, both electricity sources result in a lower GHG Footprint than Jet A.
- Syzygy's GHG Footprint, when onshore wind electricity is utilized, is lower than all three competitors regardless of avoided emissions accounting or carbon dioxide and methane sourcing.



About Boundless Impact Research & Analytics

Boundless Impact Research & Analytics is a market intelligence and impact analytics firm that provides quantitative and evidence-based research and data for investors, companies, and funds. Driven by the latest research from independent industry and academic experts, Boundless Impact Research & Analytics offers analysis, market trends, and evidence of best practices in a growing number of emerging sectors that address significant environmental and health challenges. Our research into emerging technologies, impact assessment of companies, and thought leadership provide investors with the latest and most relevant information to drive their investment decisions.

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