

Sustainable Aviation Fuel Market - A Global and Regional Analysis: Focus on Application, Engine Type, Fuel Type, Manufacturing Technology, Blending Capacity, and Country - Analysis and Forecast, 2023-2033

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Abstracts

Introduction to Sustainable Aviation Fuel Market

The sustainable aviation fuel (SAF) market has emerged as a crucial and rapidly growing sector within the aviation industry, driven by the urgent need to reduce greenhouse gas emissions and mitigate the impact of aviation on climate change. SAF, also known as biojet fuel, is derived from sustainable feedstocks such as agricultural waste, algae, and renewable energy sources. It offers a viable alternative to conventional jet fuel by significantly reducing carbon dioxide emissions and other pollutants. The SAF market is witnessing increasing global attention and investment as governments, airlines, and industry stakeholders strive to achieve their sustainability goals. With its potential to revolutionize aviation and contribute to a greener future, the sustainable aviation fuel market presents significant opportunities for innovation, collaboration, and positive environmental impact.

Market Introduction

Sustainable aviation fuel (SAF) has a long history that dates back to the early 2000s when environmental and climate change concerns first gained popularity. The need for alternative fuels that may lower greenhouse gas emissions and dependency on fossil fuels was acknowledged by academics and industry professionals. The first focus was on biofuels made from plants such as sugarcane and soybeans. The first commercial flight powered by a mixture of biofuel and regular jet fuel took off in 2008. Since then,

there has been a substantial advancement in the creation and acceptance of SAF, with improvements in the variety of feedstocks used, the refining procedures, and the certification criteria.

Sustainable aviation fuel (SAF) is now seeing a remarkable increase in attention and usage on a worldwide scale. Cleaner substitutes for conventional jet fuels are urgently needed in light of rising worries about climate change and the negative environmental effects of the aviation sector. Hence, a workable answer has been provided by SAF, which is produced from sustainable feedstocks such as biomass, used cooking oil, or hydrogen. Progress in the industry is being driven by cutting-edge technology and partnerships, which have boosted companies' SAF manufacturing capacity, improved supply chain logistics, and reduced prices. To encourage the implementation of SAF and provide a more sustainable future for air transport, issues including scalability, feedstock supply, and regulatory frameworks must be resolved.

Industrial Impact

The sustainable aviation fuel and technological advancements in the field are expected to have a positive impact on the global market for sustainable aviation fuel. Several organizations and government agencies are working to introduce newer manufacturing techniques into the global sustainable aviation fuel market. When compared to different sustainable aviation fuel products, such as different fuel types, the demand for biofuel stands out as the fuel that is currently in high demand.

In recent years, sustainable aviation fuel has registered an exponential surge in demand from the commercial aviation industry, with high demands for business and general aviation. Additionally, due to the increasing environmental concerns, sustainable aviation fuel has grown in significance during the past few years. For instance, in May 2023, Neste signed an agreement with ITOCHU, which extended its collaboration in order to represent Neste MY Renewable Diesel as an authorized distributor in Japan. Based on this arrangement, Neste MY Renewable Diesel's market reach would be increased, for instance, to the region around Osaka in order to supply the fuel for the 2025 Osaka-Kansai Japan Expo building site.

Market Segmentation:

Segmentation 1: by Application

Commercial Aviation

Business and General Aviation

Military Aviation

Unmanned Aerial Vehicle (UAV)

Commercial Aviation Segment to Dominate the Global Sustainable Aviation Fuel Market (by Application)

Based on application, the sustainable aviation fuel market is led by the commercial aviation segment, with a 78.64% share in 2023. Increasing environmental concerns and volatile jet fuel prices are expected to drive the growth of the sustainable aviation fuel market.

Given that commercial aviation contributes significantly to the world's greenhouse gas emissions, it is the greatest consumer of sustainable aviation fuel (SAF). The environmental effect of aviation has evolved into a critical issue as air travel continues to expand quickly. By lowering the carbon impact of airplanes, SAF provides a possible alternative. Commercial airlines have adopted SAF as a way to meet their sustainability objectives because they understand the urgent need to switch to greener fuels. The aviation industry is a great sector for promoting the demand for and supply of sustainable aviation fuel because it has the size and infrastructure to facilitate widespread SAF adoption. Commercial aviation contributes significantly to reducing climate change and promoting a more environment-friendly future by setting the standard for SAF usage.

Segmentation 2: by Engine Type

Piston Engine

Turbine Engine

Turbine Engine Segment to Lead the Global Sustainable Aviation Fuel Market (by Engine Type)

Segmentation 3: by Fuel Type

Hydrogen Fuel

Biofuel

Power-to-Liquid Fuel

Gas-to-Liquid Fuel

Biofuel Segment to Lead the Global Sustainable Aviation Fuel Market (by Fuel Type)

Based on fuel type, the sustainable aviation fuel market is expected to be dominated by the biofuel segment in 2023, with a 95.64% share in terms of revenue due to the high demand for sustainable aviation fuel in the aviation industry.

Additionally, the fuel type segment comprises hydrogen fuel, biofuel, power-to-liquid, and gas-to-liquid that make up the fuel type segment in sustainable aviation fuel. These fuels provide solutions for achieving net zero emissions and lowering carbon footprints. The capabilities and efficacy of sustainable aviation fuel are continually being enhanced via the development and integration of manufacturing technologies.

Segmentation 4: by Manufacturing Technology

Fischer-Tropsch Synthetic Paraffinic Kerosene (FT-SPK)

Hydroprocessed Esters and Fatty Acids-Synthetic Paraffinic Kerosene (HEFA-SPK)

Alcohol-to-Jet Synthetic Paraffinic Kerosene (ATJ-SPK)

Synthetic ISO-Paraffin from Fermented Hydroprocessed Sugar (HFS-SIP)

Catalytic Hydrothermolysis Jet (CHJ)

Hydroprocessed Esters and Fatty Acids-Synthetic Paraffinic Kerosene (HEFA-SPK)
Segment to Lead the Global Sustainable Aviation Fuel Market (by Manufacturing Technology)

The hydroprocessed esters and fatty acids-synthetic paraffinic kerosene (HEFA-SPK) segment is expected to dominate the market, with a share of 32.24% in 2033.

Segmentation 5: by Blending Capacity

Below 30%

30% to 50%

Above 50%

30% to 50% Segment to Lead the Global Sustainable Aviation Fuel Market (by Blending Capacity)

The 30% to 50% blending capacity segment is expected to dominate the market, with a share of 50.1% in 2033.

Segmentation 6: by Region

North America - U.S. and Canada

Europe - U.K., Germany, France, and Rest-of-Europe

Asia-Pacific - Japan, India, China, and Rest-of-Asia-Pacific

Rest-of-the-World - Middle East and Africa and Latin America

North America to Dominate Global Sustainable Aviation Fuel Market (by Region)

North America accounted for the highest share of 48.09% in 2022 in the global sustainable aviation fuel market, owing to a significant number of companies based in the region. North America's growth is driven by various activities in the U.S. and Canada, as well as increased spending by commercial organizations such as Aemetis, Inc., Alder Fuels, Gevo, Inc., Fulcrum BioEnergy, Inc., and government key agencies.

Recent Developments in the Sustainable Aviation Fuel Market

In May 2023, Neste signed an agreement with ITOCHU, which extended their collaboration in order to represent Neste MY Renewable Diesel as an authorized distributor in Japan. Based on this arrangement, Neste MY Renewable Diesel's market reach would be increased, for instance, to the region around Osaka in order to supply the fuel for the 2025 Osaka-Kansai Japan Expo building site.

In April 2023, Shell signed an agreement with Delta under which Delta would purchase 10 million gallons of SAF from Shell Aviation over a period of 2 years, with the Los Angeles International Airport (LAX) serving as its hub. With more than 200 million gallons of SAF committed, the international airline will be well on its approach to meeting its target of using 35% SAF by 2035 and more than halfway toward its objective of using 10% SAF annually by the end of 2030.

In November 2022, Gevo signed an agreement with Iberia Airlines, under which they would receive 6 million gallons of SAF for the next five years for its commercial operations. The company expects to fuel its aircraft with SAF coming from Gevo, Inc. from 2028. The agreement is valued at \$165 million for the tenure of 5 years.

Demand – Drivers and Limitations

Following are the drivers for the sustainable aviation fuel market:

Increasing Environmental Concerns

Volatile Jet Fuel Prices

Advances in Conversion Technologies

Following are the challenges for the sustainable aviation fuel market:

Infrastructure Development Cost

Inadequate Supply of Feedstock

Following are the opportunities for the sustainable aviation fuel market:

SAF Offtake Agreements

How can this report add value to an organization?

Product/Innovation Strategy: The product segment helps the reader understand the different types of products available for deployment and their potential globally. Moreover, the study provides the reader with a detailed understanding of the sustainable aviation fuel market by application (commercial aviation, business and general aviation, military aviation and unmanned aerial vehicle (UAV), engine type (turbine engine and piston engine), product on the basis of fuel type (hydrogen fuel, biofuel, power-to-liquid fuel, and gas-to-liquid fuel), manufacturing technology (fischer-tropsch synthetic paraffinic kerosene (FT-SPK), hydroprocessed esters and fatty acids-synthetic paraffinic kerosene (HEFA-SPK), alcohol-to-jet synthetic paraffinic kerosene (ATJ-SPK), synthetic ISO-paraffin from fermented hydroprocessed sugar (HFS-SIP), and catalytic hydrothermolysis jet (CHJ), and blending capacity (below 30%, 30% to 50%, and above 50%).

Growth/Marketing Strategy: The sustainable aviation fuel market has seen major development by key players operating in the market, such as business expansion, partnership, collaboration, and joint venture. The favored strategy for the companies has been merger and acquisition to strengthen their position in the sustainable aviation fuel market. For instance, in February 2023, Fulcrum BioEnergy stated that its U.K. subsidiary, Fulcrum BioEnergy, Ltd., has been awarded a grant from the U.K. Department for Transport Advanced Fuels Fund of over \$20.2 million. The award, which is valid through 2025, will aid in the construction of Fulcrum NorthPoint, a plant that will convert residual waste into sustainable aviation fuel (SAF) at the Essar Stanlow site.

Competitive Strategy: Key players in the sustainable aviation fuel market analyzed and profiled in the study involve major sustainable aviation fuel offering companies providing sustainable aviation fuel and different manufacturing technology. Moreover, a detailed competitive benchmarking of the players operating in the sustainable aviation fuel market has been done to help the reader understand how players stack against each other, presenting a clear market landscape. Additionally, comprehensive competitive strategies such as partnerships, agreements, and collaborations will aid the reader in understanding the untapped revenue pockets in the market.

Methodology: The research methodology design adopted for this specific study includes a mix of data collected from primary and secondary data sources. Both primary resources (key players, market leaders, and in-house experts) and secondary research

(a host of paid and unpaid databases), along with analytical tools, are employed to build the predictive and forecast models.

Data and validation have been taken into consideration from both primary sources as well as secondary sources.

Key Market Players and Competition Synopsis

The companies that are profiled have been selected based on thorough secondary research, which includes analyzing company coverage, product portfolio, market penetration, and insights, which are gathered from primary experts.

The market for sustainable aviation fuel is divided between the established players and the start-ups. As of 2022, the market for sustainable aviation fuel is dominated by established players who contribute toward 78% market share dominance, whereas start-ups have a share of 22% in the market. The start-ups' numbers are set to witness growth in the future as more and more airlines and the aviation industry as a whole look toward achieving net-zero carbon emission by 2050.

Key Companies Profiled:

Aemetis, Inc.

BP p.l.c.

Shell

Neste

Gevo, Inc.

SkyNRG

Velocys plc

TotalEnergies

Fulcrum BioEnergy, Inc.

Contents

1 MARKETS

1.1 Industry Outlook

1.1.1 Global Sustainable Aviation Fuel Market: Overview

1.1.2 Evolving Emission Control Measures in the Aviation Industry

1.1.3 Emerging Zero Emissions Aircraft Technology

1.1.3.1 Electric Propulsion Systems

1.1.3.2 Hydrogen Fuel Cell Technology

1.1.3.3 Advanced Aerodynamics and Lightweight Materials

1.1.3.4 Urban Air Mobility (UAM) and Electric Vertical Take-Off and Landing (eVTOL)

1.1.4 Current and Future Technological Trends

1.1.4.1 Carbon Capture and Utilization (CCU) Technologies

1.1.4.2 Direct Air Capture (DAC) Technologies

1.1.5 Evolving Aviation Propulsion Technologies: Migration Toward Reduced Emissions

1.1.6 Critical Success Parameters for Sustainable Aviation Fuel Adoption

1.2 Business Dynamics

1.2.1 Business Drivers

1.2.1.1 Increasing Environmental Concerns

1.2.1.2 Volatile Jet Fuel Prices

1.2.1.3 Advances in Conversion Technologies

1.2.2 Business Challenges

1.2.2.1 Infrastructure Development Cost

1.2.2.2 Certification and Sustainability Criteria

1.2.2.3 Inadequate Supply of Feedstock

1.2.3 Business Opportunities

1.2.3.1 SAF Offtake Agreements

1.2.4 Business Strategies

1.2.4.1 Market Developments

1.2.4.2 Partnerships, Collaborations, Agreements, and Contracts

2 APPLICATION

2.1 Global Sustainable Aviation Fuel Market (by Application)

2.1.1 Market Overview

2.1.1.1 Demand Analysis for Global Sustainable Aviation Fuel Market (by Application)

2.1.2 Commercial Aviation

- 2.1.3 Business and General Aviation
- 2.1.4 Military Aviation
- 2.1.5 Unmanned Aerial Vehicle (UAV)
- 2.2 Global Sustainable Aviation Fuel Market (by Engine Type)
 - 2.2.1 Market Overview
 - 2.2.1.1 Demand Analysis for Global Sustainable Aviation Fuel Market (by Engine Type)
 - 2.2.2 Piston Engine
 - 2.2.3 Turbine Engine

3 PRODUCTS

- 3.1 Global Sustainable Aviation Fuel Market (by Fuel Type)
 - 3.1.1 Market Overview
 - 3.1.1.1 Demand Analysis for Global Sustainable Aviation Fuel Market (by Fuel Type)
 - 3.1.2 Hydrogen Fuel
 - 3.1.3 Biofuel
 - 3.1.4 Power-to-Liquid Fuel
 - 3.1.5 Gas-to-Liquid Fuel
- 3.2 Global Sustainable Aviation Fuel Market (by Manufacturing Technology)
 - 3.2.1 Market Overview
 - 3.2.1.1 Demand Analysis for Global Sustainable Aviation Fuel Market (by Manufacturing Technology)
 - 3.2.2 Fischer-Tropsch Synthetic Paraffinic Kerosene (FT-SPK)
 - 3.2.3 Hydroprocessed Esters and Fatty Acids-Synthetic Paraffinic Kerosene (HEFA-SPK)
 - 3.2.4 Alcohol-to-Jet Synthetic Paraffinic Kerosene (ATJ-SPK)
 - 3.2.5 Synthetic ISO-Paraffin from Fermented Hydroprocessed Sugar (HFS-SIP)
 - 3.2.6 Catalytic Hydrothermolysis Jet (CHJ)
- 3.3 Global Sustainable Aviation Fuel Market (by Blending Capacity)
 - 3.3.1 Market Overview
 - 3.3.1.1 Demand Analysis for Global Sustainable Aviation Fuel Market (by Blending Capacity)
 - 3.3.2 Below 30%
 - 3.3.3 30% to 50%
 - 3.3.4 Above 50%

4 REGION

4.1 Global Sustainable Aviation Fuel Market (by Region)

4.2 North America

4.2.1 Market

4.2.1.1 Key Players in North America

4.2.1.2 Business Drivers

4.2.1.3 Business Challenges

4.2.2 Application

4.2.2.1 North America Sustainable Aviation Fuel Market (by Application)

4.2.3 Product

4.2.3.1 North America Sustainable Aviation Fuel Market (by Fuel Type)

4.2.3.2 North America Sustainable Aviation Fuel Market (by Manufacturing

Technology)

4.2.4 North America (by Country)

4.2.4.1 U.S.

4.2.4.1.1 Market

4.2.4.1.1.1 Key Players in the U.S.

4.2.4.1.2 Application

4.2.4.1.2.1 U.S. Sustainable Aviation Fuel Market (by Application)

4.2.4.1.3 Product

4.2.4.1.3.1 U.S. Sustainable Aviation Fuel Market (by Fuel Type)

4.2.4.2 Canada

4.2.4.2.1 Market

4.2.4.2.1.1 Key Players in Canada

4.2.4.2.2 Application

4.2.4.2.2.1 Canada Sustainable Aviation Fuel Market (by Application)

4.2.4.2.3 Product

4.2.4.2.3.1 Canada Sustainable Aviation Fuel Market (by Fuel Type)

4.3 Europe

4.3.1 Market

4.3.1.1 Key Players in Europe

4.3.1.2 Business Drivers

4.3.1.3 Business Challenges

4.3.2 Application

4.3.2.1 Europe Sustainable Aviation Fuel Market (by Application)

4.3.3 Product

4.3.3.1 Europe Sustainable Aviation Fuel Market (by Fuel Type)

4.3.3.2 Europe Sustainable Aviation Fuel Market (by Manufacturing Technology)

4.3.4 Europe (by Country)

4.3.4.1 France

- 4.3.4.1.1 Market
 - 4.3.4.1.1.1 Key Players in France
- 4.3.4.1.2 Application
 - 4.3.4.1.2.1 France Sustainable Aviation Fuel Market (by Application)
- 4.3.4.1.3 Product
 - 4.3.4.1.3.1 France Sustainable Aviation Fuel Market (by Fuel Type)
- 4.3.4.2 Germany
 - 4.3.4.2.1 Market
 - 4.3.4.2.1.1 Key Players in Germany
 - 4.3.4.2.2 Application
 - 4.3.4.2.2.1 Germany Sustainable Aviation Fuel Market (by Application)
 - 4.3.4.2.3 Product
 - 4.3.4.2.3.1 Germany Sustainable Aviation Fuel Market (by Fuel Type)
- 4.3.4.3 U.K.
 - 4.3.4.3.1 Market
 - 4.3.4.3.1.1 Key Players in the U.K.
 - 4.3.4.3.2 Application
 - 4.3.4.3.2.1 U.K. Sustainable Aviation Fuel Market (by Application)
 - 4.3.4.3.3 Product
 - 4.3.4.3.3.1 U.K. Sustainable Aviation Fuel Market (by Fuel Type)
- 4.3.4.4 Rest-of-Europe
 - 4.3.4.4.1 Market
 - 4.3.4.4.1.1 Key Players in Rest-of-Europe
 - 4.3.4.4.2 Application
 - 4.3.4.4.2.1 Rest-of-Europe Sustainable Aviation Fuel Market (by Application)
 - 4.3.4.4.3 Product
 - 4.3.4.4.3.1 Rest-of-Europe Sustainable Aviation Fuel Market (by Fuel Type)
- 4.4 Asia-Pacific
 - 4.4.1 Market
 - 4.4.1.1 Key Players in Asia-Pacific
 - 4.4.1.2 Business Drivers
 - 4.4.1.3 Business Challenges
 - 4.4.2 Application
 - 4.4.2.1 Asia-Pacific Sustainable Aviation Fuel Market (by Application)
 - 4.4.3 Product
 - 4.4.3.1 Asia-Pacific Sustainable Aviation Fuel Market (by Fuel Type)
 - 4.4.3.2 Asia-Pacific Sustainable Aviation Fuel Market (by Manufacturing Technology)
 - 4.4.4 Asia-Pacific (by Country)
 - 4.4.4.1 China

- 4.4.4.1.1 Market
 - 4.4.4.1.1.1 Key Players in China
- 4.4.4.1.2 Application
 - 4.4.4.1.2.1 China Sustainable Aviation Fuel Market (by Application)
- 4.4.4.1.3 Product
 - 4.4.4.1.3.1 China Sustainable Aviation Fuel Market (by Fuel Type)
- 4.4.4.2 India
 - 4.4.4.2.1 Market
 - 4.4.4.2.1.1 Key Players in India
 - 4.4.4.2.2 Application
 - 4.4.4.2.2.1 India Sustainable Aviation Fuel Market (by Application)
 - 4.4.4.2.3 Product
 - 4.4.4.2.3.1 India Sustainable Aviation Fuel Market (by Fuel Type)
- 4.4.4.3 Japan
 - 4.4.4.3.1 Market
 - 4.4.4.3.1.1 Key Players in Japan
 - 4.4.4.3.2 Application
 - 4.4.4.3.2.1 Japan Sustainable Aviation Fuel Market (by Application)
 - 4.4.4.3.3 Product
 - 4.4.4.3.3.1 Japan Sustainable Aviation Fuel Market (by Fuel Type)
- 4.4.4.4 Rest-of-Asia-Pacific
 - 4.4.4.4.1 Market
 - 4.4.4.4.1.1 Key Players in Rest-of-Asia-Pacific
 - 4.4.4.4.2 Application
 - 4.4.4.4.2.1 Rest-of-Asia-Pacific Sustainable Aviation Fuel Market (by Application)
 - 4.4.4.4.3 Product
 - 4.4.4.4.3.1 Rest-of-Asia-Pacific Sustainable Aviation Fuel Market (by Fuel Type)
- 4.5 Rest-of-the-World
 - 4.5.1 Market
 - 4.5.1.1 Key Players in Rest-of-the-World
 - 4.5.1.2 Business Drivers
 - 4.5.1.3 Business Challenges
 - 4.5.2 Application
 - 4.5.2.1 Rest-of-the-World Sustainable Aviation Fuel Market (by Application)
 - 4.5.3 Product
 - 4.5.3.1 Rest-of-the-World Sustainable Aviation Fuel Market (by Fuel Type)
 - 4.5.3.2 Rest-of-the-World Sustainable Aviation Fuel Market (by Manufacturing Technology)
 - 4.5.4 Rest-of-the-World (by Region)

4.5.4.1 Middle East and Africa

4.5.4.1.1 Market

4.5.4.1.1.1 Key Players in the Middle East and Africa

4.5.4.1.2 Application

4.5.4.1.2.1 Middle East and Africa Sustainable Aviation Fuel Market (by Application)

4.5.4.1.3 Product

4.5.4.1.3.1 Middle East and Africa Sustainable Aviation Fuel Market (by Fuel Type)

4.5.4.2 Latin America

4.5.4.2.1 Market

4.5.4.2.1.1 Key Players in Latin America

4.5.4.2.2 Application

4.5.4.2.2.1 Latin America Sustainable Aviation Fuel Market (by Application)

4.5.4.2.3 Product

4.5.4.2.3.1 Latin America Sustainable Aviation Fuel Market (by Fuel Type)

5 MARKETS - COMPETITIVE BENCHMARKING & COMPANY PROFILES

5.1 Competitive Benchmarking

5.2 Company Profiles

5.2.1 Aemetis, Inc.

5.2.1.1 Company Overview

5.2.1.1.1 Role of Aemetis, Inc. in the Global Sustainable Aviation Fuel Market

5.2.1.2 Product Portfolio

5.2.1.3 Corporate Strategies

5.2.1.3.1 Partnerships, Collaborations, Agreements, and Contracts

5.2.1.4 Analyst View

5.2.2 Alder Fuels

5.2.2.1 Company Overview

5.2.2.1.1 Role of Alder Fuels in the Global Sustainable Aviation Fuel Market

5.2.2.1.2 Product Portfolio

5.2.2.2 Corporate Strategies

5.2.2.2.1 Partnerships, Collaborations, Agreements, and Contracts

5.2.2.3 Analyst View

5.2.3 BP p.l.c.

5.2.3.1 Company Overview

5.2.3.1.1 Role of BP p.l.c. in the Global Sustainable Aviation Fuel Market

5.2.3.1.2 Product Portfolio

5.2.3.2 Corporate Strategies

- 5.2.3.2.1 Partnerships, Collaborations, Agreements, and Contracts
- 5.2.3.3 Analyst View
- 5.2.4 Shell
 - 5.2.4.1 Company Overview
 - 5.2.4.1.1 Role of Shell in the Global Sustainable Aviation Fuel Market
 - 5.2.4.1.2 Product Portfolio
 - 5.2.4.2 Corporate Strategies
 - 5.2.4.2.1 Partnerships, Collaborations, Agreements, Investments, and Contracts
 - 5.2.4.3 Business Strategies
 - 5.2.4.3.1 Market Developments
 - 5.2.4.4 Analyst View
- 5.2.5 Neste
 - 5.2.5.1 Company Overview
 - 5.2.5.1.1 Role of Neste in the Global Sustainable Aviation Fuel Market
 - 5.2.5.1.2 Product Portfolio
 - 5.2.5.2 Corporate Strategies
 - 5.2.5.2.1 Partnerships, Collaborations, Agreements, Investments, and Contracts
 - 5.2.5.3 Business Strategies
 - 5.2.5.3.1 Market Developments
 - 5.2.5.4 Analyst View
- 5.2.6 Gevo, Inc.
 - 5.2.6.1 Company Overview
 - 5.2.6.1.1 Role of Gevo, Inc. in the Global Sustainable Aviation Fuel Market
 - 5.2.6.2 Product Portfolio
 - 5.2.6.3 Corporate Strategies
 - 5.2.6.3.1 Partnerships, Collaborations, Agreements, and Contracts
 - 5.2.6.4 Analyst View
- 5.2.7 SkyNRG
 - 5.2.7.1 Company Overview
 - 5.2.7.1.1 Role of SkyNRG in the Global Sustainable Aviation Fuel Market
 - 5.2.7.1.2 Product Portfolio
 - 5.2.7.2 Business Strategies
 - 5.2.7.2.1 Market Developments
 - 5.2.7.3 Corporate Strategies
 - 5.2.7.3.1 Partnerships, Collaborations, Agreements, and Contracts
 - 5.2.7.4 Analyst View
- 5.2.8 Velocys plc
 - 5.2.8.1 Company Overview
 - 5.2.8.1.1 Role of Velocys plc in the Global Sustainable Aviation Fuel Market

5.2.8.1.2 Product Portfolio

5.2.8.2 Corporate Strategies

5.2.8.2.1 Partnerships, Collaborations, Agreements, and Contracts

5.2.8.3 Business Strategies

5.2.8.3.1 Market Developments

5.2.8.4 Analyst View

5.2.9 TotalEnergies

5.2.9.1 Company Overview

5.2.9.1.1 Role of TotalEnergies in the Global Sustainable Aviation Fuel Market

5.2.9.1.2 Product Portfolio

5.2.9.2 Corporate Strategies

5.2.9.2.1 Partnerships, Collaborations, Agreements, and Contracts

5.2.9.3 Business Strategies

5.2.9.3.1 Market Developments

5.2.9.4 Analyst View

5.2.10 Fulcrum BioEnergy, Inc.

5.2.10.1 Company Overview

5.2.10.1.1 Role of Fulcrum BioEnergy, Inc. in the Global Sustainable Aviation Fuel Market

5.2.10.1.2 Product Portfolio

5.2.10.2 Business Strategies

5.2.10.2.1 Market Developments

5.2.10.3 Analyst View

6 GROWTH OPPORTUNITY AND RECOMMENDATION

6.1 Growth Opportunities

6.1.1 Growth Opportunity: Use of Forest and Crop Residue Feedstock for SAF Production

6.1.1.1 Recommendations

6.1.2 Growth Opportunity: Redesign and Optimization Potential of Aircraft Engines and Fuel Cells to be Adept for Higher Blend SAF

6.1.2.1 Recommendations

7 RESEARCH METHODOLOGY

7.1 Factors for Data Prediction and Modeling

List Of Figures

LIST OF FIGURES

Figure 1: Global Sustainable Aviation Fuel Market, \$Billion, 2022-2033

Figure 2: Global Sustainable Aviation Fuel Market, Million Gallon, 2022-2033

Figure 3: Global Sustainable Aviation Fuel Market (by Application), \$Billion, 2022 and 2033

Figure 4: Global Sustainable Aviation Fuel Market (by Engine Type), \$Billion, 2022 and 2033

Figure 5: Global Sustainable Aviation Fuel Market (by Fuel Type), \$Billion, 2022 and 2033

Figure 6: Global Sustainable Aviation Fuel Market (by Manufacturing Technology), \$Billion, 2022 and 2033

Figure 7: Global Sustainable Aviation Fuel Market (by Blending Capacity), \$Billion, 2022 and 2033

Figure 8: Global Sustainable Aviation Fuel Market (by Region), \$Billion, 2033

Figure 9: Global Sustainable Aviation Fuel Market Coverage

Figure 10: Sustainable Aviation Fuel Market, Business Dynamics

Figure 11: Jet Fuel Prices, May 2018-March 2023

Figure 12: Share of Key Business Strategies and Developments, January 2020-June 2023

Figure 13: Global Sustainable Aviation Fuel Market (by Application)

Figure 14: Global Sustainable Aviation Fuel Market (by Engine Type)

Figure 15: Global Sustainable Aviation Fuel Market (by Fuel Type)

Figure 16: Global Sustainable Aviation Fuel Market (by Manufacturing Technology)

Figure 17: Global Sustainable Aviation Fuel Market (by Blending Capacity)

Figure 18: Global Sustainable Aviation Fuel Market, Competitive Benchmarking

Figure 19: Research Methodology

Figure 20: Top-Down and Bottom-Up Approach

Figure 21: Assumptions and Limitations

List Of Tables

LIST OF TABLES

Table 1: Market Developments, January 2020-June 2023

Table 2: Partnerships, Collaborations, Agreements, and Contracts, January 2020-June 2023

Table 3: Global Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 4: Global Sustainable Aviation Fuel Market (by Engine Type), \$Million, 2022-2033

Table 5: Global Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 6: Global Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 7: Global Sustainable Aviation Fuel Market (by Manufacturing Technology), \$Million, 2022-2033

Table 8: Global Sustainable Aviation Fuel Market (by Blending Capacity), \$Million, 2022-2033

Table 9: Global Sustainable Aviation Fuel Market (by Blending Capacity), Million Gallon, 2022-2033

Table 10: Global Sustainable Aviation Fuel Market (by Region), Million Gallon, 2022-2033

Table 11: Global Sustainable Aviation Fuel Market (by Region), \$Million, 2022-2033

Table 12: North America Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 13: North America Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 14: North America Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 15: North America Sustainable Aviation Fuel Market (by Manufacturing Technology), \$Million, 2022-2033

Table 16: U.S. Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 17: U.S. Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 18: U.S. Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 19: Canada Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 20: Canada Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 21: Canada Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 22: Europe Sustainable Aviation Fuel Market (by Application), \$Million,

2022-2033

Table 23: Europe Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 24: Europe Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 25: Europe Sustainable Aviation Fuel Market (by Manufacturing Technology), \$Million, 2022-2033

Table 26: France Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 27: France Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 28: France Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 29: Germany Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 30: Germany Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 31: Germany Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 32: U.K. Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 33: U.K. Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 34: U.K. Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 35: Rest-of-Europe Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 36: Rest-of-Europe Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 37: Rest-of-Europe Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 38: Asia-Pacific Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 39: Asia-Pacific Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 40: Asia-Pacific Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 41: Asia-Pacific Sustainable Aviation Fuel Market (by Manufacturing Technology), \$Million, 2022-2033

Table 42: China Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 43: China Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 44: China Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 45: India Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 46: India Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 47: India Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 48: Japan Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 49: Japan Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 50: Japan Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 51: Rest-of-Asia-Pacific Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 52: Rest-of-Asia-Pacific Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 53: Rest-of-Asia-Pacific Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 54: Rest-of-the-World Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 55: Rest-of-the-World Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 56: Rest-of-the-World Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 57: Rest-of-the-World Sustainable Aviation Fuel Market (by Manufacturing Technology), \$Million, 2022-2033

Table 58: Middle East and Africa Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 59: Middle East and Africa Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 60: Middle East and Africa Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 61: Latin America Sustainable Aviation Fuel Market (by Application), \$Million, 2022-2033

Table 62: Latin America Sustainable Aviation Fuel Market (by Fuel Type), Million Gallon, 2022-2033

Table 63: Latin America Sustainable Aviation Fuel Market (by Fuel Type), \$Million, 2022-2033

Table 64: Aemetis, Inc.: Product Portfolio

Table 65: Aemetis, Inc.: Partnerships, Collaborations, Agreements, and Contracts

Table 66: Alder Energy, LLC: Product Portfolio

Table 67: Alder Fuels: Partnerships, Collaborations, Agreements, and Contracts

Table 68: BP p.l.c.: Product Portfolio

Table 69: BP p.l.c.: Partnerships, Collaborations, Agreements, and Contracts

Table 70: Shell: Product Portfolio

Table 71: Shell: Partnerships, Collaborations, Agreements, Investments, and Contracts

Table 72: Shell: Market Developments

Table 73: Neste: Product Portfolio

Table 74: Neste: Partnerships, Collaborations, Agreements, Investments, and Contracts

Table 75: Neste: Market Developments

Table 76: Gevo, Inc.: Product Portfolio

Table 77: Gevo, Inc.: Partnerships, Collaborations, Agreements, and Contracts

Table 78: SkyNRG: Product Portfolio

Table 79: SkyNRG: Market Developments

Table 80: SkyNRG: Partnerships, Collaborations, Agreements, and Contracts

Table 81: Velocys plc: Product Portfolio

Table 82: Velocys plc: Partnerships, Collaborations, Agreements, and Contracts

Table 83: Velocys plc: Market Developments

Table 84: TotalEnergies: Product Portfolio

Table 85: TotalEnergies: Partnerships, Collaborations, Agreements, and Contracts

Table 86: TotalEnergies: Market Developments

Table 87: Fulcrum BioEnergy, Inc: Product Portfolio

Table 88: Fulcrum BioEnergy, Inc: Market Developments

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