

The Global Market for Biofuels 2024-2035

https://marketpublishers.com/r/G97F5F550CF0EN.html Date: February 2024 Pages: 426 Price: US\$ 1,400.00 (Single User License) ID: G97F5F550CF0EN

Abstracts

The biofuels market has grown significantly as nations and companies pursue renewable, low carbon alternatives for replacing petroleum across transportation applications like passenger vehicles, aviation, marine and heavy freight, while serving broader circular economy sustainability aims. Continued growth is forecast driven by supportive government policies, rising adoption of biofuels blends in Asia and Americas markets, innovations in feedstocks and production methods, and increasing costcompetitiveness in light of petroleum volatility and environmental motivations.

The Global Market for Biofuels 2024-2035 provides a comprehensive analysis of the global biofuels market and emerging alternatives through 2035. It benchmarks over 15 industry drivers including energy security, emissions compliance, new revenue opportunities, rural development, landfill diversion and waste monetization, promoting adoption of various solid, liquid and gaseous biofuels derived from diverse biomass, waste, algal and carbon capture technologies. Granular feedstock, process technology and application assessments provide insights for stakeholders to position across the evolving biofuels value chain. The report analyses over a dozen types of biofuels utilizing distinct feedstocks and production methods suitable for specific applications spanning road transport, aviation, marine, rail, off-road vehicles, power generation and more.

Granular 11-year volume forecasts are provided as well as detailed impact analysis of circular economy transition, feedstock, process innovation, policy, pricing outlooks and competing energy technologies affecting biofuels growth. Types covered include:

Market analysis including key players, end use markets, production processes, costs, production capacities, market demand for biofuels including:

biodiesel



renewable diesel

bio-jet fuels

bio-naphtha

biomethanol

ethanol

biobutanol

biogas

biosyngas

biohydrogen

biofuel from plastic waste & used tires

biofuels from carbon capture

chemical recycling based biofuels

electrofuels

bio-oils

algae-derived biofuels

green ammonia

refuse-derived biofuels.

Report contents include:

Industry Developments 2022-2024: Key mergers, partnerships, funding, policy



updates, pricing shifts

Biofuels Market Outlook: Definition, role, types - solid, liquid, gaseous; blends, performance relative to petrol/diesel

Feedstocks Analysis: Wide range assessed - Energy crops, lignocellulosic waste, algae, municipal waste, forestry residue etc.

Production Pathways: - anaerobic digestion, gasification, pyrolysis, Fischer-Tropsch, hydrocracking etc creating variety of biofuels

Biodiesel/Renewable Diesel: Leading liquid biofuels currently. Market drivers, regional dynamics, forecast to 2035

Emerging Options: Biojet fuel, biomethanol, bio-oils, biosyngas, electrofuels etc – industry status, challenges, future demand potential

Sector Applications: Detailed biofuel use in road transport, aviation, marine, offroad vehicles, power generation – outlook by vertical

Regional Market Analysis: Historic and forecasted biofuels demand from 2020-2035 across America, Asia, Europe, ROW

Prices Trends: Biofuels pricing benchmarking - current vs projections by type through 2035 – impact on adoption economics

Sustainability Metrics: Life cycle emissions, circularity - comparison vs alternatives like solar, wind, EVs, hydrogen

Company Profiles: 200+ leading biofuels producers and technology providers. Companies profiled include BTG Bioliquids, Byogy Renewables, Caphenia, Enerkem, Electro-Active Technologies Inc., Eni S.p.A., Ensyn, FORGE Hydrocarbons Corporation, Fulcrum Bioenergy, Genecis Bioindustries, Gevo, Haldor Topsoe, Infinium Electrofuels, Kvasir Technologies, Opera Bioscience, Reverion GmbH, Steeper Energy, SunFire GmbH, Vertus Energy, Viridos, Inc. and WasteFuel. (Full list of companies profiled in table of contents).

Conclusions: Key findings, trends 2025-2035 outlook, commercialization roadmaps, opportunities by biofuel type and geography.



The Global Market for Biofuels 2024-2035



Contents

1 RESEARCH METHODOLOGY

2 EXECUTIVE SUMMARY

- 2.1 Comparison to fossil fuels
- 2.2 Role in the circular economy
- 2.3 Market drivers
- 2.4 Market challenges
- 2.5 Liquid biofuels market
 - 2.5.1 Liquid biofuel production and consumption (in thousands of m3), 2000-2022
 - 2.5.2 Liquid biofuels market 2020-2035, by type and production.

3 INDUSTRY DEVELOPMENTS 2022-2024

4 BIOFUELS

- 4.1 Overview
- 4.2 The global biofuels market
- 4.2.1 Diesel substitutes and alternatives
- 4.2.2 Gasoline substitutes and alternatives
- 4.3 SWOT analysis: Biofuels market
- 4.4 Comparison of biofuel costs 2023, by type
- 4.5 Types
 - 4.5.1 Solid Biofuels
 - 4.5.2 Liquid Biofuels
 - 4.5.3 Gaseous Biofuels
 - 4.5.4 Conventional Biofuels
 - 4.5.5 Advanced Biofuels
- 4.6 Feedstocks
 - 4.6.1 First-generation (1-G)
 - 4.6.2 Second-generation (2-G)
 - 4.6.2.1 Lignocellulosic wastes and residues
 - 4.6.2.2 Biorefinery lignin
 - 4.6.3 Third-generation (3-G)
 - 4.6.3.1 Algal biofuels
 - 4.6.3.1.1 Properties
 - 4.6.3.1.2 Advantages



- 4.6.4 Fourth-generation (4-G)
- 4.6.5 Advantages and disadvantages, by generation
- 4.6.6 Energy crops
- 4.6.6.1 Feedstocks
- 4.6.6.2 SWOT analysis
- 4.6.7 Agricultural residues
- 4.6.7.1 Feedstocks
- 4.6.7.2 SWOT analysis
- 4.6.8 Manure, sewage sludge and organic waste
- 4.6.8.1 Processing pathways
- 4.6.8.2 SWOT analysis
- 4.6.9 Forestry and wood waste
- 4.6.9.1 Feedstocks
- 4.6.9.2 SWOT analysis
- 4.6.10 Feedstock costs

5 HYDROCARBON BIOFUELS

- 5.1 Biodiesel
 - 5.1.1 Biodiesel by generation
 - 5.1.2 SWOT analysis
 - 5.1.3 Production of biodiesel and other biofuels
 - 5.1.3.1 Pyrolysis of biomass
 - 5.1.3.2 Vegetable oil transesterification
 - 5.1.3.3 Vegetable oil hydrogenation (HVO)
 - 5.1.3.3.1 Production process
 - 5.1.3.4 Biodiesel from tall oil
 - 5.1.3.5 Fischer-Tropsch BioDiesel
 - 5.1.3.6 Hydrothermal liquefaction of biomass
 - 5.1.3.7 CO2 capture and Fischer-Tropsch (FT)
 - 5.1.3.8 Dymethyl ether (DME)
 - 5.1.4 Prices
 - 5.1.5 Global production and consumption
- 5.2 Renewable diesel
 - 5.2.1 Production
 - 5.2.2 SWOT analysis
 - 5.2.3 Global consumption
 - 5.2.4 Prices
- 5.3 Bio-aviation fuel (bio-jet fuel, sustainable aviation fuel, renewable jet fuel or aviation



biofuel)

- 5.3.1 Description
- 5.3.2 SWOT analysis
- 5.3.3 Global production and consumption
- 5.3.4 Production pathways
- 5.3.5 Prices
- 5.3.6 Bio-aviation fuel production capacities
- 5.3.7 Challenges
- 5.3.8 Global consumption
- 5.4 Bio-naphtha
 - 5.4.1 Overview
 - 5.4.2 SWOT analysis
 - 5.4.3 Markets and applications
 - 5.4.4 Prices
 - 5.4.5 Production capacities, by producer, current and planned
 - 5.4.6 Production capacities, total (tonnes), historical, current and planned

6 ALCOHOL FUELS

- 6.1 Biomethanol
 - 6.1.1 SWOT analysis
 - 6.1.2 Methanol-to gasoline technology
 - 6.1.2.1 Production processes
 - 6.1.2.1.1 Anaerobic digestion
 - 6.1.2.1.2 Biomass gasification
 - 6.1.2.1.3 Power to Methane
- 6.2 Ethanol
 - 6.2.1 Technology description
 - 6.2.2 1G Bio-Ethanol
 - 6.2.3 SWOT analysis
 - 6.2.4 Ethanol to jet fuel technology
 - 6.2.5 Methanol from pulp & paper production
 - 6.2.6 Sulfite spent liquor fermentation
 - 6.2.7 Gasification
 - 6.2.7.1 Biomass gasification and syngas fermentation
 - 6.2.7.2 Biomass gasification and syngas thermochemical conversion
 - 6.2.8 CO2 capture and alcohol synthesis
 - 6.2.9 Biomass hydrolysis and fermentation
 - 6.2.9.1 Separate hydrolysis and fermentation



- 6.2.9.2 Simultaneous saccharification and fermentation (SSF)
- 6.2.9.3 Pre-hydrolysis and simultaneous saccharification and fermentation (PSSF)
- 6.2.9.4 Simultaneous saccharification and co-fermentation (SSCF)
- 6.2.9.5 Direct conversion (consolidated bioprocessing) (CBP)
- 6.2.10 Global ethanol consumption

6.3 Biobutanol

- 6.3.1 Production
- 6.3.2 Prices

7 BIOMASS-BASED GAS

- 7.1 Feedstocks
 - 7.1.1 Biomethane
 - 7.1.2 Production pathways
 - 7.1.2.1 Landfill gas recovery
 - 7.1.2.2 Anaerobic digestion
 - 7.1.2.3 Thermal gasification
 - 7.1.3 SWOT analysis
 - 7.1.4 Global production
 - 7.1.5 Prices
 - 7.1.5.1 Raw Biogas
 - 7.1.5.2 Upgraded Biomethane
 - 7.1.6 Bio-LNG
 - 7.1.6.1 Markets
 - 7.1.6.1.1 Trucks
 - 7.1.6.1.2 Marine
 - 7.1.6.2 Production
 - 7.1.6.3 Plants
 - 7.1.7 bio-CNG (compressed natural gas derived from biogas)
 - 7.1.8 Carbon capture from biogas
- 7.2 Biosyngas
 - 7.2.1 Production
 - 7.2.2 Prices
- 7.3 Biohydrogen
 - 7.3.1 Description
 - 7.3.2 SWOT analysis
 - 7.3.3 Production of biohydrogen from biomass
 - 7.3.3.1 Biological Conversion Routes
 - 7.3.3.1.1 Bio-photochemical Reaction



- 7.3.3.1.2 Fermentation and Anaerobic Digestion
- 7.3.3.2 Thermochemical conversion routes
 - 7.3.3.2.1 Biomass Gasification
 - 7.3.3.2.2 Biomass Pyrolysis
 - 7.3.3.2.3 Biomethane Reforming
- 7.3.4 Applications
- 7.3.5 Prices
- 7.4 Biochar in biogas production
- 7.5 Bio-DME

8 CHEMICAL RECYCLING FOR BIOFUELS

- 8.1 Plastic pyrolysis
- 8.2 Used tires pyrolysis
- 8.2.1 Conversion to biofuel
- 8.3 Co-pyrolysis of biomass and plastic wastes
- 8.4 Gasification
- 8.4.1 Syngas conversion to methanol
- 8.4.2 Biomass gasification and syngas fermentation
- 8.4.3 Biomass gasification and syngas thermochemical conversion
- 8.5 Hydrothermal cracking
- 8.6 SWOT analysis

9 ELECTROFUELS (E-FUELS)

9.1 Introduction

9.1.1 Benefits of e-fuels

- 9.2 Feedstocks
 - 9.2.1 Hydrogen electrolysis
 - 9.2.2 CO2 capture
- 9.3 SWOT analysis
- 9.4 Production
 - 9.4.1 eFuel production facilities, current and planned
- 9.5 Electrolysers
 - 9.5.1 Commercial alkaline electrolyser cells (AECs)
- 9.5.2 PEM electrolysers (PEMEC)
- 9.5.3 High-temperature solid oxide electrolyser cells (SOECs)

9.6 Prices

9.7 Market challenges



9.8 Companies

10 ALGAE-DERIVED BIOFUELS

- 10.1 Technology description
- 10.2 Conversion pathways
- 10.3 SWOT analysis
- 10.4 Production
- 10.5 Market challenges
- 10.6 Prices
- 10.7 Producers

11 GREEN AMMONIA

- 11.1 Production
 - 11.1.1 Decarbonisation of ammonia production
- 11.1.2 Green ammonia projects
- 11.2 Green ammonia synthesis methods
- 11.2.1 Haber-Bosch process
- 11.2.2 Biological nitrogen fixation
- 11.2.3 Electrochemical production
- 11.2.4 Chemical looping processes
- 11.3 SWOT analysis
- 11.4 Blue ammonia
- 11.4.1 Blue ammonia projects
- 11.5 Markets and applications
 - 11.5.1 Chemical energy storage
 - 11.5.1.1 Ammonia fuel cells
- 11.5.2 Marine fuel
- 11.6 Prices
- 11.7 Estimated market demand
- 11.8 Companies and projects

12 BIOFUELS FROM CARBON CAPTURE

- 12.1 Overview
- 12.2 CO2 capture from point sources
- 12.3 Production routes
- 12.4 SWOT analysis



- 12.5 Direct air capture (DAC)
 - 12.5.1 Description
 - 12.5.2 Deployment
 - 12.5.3 Point source carbon capture versus Direct Air Capture
 - 12.5.4 Technologies
 - 12.5.4.1 Solid sorbents
 - 12.5.4.2 Liquid sorbents
 - 12.5.4.3 Liquid solvents
 - 12.5.4.4 Airflow equipment integration
 - 12.5.4.5 Passive Direct Air Capture (PDAC)
 - 12.5.4.6 Direct conversion
 - 12.5.4.7 Co-product generation
 - 12.5.4.8 Low Temperature DAC
 - 12.5.4.9 Regeneration methods
 - 12.5.5 Commercialization and plants
 - 12.5.6 Metal-organic frameworks (MOFs) in DAC
 - 12.5.7 DAC plants and projects-current and planned
 - 12.5.8 Markets for DAC
 - 12.5.9 Costs
 - 12.5.10 Challenges
 - 12.5.11 Players and production
- 12.6 Carbon utilization for biofuels
 - 12.6.1 Production routes
 - 12.6.1.1 Electrolyzers
 - 12.6.1.2 Low-carbon hydrogen
 - 12.6.2 Products & applications
 - 12.6.2.1 Vehicles
 - 12.6.2.2 Shipping
 - 12.6.2.3 Aviation
 - 12.6.2.4 Costs
 - 12.6.2.5 Ethanol
 - 12.6.2.6 Methanol
 - 12.6.2.7 Sustainable Aviation Fuel
 - 12.6.2.8 Methane
 - 12.6.2.9 Algae based biofuels
 - 12.6.2.10 CO?-fuels from solar
 - 12.6.3 Challenges
 - 12.6.4 SWOT analysis
 - 12.6.5 Companies



13 BIO-OILS (PYROLYSIS OIL)

13.1 Description

- 13.1.1 Advantages of bio-oils
- 13.2 Production
 - 13.2.1 Fast Pyrolysis
 - 13.2.2 Costs of production
- 13.2.3 Upgrading
- 13.3 SWOT analysis
- 13.4 Applications
- 13.5 Bio-oil producers
- 13.6 Prices

14 REFUSE-DERIVED FUELS (RDF)

- 14.1 Overview
- 14.2 Production
- 14.2.1 Production process
- 14.2.2 Mechanical biological treatment
- 14.3 Markets

15 COMPANY PROFILES

- 15.1 Aduro Clean Technologies, Inc.
- 15.2 Aemetis, Inc.
- 15.3 Agilyx
- 15.4 Air Company
- 15.5 Agra Energy
- 15.6 Aircela Inc
- 15.7 Algenol
- 15.8 Alpha Biofuels (Singapore) Pte Ltd
- 15.9 Andritz AG
- 15.10 APChemi Pvt. Ltd.
- 15.11 Apeiron Bioenergy
- 15.12 Aperam BioEnergia
- 15.13 Applied Research Associates, Inc. (ARA)
- 15.14 Arcadia eFuels
- 15.15 ASB Biodiesel Limited



- 15.16 Atmonia
- 15.17 Avantium B.V.
- 15.18 BASF
- 15.19 BBCA Biochemical & GALACTIC Lactic Acid Co., Ltd.
- 15.20 BDI-BioEnergy International GmbH
- 15.21 BEE Biofuel
- 15.22 Benefuel Inc.
- 15.23 Bio2Oil ApS
- 15.24 Bio-Oils
- 15.25 BIOD Energy
- 15.26 Biofy
- 15.27 Biofine Technology, LLC
- 15.28 BiogasClean A/S
- 15.29 Biojet AS
- 15.30 Bloom Biorenewables SA
- 15.31 BlueAlp Technology
- 15.32 Blue BioFuels, Inc.
- 15.33 Braven Environmental, LLC
- 15.34 Brightmark Energy
- 15.35 bse Methanol GmbH
- 15.36 BTG Bioliquids B.V.
- 15.37 Byogy Renewables, Inc.
- 15.38 C1 Green Chemicals AG
- 15.39 Caphenia GmbH
- 15.40 Carbonade
- 15.41 Carbon Collect Limited
- 15.42 Carbon Engineering Ltd.
- 15.43 Carbon Infinity Limited
- 15.44 Carbon Recycling International
- 15.45 Carbon Sink LLC
- 15.46 Carbyon BV
- 15.47 Cargill
- 15.48 Cassandra Oil AB
- 15.49 Casterra Ag Ltd.
- 15.50 Celtic Renewables Ltd.
- 15.51 CERT Systems, Inc.
- 15.52 CF Industries Holdings, Inc.
- 15.53 Chitose Bio Evolution Pte Ltd.
- 15.54 Circla Nordic



- 15.55 Climeworks
- 15.56 CNF Biofuel AS
- 15.57 Cool Planet Energy Systems
- 15.58 Corsair Group International
- 15.59 Coval Energy B.V.
- 15.60 Crimson Renewable Energy LLC
- 15.61 C-Zero Inc.
- 15.62 D-CRBN
- 15.63 Diamond Green Diesel LLC
- 15.64 Dimensional Energy
- 15.65 Royal DSM N.V
- 15.66 Dioxide Materials
- 15.67 Dioxycle
- 15.68 Domsj? Fabriker AB
- 15.69 DuPont
- 15.70 EcoCeres, Inc.
- 15.71 Eco Environmental
- 15.72 Eco Fuel Technology, Inc
- 15.73 Electro-Active Technologies Inc.
- 15.74 Emerging Fuels Technology (EFT)
- 15.75 Encina Development Group, LLC
- 15.76 Enerkem, Inc.
- 15.77 Eneus Energy
- 15.78 Enexor BioEnergy
- 15.79 Eni Sustainable Mobility
- 15.80 Ensyn Corporation
- 15.81 Euglena Co., Ltd.
- 15.82 EnviTec Biogas AG
- 15.83 Firefly Green Fuels
- 15.84 Forge Hydrocarbons Corporation
- 15.85 FuelPositive Corp.
- 15.86 Fuenix Ecogy
- 15.87 Fulcrum BioEnergy, Inc.
- 15.88 Galp Energia, SGPS, S.A.
- 15.89 GenCell Energy
- 15.90 Genecis Bioindustries, Inc.
- 15.91 Gevo, Inc
- 15.92 GIDARA Energy B.V.
- 15.93 Graforce Hydro GmbH



- 15.94 Granbio Technologies
- 15.95 Green COP Pte Ltd
- 15.96 Green Earth Institute
- 15.97 Green Fuel
- 15.98 Hago Energetics
- 15.99 Haldor Topsoe A/S
- 15.100 Handerek Technologies
- 15.101 Hero BX
- 15.102 Honeywell
- 15.103 Hyundai Oilbank
- 15.104 Oy Hydrocell Ltd.
- 15.105 Hy2Gen AG
- 15.106 HYCO1, Inc.
- 15.107 HydGene Renewables
- 15.108 Ineratec GmbH
- 15.109 Infinitree LLC
- 15.110 Infinium Electrofuels
- 15.111 Innoltek
- 15.112 Jilin COFCO Biomaterial Corporation
- 15.113 Jupiter Ionics Pty Ltd
- 15.114 Kaidi
- 15.115 Kanteleen Voima
- 15.116 Khepra
- 15.117 Klean Industries
- 15.118 Krajete GmbH
- 15.119 Kvasir Technologies
- 15.120 LanzaJet, Inc.
- 15.121 Lanzatech
- 15.122 Lectrolyst LLC
- 15.123 Licella
- 15.124 Liquid Wind AB
- 15.125 Lummus Technology LLC
- 15.126 LXP Group GmbH
- 15.127 Manta Biofuel, LLC
- 15.128 Mash Energy ApS
- 15.129 Mercurius Biorefining Inc
- 15.130 MOFWORX
- 15.131 Mote, Inc.
- 15.132 NeoZeo AB



- 15.133 Neste
- 15.134 New Hope Energy
- 15.135 NewEnergyBlue LLC
- 15.136 Nexus Fuels, LLC
- 15.137 Nordic ElectroFuel
- 15.138 Nordsol
- 15.139 Norsk e-Fuel AS
- 15.140 Nova Pangaea Technologies (UK) Ltd.
- 15.141 Novozymes A/S
- 15.142 Obeo Biogas
- 15.143 Oberon Fuels Inc.
- 15.144 Obrist Group
- 15.145 O.C.O
- 15.146 Opus 12, Inc.
- 15.147 ORLEN Po?udnie
- 15.148 OxEon Energy, LLC
- 15.149 Phillips 66
- 15.150 Phoenix BioPower
- 15.151 Photanol B.V.
- 15.152 Phycobloom
- 15.153 Phytonix Corporation
- 15.154 Plastic2Oil, Inc.
- 15.155 Plastogaz SA
- 15.156 Polycycl
- 15.157 Praj Industries Ltd.
- 15.158 Preem AB
- 15.159 Prometheus Fuels, Inc.
- 15.160 Proton Power, Inc.
- 15.161 Provectus Algae
- 15.162 Pure Lignin Environmental Technology
- 15.163 Pyrochar
- 15.164 Qairos Energies
- 15.165 Quadrise PLC
- 15.166 QuantaFuel ASA
- 15.167 RenFuel
- 15.168 Renmatix
- 15.169 Renovare Fuels
- 15.170 Repsol
- 15.171 Resilient Energi



- 15.172 Resynergi, Inc.
- 15.173 Reverion GmbH
- 15.174 RISE Research Institutes of Sweden AB
- 15.175 SABIC
- 15.176 Sainc Energy Limited
- 15.177 SBI BioEnergy Inc.
- 15.178 Sea6 Energy
- 15.179 Sekab E-Technology AB
- 15.180 Shell
- 15.181 Silva Green Fuel
- 15.182 SkyNRG
- 15.183 Skytree BV
- 15.184 St1 Oy
- 15.185 Steeper Energy Aps
- 15.186 Stiesdal
- 15.187 Sumitomo
- 15.188 SunCoal Industries GmbH
- 15.189 Sundrop Fuels, Inc.
- 15.190 Sunho Biodiesel Corporation
- 15.191 Sunfire GmbH
- 15.192 Synhelion
- 15.193 Synkero
- 15.194 Syzygy Plasmonics, Inc.
- 15.195 Swedish Biofuels AB
- 15.196 Takachar
- 15.197 TotalEnergies
- 15.198 Tree Energy Solutions (TES-H2)
- 15.199 Twelve
- 15.200 Uflex
- 15.201 UPM Biofuels
- 15.202 Velocys
- 15.203 VERBIO Vereinigte BioEnergie AG
- 15.204 Vertimass LLC
- 15.205 Vertoro
- 15.206 Versalis SpA
- 15.207 Vertus Energy Ltd.
- 15.208 Virent Inc.
- 15.209 Viridos, Inc.
- 15.210 WasteFuel



15.211 XFuel 15.212 Yield10 Bioscience, Inc.

16 REFERENCES





List Of Tables

LIST OF TABLES

- Table 1. Market drivers for biofuels.
- Table 2. Market challenges for biofuels.
- Table 3. Liquid biofuels market 2020-2035, by type and production.
- Table 4. Industry developments in biofuels 2022-2024.
- Table 5. Comparison of biofuels.
- Table 6. Comparison of biofuel costs (USD/liter) 2023, by type.
- Table 7. Categories and examples of solid biofuel.
- Table 8. Comparison of biofuels and e-fuels to fossil and electricity.
- Table 9. Classification of biomass feedstock.
- Table 10. Biorefinery feedstocks.
- Table 11. Feedstock conversion pathways.
- Table 12. First-Generation Feedstocks.
- Table 13. Lignocellulosic ethanol plants and capacities.
- Table 14. Comparison of pulping and biorefinery lignins.

Table 15. Commercial and pre-commercial biorefinery lignin production facilities and processes

Table 16. Operating and planned lignocellulosic biorefineries and industrial flue gas-toethanol.

- Table 17. Properties of microalgae and macroalgae.
- Table 18. Yield of algae and other biodiesel crops.
- Table 19. Advantages and disadvantages of biofuels, by generation.
- Table 20. Biodiesel by generation.
- Table 21. Biodiesel production techniques.
- Table 22. Summary of pyrolysis technique under different operating conditions.
- Table 23. Biomass materials and their bio-oil yield.
- Table 24. Biofuel production cost from the biomass pyrolysis process.
- Table 25. Properties of vegetable oils in comparison to diesel.
- Table 26. Main producers of HVO and capacities.
- Table 27. Example commercial Development of BtL processes.
- Table 28. Pilot or demo projects for biomass to liquid (BtL) processes.
- Table 29. Global biodiesel consumption, 2010-2035 (M litres/year).
- Table 30. Global renewable diesel consumption, 2010-2035 (M litres/year).
- Table 31. Renewable diesel price ranges.
- Table 32. Advantages and disadvantages of Bio-aviation fuel.
- Table 33. Production pathways for Bio-aviation fuel.



Table 34. Current and announced Bio-aviation fuel facilities and capacities.

- Table 35. Global bio-jet fuel consumption 2019-2035 (Million litres/year).
- Table 36. Bio-based naphtha markets and applications.
- Table 37. Bio-naphtha market value chain.

Table 38. Bio-naphtha pricing against petroleum-derived naphtha and related fuel products.

- Table 39. Bio-based Naphtha production capacities, by producer.
- Table 40. Comparison of biogas, biomethane and natural gas.
- Table 41. ?Processes in bioethanol production.

Table 42. Microorganisms used in CBP for ethanol production from biomass lignocellulosic.

- Table 43. Ethanol consumption 2010-2035 (million litres).
- Table 44. Biogas feedstocks.
- Table 45. Existing and planned bio-LNG production plants.
- Table 46. Methods for capturing carbon dioxide from biogas.
- Table 47. Comparison of different Bio-H2 production pathways.
- Table 48. Markets and applications for biohydrogen.
- Table 49. Summary of gasification technologies.
- Table 50. Overview of hydrothermal cracking for advanced chemical recycling.
- Table 51. Applications of e-fuels, by type.
- Table 52. Overview of e-fuels.
- Table 53. Benefits of e-fuels.
- Table 54. eFuel production facilities, current and planned.
- Table 55. Main characteristics of different electrolyzer technologies.
- Table 56. Market challenges for e-fuels.
- Table 57. E-fuels companies.
- Table 58. Algae-derived biofuel producers.
- Table 59. Green ammonia projects (current and planned).
- Table 60. Blue ammonia projects.
- Table 61. Ammonia fuel cell technologies.
- Table 62. Market overview of green ammonia in marine fuel.
- Table 63. Summary of marine alternative fuels.
- Table 64. Estimated costs for different types of ammonia.
- Table 65. Main players in green ammonia.
- Table 66. Market overview for CO2 derived fuels.
- Table 67. Point source examples.
- Table 68. Advantages and disadvantages of DAC.
- Table 69. Companies developing airflow equipment integration with DAC.
- Table 70. Companies developing Passive Direct Air Capture (PDAC) technologies.



- Table 71. Companies developing regeneration methods for DAC technologies.
- Table 72. DAC companies and technologies.
- Table 73. DAC technology developers and production.
- Table 74. DAC projects in development.
- Table 75. Markets for DAC.
- Table 76. Costs summary for DAC.
- Table 77. Cost estimates of DAC.
- Table 78. Challenges for DAC technology.
- Table 79. DAC companies and technologies.
- Table 80. Market overview for CO2 derived fuels.

Table 81. Main production routes and processes for manufacturing fuels from captured carbon dioxide.

- Table 82. CO?-derived fuels projects.
- Table 83. Thermochemical methods to produce methanol from CO2.
- Table 84. pilot plants for CO2-to-methanol conversion.
- Table 85. Microalgae products and prices.
- Table 86. Main Solar-Driven CO2 Conversion Approaches.
- Table 87. Market challenges for CO2 derived fuels.
- Table 88. Companies in CO2-derived fuel products.
- Table 89. Typical composition and physicochemical properties reported for bio-oils and heavy petroleum-derived oils.
- Table 90. Properties and characteristics of pyrolysis liquids derived from biomass versus a fuel oil.
- Table 91. Main techniques used to upgrade bio-oil into higher-quality fuels.
- Table 92. Markets and applications for bio-oil.
- Table 93. Bio-oil producers.
- Table 94. Key resource recovery technologies
- Table 95. Markets and end uses for refuse-derived fuels (RDF).
- Table 96. Granbio Nanocellulose Processes.



List Of Figures

LIST OF FIGURES

- Figure 1. Liquid biofuel production and consumption (in thousands of m3), 2000-2022.
- Figure 2. Distribution of global liquid biofuel production in 2022.
- Figure 3. Diesel and gasoline alternatives and blends.
- Figure 4. SWOT analysis for biofuels.
- Figure 5. Schematic of a biorefinery for production of carriers and chemicals.
- Figure 6. Hydrolytic lignin powder.
- Figure 7. SWOT analysis for energy crops in biofuels.
- Figure 8. SWOT analysis for agricultural residues in biofuels.
- Figure 9. SWOT analysis for Manure, sewage sludge and organic waste in biofuels.
- Figure 10. SWOT analysis for forestry and wood waste in biofuels.
- Figure 11. Range of biomass cost by feedstock type.
- Figure 12. Regional production of biodiesel (billion litres).
- Figure 13. SWOT analysis for biodiesel.
- Figure 14. Flow chart for biodiesel production.
- Figure 15. Biodiesel (B20) average prices, current and historical, USD/litre.
- Figure 16. Global biodiesel consumption, 2010-2035 (M litres/year).
- Figure 17. SWOT analysis for renewable iesel.
- Figure 18. Global renewable diesel consumption, 2010-2035 (M litres/year).
- Figure 19. SWOT analysis for Bio-aviation fuel.
- Figure 20. Global bio-jet fuel consumption to 2019-2035 (Million litres/year).
- Figure 21. SWOT analysis for bio-naphtha.
- Figure 22. Bio-based naphtha production capacities, 2018-2035 (tonnes).
- Figure 23. SWOT analysis biomethanol.
- Figure 24. Renewable Methanol Production Processes from Different Feedstocks.
- Figure 25. Production of biomethane through anaerobic digestion and upgrading.
- Figure 26. Production of biomethane through biomass gasification and methanation.
- Figure 27. Production of biomethane through the Power to methane process.
- Figure 28. SWOT analysis for ethanol.
- Figure 29. Ethanol consumption 2010-2035 (million litres).
- Figure 30. Properties of petrol and biobutanol.
- Figure 31. Biobutanol production route.
- Figure 32. Biogas and biomethane pathways.
- Figure 33. Overview of biogas utilization.
- Figure 34. Biogas and biomethane pathways.
- Figure 35. Schematic overview of anaerobic digestion process for biomethane



production.

- Figure 36. Schematic overview of biomass gasification for biomethane production.
- Figure 37. SWOT analysis for biogas.
- Figure 38. Total syngas market by product in MM Nm?/h of Syngas, 2021.
- Figure 39. SWOT analysis for biohydrogen.
- Figure 40. Waste plastic production pathways to (A) diesel and (B) gasoline
- Figure 41. Schematic for Pyrolysis of Scrap Tires.
- Figure 42. Used tires conversion process.
- Figure 43. Total syngas market by product in MM Nm?/h of Syngas, 2021.
- Figure 44. Overview of biogas utilization.
- Figure 45. Biogas and biomethane pathways.
- Figure 46. SWOT analysis for chemical recycling of biofuels.
- Figure 47. Process steps in the production of electrofuels.
- Figure 48. Mapping storage technologies according to performance characteristics.
- Figure 49. Production process for green hydrogen.
- Figure 50. SWOT analysis for E-fuels.
- Figure 51. E-liquids production routes.
- Figure 52. Fischer-Tropsch liquid e-fuel products.
- Figure 53. Resources required for liquid e-fuel production.
- Figure 54. Levelized cost and fuel-switching CO2 prices of e-fuels.
- Figure 55. Cost breakdown for e-fuels.
- Figure 56. Pathways for algal biomass conversion to biofuels.
- Figure 57. SWOT analysis for algae-derived biofuels.
- Figure 58. Algal biomass conversion process for biofuel production.
- Figure 59. Classification and process technology according to carbon emission in ammonia production.
- Figure 60. Green ammonia production and use.
- Figure 61. Schematic of the Haber Bosch ammonia synthesis reaction.
- Figure 62. Schematic of hydrogen production via steam methane reformation.
- Figure 63. SWOT analysis for green ammonia.
- Figure 64. Estimated production cost of green ammonia.
- Figure 65. Projected annual ammonia production, million tons.
- Figure 66. CO2 capture and separation technology.
- Figure 67. Conversion route for CO2-derived fuels and chemical intermediates.
- Figure 68. Conversion pathways for CO2-derived methane, methanol and diesel.
- Figure 69. SWOT analysis for biofuels from carbon capture.

Figure 70. CO2 captured from air using liquid and solid sorbent DAC plants, storage, and reuse.

Figure 71. Global CO2 capture from biomass and DAC in the Net Zero Scenario.



Figure 72. DAC technologies.

Figure 73. Schematic of Climeworks DAC system.

Figure 74. Climeworks' first commercial direct air capture (DAC) plant, based in Hinwil, Switzerland.

Figure 75. Flow diagram for solid sorbent DAC.

Figure 76. Direct air capture based on high temperature liquid sorbent by Carbon Engineering.

- Figure 77. Global capacity of direct air capture facilities.
- Figure 78. Global map of DAC and CCS plants.
- Figure 79. Schematic of costs of DAC technologies.
- Figure 80. DAC cost breakdown and comparison.
- Figure 81. Operating costs of generic liquid and solid-based DAC systems.
- Figure 82. Conversion route for CO2-derived fuels and chemical intermediates.
- Figure 83. Conversion pathways for CO2-derived methane, methanol and diesel.
- Figure 84. CO2 feedstock for the production of e-methanol.
- Figure 85. Schematic illustration of (a) biophotosynthetic, (b) photothermal, (c) microbial-
- photoelectrochemical, (d) photosynthetic and photocatalytic (PS/PC), (e)

photoelectrochemical (PEC), and (f) photovoltaic plus electrochemical (PV+EC) approaches for CO2.

- Figure 86. SWOT analysis: CO2 utilization in fuels.
- Figure 87. Audi synthetic fuels.
- Figure 88. Bio-oil upgrading/fractionation techniques.
- Figure 89. SWOT analysis for bio-oils.
- Figure 90. ANDRITZ Lignin Recovery process.
- Figure 91. ChemCyclingTM prototypes.
- Figure 92. ChemCycling circle by BASF.
- Figure 93. FBPO process
- Figure 94. Direct Air Capture Process.
- Figure 95. CRI process.
- Figure 96. Cassandra Oil process.
- Figure 97. Colyser process.
- Figure 98. ECFORM electrolysis reactor schematic.
- Figure 99. Dioxycle modular electrolyzer.
- Figure 100. Domsj? process.
- Figure 101. FuelPositive system.
- Figure 102. INERATEC unit.
- Figure 103. Infinitree swing method.
- Figure 104. Audi/Krajete unit.
- Figure 105. Enfinity cellulosic ethanol technology process.



Figure 106: Plantrose process.

Figure 107. Sunfire process for Blue Crude production.

Figure 108. Takavator.

Figure 109. O12 Reactor.

Figure 110. Sunglasses with lenses made from CO2-derived materials.

Figure 111. CO2 made car part.

Figure 112. The Velocys process.

Figure 113. Goldilocks process and applications.

Figure 114. The Proesa® Process.



I would like to order

Product name: The Global Market for Biofuels 2024-2035

Product link: https://marketpublishers.com/r/G97F5F550CF0EN.html

Price: US\$ 1,400.00 (Single User License / Electronic Delivery) If you want to order Corporate License or Hard Copy, please, contact our Customer Service: <u>info@marketpublishers.com</u>

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <u>https://marketpublishers.com/r/G97F5F550CF0EN.html</u>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name: Last name: Email: Company: Address: City: Zip code: Country: Tel: Fax: Your message:

**All fields are required

Custumer signature _____

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <u>https://marketpublishers.com/docs/terms.html</u>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970