+357 96 030922
info@marketpublishers.com

Direct Air Capture (DAC) Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Technology (Solid DAC, Liquid DAC, Electrochemical DAC), By End User (Chemicals & Fuels, Carbon Mineralization, Oil & Gas, Others), By Region and Competition, 2020-2030F

https://marketpublishers.com/r/D4C2C597669DEN.html
Date: January 2025
Pages: 185
Price: US$ 4,500.00 (Single User License)
ID: D4C2C597669DEN

Abstracts

Global Direct Air Capture (DAC) Market was valued at USD 52.32 Million in 2024 and is expected to reach USD 66.86 Million by 2030 with a CAGR of 4.37% during the forecast period. One of the primary drivers of the global DAC market is the growing need for carbon removal solutions. Despite ongoing efforts to reduce emissions through renewable energy adoption and energy efficiency measures, many industries, such as aviation and heavy manufacturing, continue to emit significant amounts of CO2. DAC technology provides a scalable solution for offsetting these emissions by capturing and storing CO2 or converting it into valuable products. This is critical for achieving net-zero targets and aligning with international climate agreements such as the Paris Agreement.

Despite its promising potential, the DAC market faces several challenges, most notably the high cost of operation and the energy required for CO2 capture. However, ongoing research and development efforts aim to overcome these hurdles by improving energy efficiency and scaling up DAC technologies to lower costs. In addition, the infrastructure required for CO2 transport and storage needs to be further developed to support widespread adoption.

The global DAC market is expected to witness significant growth in the coming years, driven by increasing climate action initiatives and advancements in technology. North America and Europe are currently leading the market, with several large-scale DAC

+357 96 030922
info@marketpublishers.com

facilities under development. However, the Asia-Pacific region is also emerging as a key player, as countries like Japan and South Korea invest in carbon removal technologies to meet their climate goals.

Key Market Drivers

Growth in Oil & Gas Industry

One of the key factors driving the growth of the oil and gas industry is the rising global demand for energy. As economies continue to expand, particularly in emerging markets, the need for reliable and affordable energy sources increases. Oil and gas remain critical components of the global energy mix, despite the transition toward renewable energy. Industries such as transportation, manufacturing, and power generation continue to rely heavily on fossil fuels, thereby sustaining demand for oil and gas products. This ongoing demand encourages investment in exploration, production, and infrastructure, which further drives growth within the sector.

The discovery and development of new oil and gas reserves also contribute to the industry's growth. Guyana emerged as the country with the largest newly discovered oil and gas reserves between 2022 and 2023, with a total of 3.76 billion barrels of oil equivalent identified during this period. These discoveries position the South American nation as a potential new major player in the global oil and gas industry. As traditional reserves deplete, companies are increasingly focusing on offshore drilling, deepwater exploration, and unconventional resources such as shale gas and oil sands. These new discoveries are vital in maintaining production levels and meeting global energy needs. The development of these resources requires significant investment in infrastructure, such as pipelines, refineries, and storage facilities, which creates further opportunities for growth within the industry. Additionally, the expansion into new geographical regions opens up new markets and strengthens the global supply chain, driving further investment and growth.

Furthermore, the oil and gas industry's integration with related sectors, such as petrochemicals, power generation, and transportation, creates additional opportunities for growth. The industry's byproducts are critical inputs for various industries, from plastics and chemicals to fertilizers and pharmaceuticals. This interconnectedness ensures a steady demand for oil and gas products across multiple industries, supporting continued expansion.

Surge in Technological Advancements

+357 96 030922
info@marketpublishers.com

The surge in technological advancements is a major driver of growth across various industries, revolutionizing traditional practices and fostering innovation. NEG8 Carbon, a prominent carbon capture company based in Waterford, Ireland, has implemented significant upgrades to its Direct Air Capture (DAC) system. Recognizing that merely reducing emissions is insufficient to tackle the climate challenge, the company's innovative enhancements are designed to optimize CO? capture from the atmosphere, making the process both more efficient and effective. Their advanced blueprint DAC system accelerates CO? capture and reduces regeneration time by an impressive 90%. Moreover, improvements in the heat exchange process enhance CO? absorption by 50%, while cutting energy consumption by over 20%. These upgrades significantly increase the system's efficiency and sustainability. As businesses strive to remain competitive in an increasingly digital world, the adoption of cutting-edge technologies has become essential. Advancements in artificial intelligence (AI), automation, and data analytics are enhancing operational efficiency, reducing costs, and enabling businesses to scale rapidly.

For instance, AI-powered solutions are transforming industries by optimizing processes, improving decision-making, and creating personalized customer experiences. Automation is streamlining workflows, minimizing human error, and increasing productivity across sectors such as manufacturing, logistics, and finance. Meanwhile, data analytics is providing businesses with actionable insights that drive better strategies and informed business decisions.

Furthermore, the development of cloud computing and the Internet of Things (IoT) has enabled seamless connectivity, allowing for real-time data sharing and collaboration, which is critical for global operations. These technologies are not only enhancing performance but also enabling new business models and revenue streams. TerraFixing's Direct Air Capture (DAC) technology is specifically designed for cold, dry climates, with operational energy requirements as low as 1 MWh per metric tonne of CO2. At an electricity cost of USD 0.03 per kWh, this enables CO2 capture at a cost of under USD 40 per tonne. The technology employs a straightforward process comprising five unit operations, using proven materials under moderate temperatures and pressures to keep capital expenditures low. This makes it particularly well-suited for regions with cold, dry climates, including Canada, Norway, Alaska, Russia, Finland, Greenland, the Tibetan Plateau, and Antarctica.

Key Market Challenges

+357 96 030922
info@marketpublishers.com

High Operational and Capital Costs

DAC systems are highly energy-intensive, consuming substantial amounts of power to capture and process CO2. The energy demand is driven by the need to operate high-capacity fans, compressors, and other machinery to capture and concentrate CO2 from the atmosphere. Depending on the specific DAC technology used, energy consumption can account for a large portion of operational costs. If the energy is sourced from non-renewable sources, the environmental benefits of DAC could be compromised, making the technology less attractive from both a financial and sustainability standpoint.

The operational costs associated with DAC are primarily driven by the energy required to run the capture process, as well as the maintenance of the facilities. Continuous operation requires skilled labor, regular equipment maintenance, and potentially the procurement of additional materials like capture solvents or sorbents. These ongoing costs can add up quickly, making it difficult for DAC facilities to achieve profitability, particularly when compared to other carbon removal methods that may have lower operational expenditures.

The high operational and capital costs of DAC are further compounded by competition from alternative carbon removal technologies, such as nature-based solutions (e.g., afforestation, soil carbon sequestration), which generally have lower upfront and operational costs. As a result, the high cost of DAC makes it harder for the technology to compete in the global market for carbon removal solutions, especially when governments and companies are looking for cost-effective methods to meet their carbon reduction targets.

Key Market Trends

Strategic Partnerships and Investments

Strategic partnerships between DAC companies and established corporations are facilitating the development and deployment of innovative technologies. In 2020, both government and industry collectively pledged nearly USD 4 billion to support Direct Air Capture (DAC) initiatives. Corporations including Microsoft, Stripe, and United Airlines have made investments in early-stage projects, while start-ups such as Carbon Engineering Ltd, based in Canada, and Climeworks AG, based in Switzerland, have each secured over USD 100 million in funding.

Another key aspect of the growing trend of strategic partnerships and investments is the

+357 96 030922
info@marketpublishers.com

influx of capital from both public and private sectors. In the United States, the Department of Energy (DOE) has committed substantial financial support for DAC projects, recognizing their potential in achieving net-zero emissions targets. Additionally, venture capitalists and private investors are increasingly recognizing DAC as a high-value sector, providing critical funding to accelerate research and development, as well as infrastructure development. These investments are instrumental in enhancing DAC technology's cost-effectiveness and scalability, making it more feasible for large-scale deployment.

Strategic partnerships also extend to the carbon credit market, where DAC companies are aligning with environmental organizations and policymakers to create frameworks for carbon offset programs. By integrating DAC into carbon markets, these partnerships facilitate the purchase of carbon removal credits, which businesses can use to meet their sustainability goals. This trend is pivotal in driving the demand for DAC services, incentivizing companies to invest in and scale these technologies further.

Segmental Insights

Technology Insights

Based on Technology, Solid DAC have emerged as the fastest growing segment in the Global Direct Air Capture (DAC) Market in 2024. Solid DAC systems generally have lower capital and operational costs compared to their liquid-based counterparts. The use of solid sorbents, which are more stable and require fewer chemicals for regeneration, reduces both the initial setup cost and ongoing maintenance expenses. These cost advantages make solid DAC more attractive to investors and operators seeking to deploy scalable solutions for carbon capture at competitive prices.

Solid DAC systems are easier to scale up compared to liquid-based technologies. They can be deployed in modular units, which allows for incremental expansion as demand and funding increase. This flexibility makes solid DAC technology highly adaptable to different geographic locations and operational requirements. Its scalability is particularly important for addressing global carbon removal targets, as it can be expanded to meet the growing need for large-scale CO2 removal.

End User Insights

Based on End User, Chemicals & Fuels have emerged as the fastest growing segment in the Global Direct Air Capture (DAC) Market during the forecast period. One of the key

+357 96 030922
info@marketpublishers.com

factors driving the rapid expansion of DAC in the chemicals and fuels sector is the increasing demand for low-carbon and carbon-neutral products. As industries within the chemicals and fuels market face mounting pressure to reduce their greenhouse gas emissions, DAC provides a viable solution for capturing and sequestering CO?, allowing companies to produce more sustainable products. DAC enables the creation of synthetic fuels and chemicals with a significantly lower environmental impact, which is essential for companies aiming to meet net-zero emissions targets.

DAC is increasingly being integrated into the production of synthetic fuels, particularly in the creation of green hydrogen and carbon-neutral fuels. By capturing CO? from the atmosphere, DAC systems enable the conversion of this captured carbon into valuable chemicals and fuels, such as methanol or synthetic gasoline. This process not only provides a renewable source of carbon but also helps address the challenges associated with the carbon intensity of traditional fuel production methods. This innovation has led to an accelerated adoption of DAC technologies in the fuels sector, positioning it as a key driver of market growth.

Regional Insights

Based on Region, North America have emerged as the dominating region in the Global Direct Air Capture (DAC) Market in 2024. Significant investment from major corporations, such as Microsoft, Stripe, and United Airlines, as well as government support, has accelerated the growth of DAC technologies. These investments not only fund the commercialization of DAC solutions but also contribute to scaling up infrastructure, enabling more widespread adoption. Additionally, start-ups in North America, like Carbon Engineering and Climeworks, have raised millions in funding, positioning the region at the forefront of DAC innovation.

Furthermore, the U.S. and Canadian governments have implemented policies and incentives that encourage the development and deployment of DAC technologies. The U.S. Infrastructure Investment and Jobs Act, for example, includes provisions for funding carbon capture technologies, reinforcing North America’s leadership in the sector.

Key Market Players

Climeworks AG

Carbon Engineering ULC.

+357 96 030922
info@marketpublishers.com

Heirloom Carbon Technologies, Inc.

Soletair Power

CarbonCapture Inc.

Avnos, Inc.

Skytree

RepAir Carbon US Inc.

Carbyon

Zero Carbon Systems

Report Scope

In this report, the Global Direct Air Capture (DAC) Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Direct Air Capture (DAC) Market, By Technology:

Solid DAC

Liquid DAC

Electrochemical DAC

Direct Air Capture (DAC) Market, By End User:

Chemicals & Fuels

Carbon Mineralization

Oil & Gas

+357 96 030922
info@marketpublishers.com

Others

Direct Air Capture (DAC) Market, By Region:

North America

United States

Canada

Mexico

Europe

France

United Kingdom

Italy

Germany

Spain

Asia Pacific

China

India

Japan

Australia

South Korea

South America

+357 96 030922
info@marketpublishers.com

Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Direct Air Capture (DAC) Market.

Available Customizations:

Global Direct Air Capture (DAC) Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

+357 96 030922
info@marketpublishers.com

Contents

+357 96 030922
info@marketpublishers.com

+357 96 030922
info@marketpublishers.com

8. ASIA PACIFIC DIRECT AIR CAPTURE (DAC) MARKET OUTLOOK

+357 96 030922
info@marketpublishers.com

9. SOUTH AMERICA DIRECT AIR CAPTURE (DAC) MARKET OUTLOOK

+357 96 030922
info@marketpublishers.com

10. MIDDLE EAST AND AFRICA DIRECT AIR CAPTURE (DAC) MARKET OUTLOOK

+357 96 030922
info@marketpublishers.com

+357 96 030922
info@marketpublishers.com

+357 96 030922
info@marketpublishers.com

I would like to order

Product name: Direct Air Capture (DAC) Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Technology (Solid DAC, Liquid DAC, Electrochemical DAC), By End User (Chemicals & Fuels, Carbon Mineralization, Oil & Gas, Others), By Region and Competition, 2020-2030F

Product link: https://marketpublishers.com/r/D4C2C597669DEN.html

Price: US$ 4,500.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:
info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page https://marketpublishers.com/r/D4C2C597669DEN.html