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Global Hydrogen-Based CCUS Technologies Market 2023 by Company, Regions, Type and Application, Forecast to 2029

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Abstracts

According to our (Global Info Research) latest study, the global Hydrogen-Based CCUS Technologies market size was valued at USD 1253.3 million in 2022 and is forecast to a readjusted size of USD 6295.9 million by 2029 with a CAGR of 25.9% during review period.

CCUS is an enabler of least-cost low-carbon hydrogen production. CCUS can remove CO2 from the atmosphere by combining it with bioenergy or direct air capture to balance emissions that are unavoidable or technically difficult to abate. Hydrogen technologies are technologies that relate to the production and use of hydrogen as a part hydrogen economy.

CCUS (Carbon Capture, Utilization and Storage) carbon capture, utilization and storage technology

surgery. It is a new development trend of CCS (Carbon Capture and Storage) technology, that is, to purify the carbon dioxide emitted in the production process, and then put it into the new production process, which can be recycled instead of simply stored. Compared with CCS, carbon dioxide can be resourced, which can generate economic benefits and is more practical.Challenges of CCUS Technology

At present, CCUS technology is still in the initial stage of research and development and demonstration, and is facing difficulties and problems in the aspects of economy, market, technology, environment and policy. There are still many obstacles and challenges to achieve large-scale development.

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1 Economic aspects

The important contribution of CCUS technology lies in its irreplaceable ability to reduce carbon emissions, but the cost is too high. Firstly, the investment cost of the CCUS project is huge, and the investment amount is tens of millions or even hundreds of millions of yuan; secondly, the installation of carbon capture devices will generate additional operation and maintenance costs; finally, for carbon utilization and storage, the price of captured CO2 is too high. High, the price is very uneconomical for oil production companies. With regard to the CCUS demonstration projects currently in operation in China, under such huge cost pressures, the corporate rate of return can only be maintained at 2% or below. If the emission reduction benefits cannot be realized, it will seriously affect the enthusiasm of enterprises to carry out CCUS demonstration projects.

2 Technical aspects

CCUS technology is a highly integrated collection, transportation, utilization and storage of various technologies, and it needs to promote the development of all links in an orderly and balanced manner. First of all, the introduction of the CCUS capture link will increase additional energy consumption. Under the current technical level, the primary energy consumption will increase by 10%~20% or even more, resulting in a great loss of efficiency. Secondly, because CO2 is chemically inert and thermally stable, a large amount of energy must be re-invested in order to effectively convert and utilize CO2, which limits the utilization of CO2 as a resource, and it is necessary to find a suitable catalyst system. There are risks of uncertainty in the geological exploration of the second geological utilization and storage link. The information support for CO2 geological storage is not enough, and the enterprise cannot make a comprehensive assessment of the stratum structure, storage potential, storage risk and detection plan, which increases the business risk of the enterprise. Finally, under the goal of carbon neutrality, CCUS technology needs to complete the cumulative emission reduction task of 17.5 to 31.5 billion tons of CO2. However, most of the current CCUS demonstration projects can capture CO2 from 10,000 to 100,000 tons, and there is a lack of large-scale, replicable A full-process integration demonstration project with obvious economic benefits. Therefore, research and development of low-cost, low-energy CCUS technology and large-scale full-process CCUS integration demonstration will promote the deployment and promotion of CCUS technology.

3 Market aspects

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The development of the CCUS industry requires long-term and large capital investment. However, due to the high cost of CCUS emission reduction and the uncertainty of technology, companies are often unwilling to bear the risk of investing in CCUS research and development and demonstration alone. In addition, the global carbon market is in its infancy, there is no large-scale CO2 demand market, the carbon tax policy is not clear, and it is impossible to measure the emission reduction capacity of this part economically. Therefore, the foundation for the commercial development of CCUS projects is weak, and many Businesses and potential investors balk at it. On the other hand, the CCUS industry chain covers almost all links of energy production and consumption, such as electric power, steel, cement, petroleum, chemical industry and other industries. At present, there are few CCUS full-process demonstration projects, and there is a lack of cross-industry and cross-departmental cooperation models. There is a problem of poor connection between CO2 capture projects and utilization and storage projects. Therefore, under the existing market environment and policy framework, how to reasonably solve the problem of cooperation and benefit distribution among multiple enterprises on the benefit chain will directly affect CCUS development process.

4 Environmental aspects

Due to the nature of CO2 itself, any leakage of CO2 in each link of CCUS technology will have an impact on the ecological environment. Under the current technical level, the environmental risks in the general capture and transportation links are small, and the main environmental risks come from the geological storage and utilization of CO2. From the perspective of geological time scale, due to complex unforeseen and uncontrollable geological movements (such as earthquakes) and the corrosiveness of CO2 to the formation, CO2 leaks and escapes to the surface, forming a catastrophic suffocation area and a sudden increase in The greenhouse effect causes a series of environmental problems such as soil, groundwater and atmosphere near the leakage area, and poses a fatal threat to animals, plants and human health. This also seriously restricts the understanding and acceptance of CCUS by the government and the public.

Prospect of CCUS Technology Application

The technical links of CCUS are closely connected and complement each other. The front-end carbon capture link provides CO2 for the utilization and storage link, the intermediate transportation link provides CO2 transportation guarantee, and the back-end CO2 utilization turns CO2 into treasure, forming a downstream related industrial chain with commercial value. , to create a huge CO2 demand market, to achieve a win-

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win situation of CO2 fixation and economic benefits, which in turn will promote the development of carbon capture projects.

Most of the current carbon capture projects are industrialized centralized capture, and there are demonstration projects for pre-combustion, post-combustion, and oxygen-enriched combustion technologies; while CO2 utilization and storage projects are mainly CO2-EOR, resource utilization projects are rare . CO2-EOR is a mature technology that has been applied by the oil industry for decades, and currently occupies a dominant position in CCUS projects around the world, but its income is heavily dependent on oil prices, and its economic sustainability is poor. In terms of resource utilization of CO2, it has been reported in the literature that only 1.1 million tons of CO2 is industrially utilized and converted into chemicals every year, of which 90% is converted into urea, inorganic carbonate, etc., and very little is converted into other high-addition materials. valuable chemicals. At present, the vast majority of CO2 resource utilization industries have not yet achieved commercial application, and have not established relevant industrial chain clusters. Despite the high cost and high energy consumption of carbon capture projects, the disconnection between them and the carbon utilization stage makes it difficult to generate economic benefits, which has become the fundamental reason restricting the development of carbon capture projects. Therefore, while researching and developing low-cost, low-energy carbon capture technology, we must accelerate the layout of CO2 resource utilization, in order to accelerate the implementation, development and large-scale promotion of CCUS projects.

CO2 Utilization Industry Development Trend

1. Utilization of high value-added carbon-based new materials

CO2 conversion to manufacture high value-added carbon-based new materials (carbon nanotubes and graphene, etc.) will be part of an effective path to carbon neutrality such as coal power plants. It will provide a sustainable economic basis for overall carbon neutrality. Carbon nanomaterials have been widely used in lithium battery conductive pastes and conductive plastics, and can also be used in solar conductive silver pastes, anti-corrosion coatings, and thermal greases. At present, this technology has been successfully applied to industrial demonstration projects, with remarkable economic benefits. Due to the limited demand for high-tech materials, billions of tons of CO2 need to find another way out. One of the important directions of green chemistry research is to regard CO2, biomass, coal, oil, and natural gas as the five basic industrial raw materials, which are used to produce tens of thousands of daily-needed end products.

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2. Chemical utilization

Incorporate CO2 into the industrial system, together with biomass materials, coal, oil and natural gas, as the five basic raw materials of industry, and build a new CO2 economic industrial chain, which is not only used to produce basic chemicals such as methanol and olefins, but also involves various intermediates Body and tens of thousands of end products (as shown in Figure 3). For example, Shanxi Clean Carbon Research Institute purifies CO2 in industrial flue gas, not only converting it into chemical products such as carbonate, ethylene glycol, and methanol fuel, but also using supercritical CO2 to manufacture lightweight materials for aircraft and automobile interior parts, Energy-saving and environment-friendly products such as packaging materials. With technological progress and cost reduction, CO2 resource utilization is gradually promoted, and the chemical industry is expected to accelerate greening.

The Global Info Research report includes an overview of the development of the Hydrogen-Based CCUS Technologies industry chain, the market status of Oil and Gas (Carbon Capture and Storage (CCS), Carbon Capture and Utilization (CCU)), Power Generation (Carbon Capture and Storage (CCS), Carbon Capture and Utilization (CCU)), and key enterprises in developed and developing market, and analysed the cutting-edge technology, patent, hot applications and market trends of Hydrogen-Based CCUS Technologies.

Regionally, the report analyzes the Hydrogen-Based CCUS Technologies markets in key regions. North America and Europe are experiencing steady growth, driven by government initiatives and increasing consumer awareness. Asia-Pacific, particularly China, leads the global Hydrogen-Based CCUS Technologies market, with robust domestic demand, supportive policies, and a strong manufacturing base.

Key Features:

The report presents comprehensive understanding of the Hydrogen-Based CCUS Technologies market. It provides a holistic view of the industry, as well as detailed insights into individual components and stakeholders. The report analysis market dynamics, trends, challenges, and opportunities within the Hydrogen-Based CCUS Technologies industry.

The report involves analyzing the market at a macro level:

Market Sizing and Segmentation: Report collect data on the overall market size,

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including the revenue generated, and market share of different by Type (e.g., Carbon Capture and Storage (CCS), Carbon Capture and Utilization (CCU)).

Industry Analysis: Report analyse the broader industry trends, such as government policies and regulations, technological advancements, consumer preferences, and market dynamics. This analysis helps in understanding the key drivers and challenges influencing the Hydrogen-Based CCUS Technologies market.

Regional Analysis: The report involves examining the Hydrogen-Based CCUS Technologies market at a regional or national level. Report analyses regional factors such as government incentives, infrastructure development, economic conditions, and consumer behaviour to identify variations and opportunities within different markets.

Market Projections: Report covers the gathered data and analysis to make future projections and forecasts for the Hydrogen-Based CCUS Technologies market. This may include estimating market growth rates, predicting market demand, and identifying emerging trends.

The report also involves a more granular approach to Hydrogen-Based CCUS Technologies:

Company Analysis: Report covers individual Hydrogen-Based CCUS Technologies players, suppliers, and other relevant industry players. This analysis includes studying their financial performance, market positioning, product portfolios, partnerships, and strategies.

Consumer Analysis: Report covers data on consumer behaviour, preferences, and attitudes towards Hydrogen-Based CCUS Technologies This may involve surveys, interviews, and analysis of consumer reviews and feedback from different by Application (Oil and Gas, Power Generation).

Technology Analysis: Report covers specific technologies relevant to Hydrogen-Based CCUS Technologies. It assesses the current state, advancements, and potential future developments in Hydrogen-Based CCUS Technologies areas.

Competitive Landscape: By analyzing individual companies, suppliers, and consumers, the report present insights into the competitive landscape of the Hydrogen-Based CCUS Technologies market. This analysis helps understand market share, competitive advantages, and potential areas for differentiation among industry players.

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Market Validation: The report involves validating findings and projections through primary research, such as surveys, interviews, and focus groups.

Market Segmentation

Hydrogen-Based CCUS Technologies market is split by Type and by Application. For the period 2018-2029, the growth among segments provides accurate calculations and forecasts for consumption value by Type, and by Application in terms of value.

Market segment by Type

- Carbon Capture and Storage (CCS)
- Carbon Capture and Utilization (CCU)
- Carbon Capture and Conversion (CCC)

Market segment by Application

- Oil and Gas
- Power Generation
- Others

Market segment by players, this report covers

- Exxonmobil Corporation
- Schlumberger
- Linde AG
- BASF
- General Electric

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Siemens

Honeywell UOP

Equinor

Aker Solutions

Shell

Fluor

Sinopec

Market segment by regions, regional analysis covers

North America (United States, Canada, and Mexico)

Europe (Germany, France, UK, Russia, Italy, and Rest of Europe)

Asia-Pacific (China, Japan, South Korea, India, Southeast Asia, Australia and Rest of Asia-Pacific)

South America (Brazil, Argentina and Rest of South America)

Middle East & Africa (Turkey, Saudi Arabia, UAE, Rest of Middle East & Africa)

The content of the study subjects, includes a total of 13 chapters:

Chapter 1, to describe Hydrogen-Based CCUS Technologies product scope, market overview, market estimation caveats and base year.

Chapter 2, to profile the top players of Hydrogen-Based CCUS Technologies, with revenue, gross margin and global market share of Hydrogen-Based CCUS Technologies from 2018 to 2023.

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Chapter 3, the Hydrogen-Based CCUS Technologies competitive situation, revenue and global market share of top players are analyzed emphatically by landscape contrast.

Chapter 4 and 5, to segment the market size by Type and application, with consumption value and growth rate by Type, application, from 2018 to 2029.

Chapter 6, 7, 8, 9, and 10, to break the market size data at the country level, with revenue and market share for key countries in the world, from 2018 to 2023.and Hydrogen-Based CCUS Technologies market forecast, by regions, type and application, with consumption value, from 2024 to 2029.

Chapter 11, market dynamics, drivers, restraints, trends, Porters Five Forces analysis, and Influence of COVID-19 and Russia-Ukraine War

Chapter 12, the key raw materials and key suppliers, and industry chain of Hydrogen-Based CCUS Technologies.

Chapter 13, to describe Hydrogen-Based CCUS Technologies research findings and conclusion.

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