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Global Supercritical CO2 Equipment Supply, Demand and Key Producers, 2026-2032

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Abstracts

The global Supercritical CO2 Equipment market size is expected to reach $ 12623 million by 2032, rising at a market growth of 4.9% CAGR during the forecast period (2026-2032).

In 2025, the global production of supercritical CO? equipment reached 2,037 units, with an average selling price of US$4.3 million per unit.

To address the problems of low energy efficiency, insufficient environmental friendliness, limited product purity, and high system complexity in traditional thermal power generation, material extraction, and precision cleaning, supercritical CO? equipment was developed. This equipment uses carbon dioxide as a medium, pressurizing it to 7.38 MPa and heating it to above 31 degrees Celsius, causing CO? to enter a supercritical state that combines the advantages of low viscosity in the gaseous state and high density in the liquid state. Utilizing the unique physicochemical properties of supercritical CO?, it is a specialized complete set of equipment that achieves energy conversion, material separation and purification, and precision cleaning. It is abbreviated as SC-CO? equipment. Its core principle is to utilize the high diffusivity, high solubility, and low surface tension characteristics of supercritical CO?, combined with core components such as compressors, turbines, heat exchangers, and extraction vessels, to complete energy transfer, material separation, or contaminant removal in closed-loop or intermittent operation, ultimately achieving the goals of high efficiency, energy saving, environmental friendliness, and precise operation. Early trial and commercialization data show that supercritical CO? power generation equipment is more than 40% more efficient than traditional steam power generation, extraction equipment improves product purity by 15%-30% compared to solvent extraction, and cleaning equipment can achieve residue-free and zero-pollution cleaning, aligning with

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global 'dual carbon' goals and the needs of green industry upgrading. Since its initial commercialization in the 1980s, supercritical CO? equipment, with its advantages of being green, efficient, and widely adaptable, has gradually developed from laboratory technology into standardized, large-scale equipment covering multiple fields such as energy, chemical industry, pharmaceuticals, food, and environmental protection. The product portfolio is constantly being enriched, and the applicable scenarios are continuously expanding.

In 2025, the global price of supercritical CO? equipment will vary significantly due to differences in product type, performance specifications, and applicable scenarios: The average price per unit of general-purpose (small-scale) supercritical CO? extraction equipment will be approximately US$1-1.5 million, suitable for small and medium-sized food and pharmaceutical companies; the average price per unit of high-end, high-efficiency equipment (such as large generator sets and specialized extraction equipment) can reach US$3-10 million, mainly used in large-scale energy projects, high-end pharmaceuticals, and aerospace fields. In terms of production capacity, the industry exhibits a 'regional concentration and segment-driven' characteristic, with major global production capacity concentrated in North America, Europe, and East Asia. Specifically, the production capacity of energy-related supercritical CO? equipment is mainly concentrated in Japan, China, and Germany, while the production capacity of extraction equipment is mainly concentrated in North America and China. The annual production capacity of a single production line is approximately 75-90 units, the industry average capacity utilization rate is approximately 93%, and the average product gross profit margin can reach 26.7%.

Typical Transaction Case: A large energy group purchased three sets of supercritical CO? waste heat power generation equipment from Mitsubishi Heavy Industries in the third quarter of 2025, model MHI-SCCO?-150 series, with a contract value of approximately US$15 million. The technical requirements included: 'The product is compatible with a 2000-ton-class steel sintering waste heat recovery project, with a rated power output of 150MW and a power generation efficiency more than 45% higher than traditional steam power generation; the system operating pressure is ?25 MPa, the operating temperature is ?600?, and it adopts an ultra-compact microchannel heat exchanger, reducing site requirements by 50% compared to traditional equipment; the equipment must pass ISO 14001 environmental certification and GB/T 19001 quality certification for the power industry, achieving seamless integration with existing sintering production lines, reducing carbon dioxide emissions by over 120,000 tons annually; the equipment service life is ?25 years, the average annual failure rate is ?1.5%, and the operation and maintenance costs are 30% lower than traditional power generation

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equipment.'

Industry Pain Points: The fundamental pain point of the supercritical CO? equipment industry is the multiple contradictions between its green and efficient equipment product attributes and the stringent requirements for green upgrading in downstream sectors, global environmental regulations, core technology barriers, and regional competitive landscape. The core pain points are specifically manifested as follows: On the product side, core technology barriers are concentrated in the high-end equipment field. Key core technologies such as the design and manufacturing of turbines and compressors for large-scale supercritical CO? power generation equipment, simulation and matching of supercritical CO? fluid dynamics, formulation of high-pressure and high-temperature resistant sealing materials, and precise temperature and pressure control technology for precision extraction equipment are dominated by a few leading overseas companies. Domestic companies have significant gaps in the operational stability and energy efficiency of high-end products (for example, the long-term operational energy efficiency of domestic large-scale power generation equipment is 8%-13% lower than that of similar products from Mitsubishi Heavy Industries and GE, and the temperature control accuracy of high-end extraction equipment is 1-2? lower than that of extraktLAB and Apeks Supercritical products). At the same time, some small and medium-sized manufacturers have problems with product design homogenization, rely on imported core components, have poor equipment adaptability, and are prone to defects such as high-pressure seal leakage, abnormal operating vibration, high energy consumption, and high maintenance costs, which lower the overall reputation of the industry and limit its penetration in the high-end downstream field. Furthermore, the localization rate of core components for supercritical CO? equipment (such as high-pressure heat exchangers and specialized valves) is low. Imported components are expensive and have long delivery cycles, further increasing equipment manufacturing costs and weakening the price competitiveness of domestic enterprises.

On the market and regulatory front, global environmental standards continue to upgrade. Policies such as the International Energy Agency's (IEA) 'Net Zero Emissions' initiative and China's '14th Five-Year Plan for Modern Energy System' and 'Integrated Emission Standards for Air Pollutants' impose stricter requirements on the energy efficiency and environmental performance of equipment. Domestic SMEs, lacking core technologies, struggle to meet energy conservation and emission reduction targets in high-end downstream sectors. Compliance upgrades are costly and require significant investment, posing a risk of being phased out. The market exhibits a typical 'niche oligopoly' structure. The global market for supercritical CO? equipment is dominated by leading companies from Japan, Germany, and the United States, while the extraction

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equipment market is primarily controlled by North American companies. The domestic market is dominated by low-to-mid-range equipment, with small and medium-sized manufacturers in East and South China caught in price wars, leading to continuously shrinking profit margins. Simultaneously, overseas brands possess first-mover technological advantages and brand influence in the high-end market, putting domestic companies at a disadvantage in brand building and downstream high-end customer certification systems. This further restricts breakthroughs in the high-end market and limits innovation and R&D investment. Furthermore, the operation and maintenance technology of supercritical CO? equipment has a high threshold, and there is a shortage of professional operation and maintenance personnel. This makes it difficult for some downstream companies to achieve efficient and stable operation after purchasing the equipment, affecting the promotion and application of the equipment.

Industry Chain Structure: The upstream of the supercritical CO? equipment industry chain covers core materials and key components: core materials include high-pressure and high-temperature resistant stainless steel (dominated by China, Japan, and Germany), special alloys (nickel-based/titanium alloys), carbon fiber composite materials (lightweight applications), high-pressure sealing materials (dominated by Germany and the United States in the high-end market), and thermal insulation ceramic fibers; key components include high-pressure heat exchangers, compressors, turbines, high-pressure extraction kettles, special pressure-resistant valves, seals, precise temperature and pressure control systems, and intelligent PLCs/sensors, etc. Additives such as CO? purity enhancers and extraction synergists are partially dependent on imports; technical support involves supercritical fluid dynamics simulation (collaboration with the Chinese Academy of Sciences, MIT, etc.), precision machining (dominated by German and Japanese equipment manufacturers, with domestic companies gradually replacing them), high-pressure sealing, temperature and pressure control, and system integration technologies; third-party testing and certification focus on pressure/energy efficiency/environmental performance. Downstream applications are wide-ranging: the energy sector accounts for 38%, focusing on industrial waste heat recovery, new energy storage, and thermal power generation, with demand for high-end power generation equipment increasing by 22% annually; the pharmaceutical sector accounts for 22%, used for traditional Chinese medicine extraction, Western medicine purification, and intermediate separation, with demand for high-efficiency equipment increasing by 18% annually; the food sector accounts for 15%, involving plant essential oils, additives, and oil extraction, aligning with the natural and healthy trend; the environmental protection sector accounts for 12%, covering wastewater treatment, flue gas desulfurization and denitrification, and solid waste treatment, with policy-driven demand increasing by 25% annually; other sectors account for 13%, including precision cleaning equipment for

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electronics and aerospace, and new energy material reaction equipment, with high added value and demand increasing by over 30% annually. The overall industry chain exhibits characteristics of 'upstream material component technology-intensive and downstream application scenario diversified growth.'

Industry Trends and Challenges: Supercritical CO? equipment is accelerating its development towards high-end, intelligent, green, integrated, and domestically produced technologies. The market share of high-end products is projected to reach 45% by 2032, integrating IoT and AI for intelligent monitoring and process optimization. The use of lightweight and environmentally friendly materials such as special alloys and carbon fiber optimizes green manufacturing processes and promotes the domestic substitution of core components. Relying on industrial clusters, an integrated 'design-manufacturing-operation and maintenance' layout is forming, enhancing the service capabilities of the entire industry chain. Domestic technological breakthroughs are driving the domestic production rate to reach 75% by 2032, and expanding into overseas markets such as Southeast Asia. Application scenarios are extending from traditional extraction and power generation to emerging fields such as new energy storage and aerospace precision cleaning, with annual demand growth exceeding 30%. In terms of opportunities, supercritical CO? equipment accounts for approximately 7.3% of the global green equipment market. Domestic policies support the retrofitting of aging equipment, with an average annual retrofitting demand of 1200 sets from 2025 to 2030. There is a global shortage of 800 sets/year of high-end equipment, and environmental subsidies are driving demand growth. Challenges include reliance on imports for high-end core technologies (such as turbine design and high-pressure sealing), with an import dependency rate of approximately 45%; increased compliance costs due to upgraded environmental and energy efficiency standards, posing a risk of elimination for SMEs; price competition in the low-to-mid-end market squeezing profits, while overseas brands dominate the high-end market; and a shortage of multidisciplinary talent and high initial equipment investment restricting SMEs' application. Overcoming technological barriers, cultivating talent, and reducing costs are necessary to achieve high-quality development.

Demand and Opportunity Analysis: The demand for supercritical CO? equipment is driven by the global necessity of 'dual carbon' targets (such as those set by the IEA). Driven by factors such as the 2050 net-zero emissions target and China's 'dual carbon' goals, mandatory environmental policies (EU REACH, China's 'Integrated Emission Standard for Air Pollutants,' etc., promoting equipment replacement and upgrading, with global demand expected to grow by more than 10% annually from 2025 to 2030), and the green transformation of downstream industries (increased demand for energy waste

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heat recovery, high-purity pharmaceutical extraction, natural and residue-free food, and environmentally efficient treatment, with a 30% annual increase in equipment demand in the new energy storage sector becoming a growth engine), technological upgrades are also driving demand upgrades (intelligentization, high efficiency, and lightweighting improve equipment stability and adaptability to various scenarios, and domestically produced equipment is becoming increasingly competitive). The advantages of domestic substitution (reducing costs and releasing demand in the low-to-mid-end market); significant advantages in technological adaptability: multi-scenario compatibility (covering all scenarios from laboratory to industrial, adapting to special requirements such as high temperature and high pressure, with a coverage rate of over 90%), efficiency and cost optimization (energy efficiency improved by more than 40%, extraction recovery rate increased by 10%-15%, short transformation cycle and recovery cycle of 3-8 years, outstanding cost performance), and the benefits of domestic substitution (domestic products are 20%-30% cheaper than overseas products, the success rate of bidding and global market share continue to increase, and policy support accelerates the substitution process), all of which together promote it to become a key supporting equipment for downstream industries to achieve carbon emission reduction and green transformation.

This report studies the global Supercritical CO2 Equipment production, demand, key manufacturers, and key regions.

This report is a detailed and comprehensive analysis of the world market for Supercritical CO2 Equipment and provides market size (US$ million) and Year-over-Year (YoY) Growth, considering 2025 as the base year. This report explores demand trends and competition, as well as details the characteristics of Supercritical CO2 Equipment that contribute to its increasing demand across many markets.

Highlights and key features of the study

Global Supercritical CO2 Equipment total production and demand, 2021-2032, (Units)
Global Supercritical CO2 Equipment total production value, 2021-2032, (USD Million)
Global Supercritical CO2 Equipment production by region & country, production, value, CAGR, 2021-2032, (USD Million) & (Units), (based on production site)
Global Supercritical CO2 Equipment consumption by region & country, CAGR, 2021-2032 & (Units)
U.S. VS China: Supercritical CO2 Equipment domestic production, consumption, key domestic manufacturers and share
Global Supercritical CO2 Equipment production by manufacturer, production, price, value and market share 2021-2026, (USD Million) & (Units)

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Global Supercritical CO2 Equipment production by Type, production, value, CAGR, 2021-2032, (USD Million) & (Units)
Global Supercritical CO2 Equipment production by Application, production, value, CAGR, 2021-2032, (USD Million) & (Units)

This report profiles key players in the global Supercritical CO2 Equipment market based on the following parameters - company overview, production, value, price, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include Mitsubishi, extraktLAB, Apeks Supercritical, Thar Process, Borisbang Industrial Technology, LABOAO, Supercritical Fluid Technologies, FeyeCon, SFE Process, Vitalis, etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Stakeholders would have ease in decision-making through various strategy matrices used in analyzing the World Supercritical CO2 Equipment market

Detailed Segmentation:

Each section contains quantitative market data including market by value (US$ Millions), volume (production, consumption) & (Units) and average price (K US$/Unit) by manufacturer, by Type, and by Application. Data is given for the years 2021-2032 by year with 2025 as the base year, 2026 as the estimate year, and 2027-2032 as the forecast year.

Global Supercritical CO2 Equipment Market, By Region:

United States

China

Europe

Japan

South Korea

ASEAN

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India

Rest of World

Global Supercritical CO2 Equipment Market, Segmentation by Type:

Intermittent

Continuous

Global Supercritical CO2 Equipment Market, Segmentation by Performance Classification:

General Purpose

High-end & High-efficiency

Special Purpose

Global Supercritical CO2 Equipment Market, Segmentation by Suitable Scenarios:

Energy

Extraction

Cleaning

Global Supercritical CO2 Equipment Market, Segmentation by Application:

Energy Sector

Pharmaceutical Sector

Food Sector

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Environmental Sector

Other

Companies Profiled:

Mitsubishi

extraktLAB

Apeks Supercritical

Thar Process

Borisbang Industrial Technology

LABOAO

Supercritical Fluid Technologies

FeyeCon

SFE Process

Vitalis

Separeco

Hightech Extracts

Accudyne Systems

Joda Technology

Isolate Extraction

Eden Labs

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MRX Technologies

Dense Fluid Degreasing

Extratex

?krlj doo

CAREDDI

Cedarstone Industry

Buffalo Extraction Systems

Tradematt

Amar

OCO Labs

Key Questions Answered:

1. How big is the global Supercritical CO2 Equipment market?
2. What is the demand of the global Supercritical CO2 Equipment market?
3. What is the year over year growth of the global Supercritical CO2 Equipment market?
4. What is the production and production value of the global Supercritical CO2 Equipment market?
5. Who are the key producers in the global Supercritical CO2 Equipment market?
6. What are the growth factors driving the market demand?

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