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Amine-Based Carbon Capture Market Opportunity, Growth Drivers, Industry Trend Analysis, and Forecast 2025 - 2034

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Abstracts

The Global Amine-Based Carbon Capture Market was valued at USD 656.6 million in 2024 and is estimated to grow at a CAGR of 6.1% to reach USD 1.2 billion by 2034, as global efforts ramp up to combat greenhouse gas emissions, particularly carbon dioxide released from power plants and heavy industries. As countries set ambitious carbon neutrality goals, demand for efficient, scalable, and cost-effective carbon capture technologies continues to rise. Amine-based carbon capture is emerging as one of the most dependable solutions, offering a practical way to significantly reduce emissions without overhauling existing infrastructure. Companies, governments, and research institutions are heavily investing in the development of advanced amine solvents and systems, recognizing their potential to transform the energy and manufacturing sectors.

This market is driven not only by regulatory pressure but also by growing investor interest in sustainable technologies. As carbon pricing mechanisms tighten and decarbonization becomes central to corporate strategies, businesses are seeking reliable, long-term solutions that ensure compliance while supporting sustainability commitments. Moreover, the growing push for circular carbon economies is reinforcing the need for technologies that capture, recycle, and even permanently remove CO?. In this context, amine-based carbon capture offers a proven track record of performance and flexibility. It can be deployed at industrial scale today while also serving as a platform for innovation, including integration with carbon utilization and storage systems. With advancements in material science, process engineering, and automation, this market is expected to continue expanding rapidly, offering significant opportunities for new entrants and established players alike.

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Amine-based capture technology is known for its high efficiency, particularly in post-combustion applications where flue gases are rich in carbon dioxide. The process relies on aqueous amine solutions to chemically absorb CO?, which is then released during the regeneration phase, allowing the solvent to be reused in continuous cycles. This technology is especially well-suited for retrofitting existing coal and gas-fired power plants, as well as other industrial facilities, without the need for extensive modifications. The increasing urgency to meet climate targets and reduce industrial carbon footprints is pushing innovation in this field, with an emphasis on improving solvent performance, increasing CO? loading capacity, and reducing the energy required for regeneration.

One of the most forward-looking developments in this space is direct air capture using solid sorbents enhanced with amines. Although more energy-intensive than capturing emissions at the source, this technology holds the potential to reverse emissions by extracting CO? directly from the atmosphere. As attention shifts toward net-negative emission strategies, this approach is gaining traction among climate tech investors and governments alike.

Recent R&D efforts are focused on improving the selectivity and reactivity of amine-based solvents, aiming to reduce overall operational costs while enhancing capture efficiency. This includes the development of new solvent formulations with higher thermal stability and lower degradation rates. Innovations are being driven by cross-sector collaboration involving chemical engineers, environmental scientists, and clean energy specialists, all working toward making carbon capture systems more viable for large-scale deployment. These advancements are particularly important in hard-to-abate sectors like cement, steel, and refining, where electrification is not a feasible path to decarbonization.

The monoethanolamine (MEA) segment accounted for a dominant 38.6% market share in 2024. Known for its strong affinity to carbon dioxide and its ability to form stable carbamate compounds, MEA remains a cornerstone of chemical absorption systems. Its

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reliability, operational consistency, and widespread availability have made it a go-to choice for post-combustion capture, particularly in legacy energy infrastructure.

Post-combustion capture technologies led the market with a 53.1% share in 2024, largely because of their seamless integration into existing systems. Industries favor this method as it allows them to reduce carbon emissions with minimal disruption to operations. Supported by decades of pilot testing, commercial projects, and engineering improvements, post-combustion capture continues to be the most practical and widely adopted solution.

The United States Amine-Based Carbon Capture Market was valued at USD 190.4 million in 2024. Federal incentives like tax credits, coupled with flexible state-level regulations, have made the U.S. a leading market for carbon capture innovation. Fast-track permitting for Class VI wells by the Environmental Protection Agency and delegated state authorities has shortened project timelines and boosted investor confidence, further accelerating deployment.

Key industry players include Toshiba Energy Systems & Solutions, Linde PLC, Mitsubishi Heavy Industries, Fluor Corporation, Koch-Glitsch, Shell CANSOLV, BASF SE, Pentair, Carbon Clean, and GEA Group. These companies are focusing on enhancing solvent regeneration efficiency, launching modular carbon capture units, and scaling up pilot projects into full-scale commercial operations. Their efforts are helping to drive down costs and improve the scalability of next-generation amine systems across a wide range of industrial applications.

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Contents

CHAPTER 1 METHODOLOGY & SCOPE

1.1 Market scope & definition
1.2 Base estimates & calculations
1.3 Forecast calculation
1.4 Data sources
  1.4.1 Primary
  1.4.2 Secondary
    1.4.2.1 Paid sources
    1.4.2.2 Public sources
1.5 Primary research and validation
  1.5.1 Primary sources
  1.5.2 Data mining sources

CHAPTER 2 EXECUTIVE SUMMARY

2.1 Industry synopsis, 2021-2034

CHAPTER 3 INDUSTRY INSIGHTS

3.1 Industry ecosystem analysis
  3.1.1 Key manufacturers
  3.1.2 Distributors
  3.1.3 Profit margins across the industry
  3.1.4 Supply disruptions
3.2 Trump administration tariffs
  3.2.1 Impact on trade
    3.2.1.1 Trade volume disruptions
    3.2.1.2 Retaliatory measures
  3.2.2 Impact on the industry
    3.2.2.1 Supply-side impact (raw materials)
      3.2.2.1.1 Price volatility in key materials
      3.2.2.1.2 Supply chain restructuring
      3.2.2.1.3 Production cost implications
    3.2.2.2 Demand-side impact (selling price)
      3.2.2.2.1 Price transmission to end markets
      3.2.2.2.2 Market share dynamics

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3.2.2.2.3 Consumer response patterns
3.2.3 Key companies impacted
3.2.4 Strategic Industry Responses
3.2.4.1 Supply Chain Reconfiguration
3.2.4.2 Pricing and Product Strategies
3.2.4.3 Policy Engagement
3.2.5 Outlook and Future Considerations
3.3 Trade statistics (HS Code)
3.3.1 Major Exporting Countries
3.3.2 Major Importing Countries
3.4 Profit margin analysis
3.5 Key news & initiatives
3.6 Regulatory landscape
3.7 Impact forces
3.7.1 Growth drivers
3.7.1.1 Increasing deployment of monoethanolamine in post-combustion CO? capture in coal-fired power plants
3.7.1.2 Technological improvements in methyldiethanolamine blends for natural gas sweetening
3.7.1.3 Rising investments in direct air capture (DAC) using amine-functionalized solid sorbents
3.7.2 Industry pitfalls & challenges
3.7.2.1 High energy penalty and operational costs associated with solvent regeneration
3.7.2.2 Corrosiveness of certain amines, requiring expensive materials for plant infrastructure
3.8 Growth potential analysis
3.9 Porter’s analysis
3.10 PESTEL analysis

CHAPTER 4 COMPETITIVE LANDSCAPE, 2024

4.1 Introduction
4.2 Company market share analysis
4.3 Competitive positioning matrix
4.4 Strategic outlook matrix

CHAPTER 5 MARKET ESTIMATES AND FORECAST, BY TYPE OF AMINES, 2021–2034 (USD MILLION) (KILO TONS)

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5.1 Key trends
5.2 Monoethanolamine
5.3 Diethanolamine
5.4 Methyldiethanolamine
5.5 Triethanol amine
5.6 Others

CHAPTER 6 MARKET ESTIMATES AND FORECAST, BY APPLICATION, 2021–2034 (USD MILLION) (KILO TONS)

6.1 Key trends
6.2 Post-combustion capture
6.3 Pre-combustion capture
6.4 Direct air capture
6.5 Others

CHAPTER 7 MARKET ESTIMATES AND FORECAST, BY REGION, 2021–2034 (USD MILLION) (KILO TONS)

7.1 Key trends
7.2 North America
  7.2.1 U.S.
  7.2.2 Canada
7.3 Europe
  7.3.1 Germany
  7.3.2 UK
  7.3.3 France
  7.3.4 Spain
  7.3.5 Italy
  7.3.6 Netherlands
7.4 Asia Pacific
  7.4.1 China
  7.4.2 India
  7.4.3 Japan
  7.4.4 Australia
  7.4.5 South Korea
7.5 Latin America
  7.5.1 Brazil

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7.5.2 Mexico
7.5.3 Argentina
7.6 Middle East and Africa
7.6.1 Saudi Arabia
7.6.2 South Africa
7.6.3 UAE

CHAPTER 8 COMPANY PROFILES

8.1 BASF SE
8.2 Carbon Clean
8.3 Fluor Corporation
8.4 GEA Group
8.5 Koch-Glitsch
8.6 Linde PLC
8.7 Mitsubishi Heavy Industries
8.8 Pentair
8.9 Shell CANSOLV
8.10 Toshiba Energy Systems & Solutions

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