

CO2 Utilization (CO2-to-Products) Reactors

ANMD-MRS14-138 · Carbon Management & Climate Technologies

A Global Sustainability Due Diligence & Market Research Study

History 2020–2024 · Base Year 2025 · Forecast 2025–2032 · Outlooks 2035 / 2040 / 2050 · Currency US\$

WHY THIS REPORT

CO₂ utilisation reactors convert captured carbon dioxide into useful products — fuels, chemicals, building materials and polymers — turning a waste stream into feedstock. The technology spans thermocatalytic, electrochemical and biological conversion routes producing e-fuels, chemicals and mineralised materials. This decision-grade study sizes the global market three ways — value, CO₂ utilised and reactors — across conversion route, product category, application and end-user, across seven regions and four scenarios to 2032, with outlooks to 2050.

SUSTAINABILITY & SDG IMPACT — THE ANMD LENS

Sustainability here depends on lifecycle rigour — utilisation delivers benefit only when energy inputs are clean and storage durable. Lifecycle-net-benefit integrity and product permanence are therefore the decisive variables the analysis screens throughout.

Mapped Sustainable Development Goals:

SDG 13 Climate Action	SDG 9 Industry & Innovation	SDG 12 Responsible Consumption	SDG 7 Affordable Clean Energy	SDG 17 Partnerships for Goals
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Measurable sustainability outcomes assessed:

- Revenue-generating CO₂ offtake and a commercial pull for capture
- Displacement of fossil feedstocks in fuels and chemicals
- Durable mineralised products that lock CO₂ into materials
- Lifecycle-net-benefit and energy-input emissions as material risks

Framework alignment: Double materiality mapped to GRI, SASB, ISSB, TCFD, TNFD, CSRD and the EU Taxonomy, with greenwashing and SDG-washing screens applied throughout.

WHAT'S INSIDE AT A GLANCE

53 Chapters	9 Report Parts	7 Regions Covered	40+ Country Markets
2025–32 Forecast Horizon	4 Forward Scenarios	25+ Companies Profiled	5 SDGs Mapped

REPORT COVERAGE

Geographic scope: North America, Europe, Asia Pacific, Latin America, Africa, Middle East and Rest of World — with named country intelligence. Europe leads e-fuels and chemicals (Germany, the Nordics); North America scales on CO₂-to-products (United States) on venture funding and clean energy; Asia Pacific is the fastest-growing engine; other regions assessed on their own merits.

MARKET OVERVIEW

From lab to first commercial reactors — where captured carbon becomes feedstock.

CO₂ utilisation is moving from lab to first commercial reactors, monetising captured carbon. Demand is driven by e-fuel mandates, low-carbon-materials demand and CO₂-offtake needs, against high energy and hydrogen input cost, scale-up limits and product-market competitiveness. The market is read three ways — value, CO₂ utilised and reactors — and forecast under four scenarios, each region reported separately.

- **Europe leads e-fuels and chemicals** — Germany and the Nordics, on e-fuel mandates and green-chemical demand
- **North America scales on CO₂-to-products** — United States and Canada, on venture funding, low-cost clean energy and materials and fuels ventures
- **Asia Pacific grows fastest** — Japan, China and South Korea, on chemical-industry scale and CO₂-utilisation programmes
- **Clean-energy cost is the differentiator** — low-cost renewable electricity and hydrogen determine which conversion routes reach viability

REGIONAL OUTLOOK

Across seven reporting regions, the report separates deployment leaders from high-growth and emerging markets — each profiled in full rather than aggregated into Rest of World.

Region	Stage	Lead Country Markets & Drivers
Europe	E-fuels leader	Germany, Nordics — e-fuel mandates, green chemicals
North America	CO ₂ -to-products scale	United States, Canada — venture funding, fuels & materials
Asia Pacific	Fastest growth	Japan, China, South Korea — chemical-industry scale, utilisation
Middle East	Emerging investor	UAE, Saudi Arabia — low-cost energy, e-fuel investment
Latin America	Emerging	Brazil, Chile — green-hydrogen-linked conversion
Africa	Frontier	South Africa, Egypt — green-fuel export potential

KEY MARKET DRIVERS & RESTRAINTS

Drivers	Restraints
• E-fuel & SAF mandates • Low-carbon-materials & green-chemical demand • CO₂-offtake monetisation • Electrochemical & biological conversion gains • Low-cost renewable energy & hydrogen	• High energy & hydrogen input cost • Scale-up & reactor-efficiency limits • Product-market competitiveness • Lifecycle-benefit & accounting scrutiny • CO₂-supply & purity dependency

SEGMENTATION SNAPSHOT

By Conversion Route	CO ₂ -to-fuels · CO ₂ -to-chemicals · CO ₂ -to-building-materials · electrochemical conversion · biological conversion
By Product Category	E-fuels / SAF · chemicals & polymers · building materials · specialty
By Application	Fuels · chemicals · materials · specialty
By End User	Industrial emitters · corporates · project developers · governments
By Business Model	Equipment sales · EPC · Capture-as-a-Service / offtake
By Scale	Pilot · demonstration · commercial / megatonne-scale

TABLE OF CONTENTS — PARTS & CHAPTERS

The full report is organised into nine parts across 53 chapters, listed below. Detailed sub-headings, country tables and directories are provided in the full report.

Part I — Report Foundation, Discovery and Strategic Intelligence

- › Chapter 1. Scope, Methodology and Report Architecture
- › Chapter 2. Industry Discovery Summary — CO₂ Utilization (CO₂-to-Products) Reactors
- › Chapter 3. Executive Intelligence and Decision Dashboard
- › Chapter 4. Strategic Findings, Materiality and Investment Verdict Preview

Part II — Market Intelligence, Sizing, Forecasting and Segmentation

- › Chapter 5. Industry Overview and Market Evolution
- › Chapter 6. Market Dynamics
- › Chapter 7. Global Market Size and Forecast, 2020–2032
- › Chapter 8. Market Segmentation Analysis
- › Chapter 9. End-User and Demand-Side Intelligence
- › Chapter 10. Pricing, Cost and Commercial Model Intelligence

Part III — Regional and Country Intelligence

- › Chapter 11. Global Regional Intelligence Framework
- › Chapter 12. North America Market Intelligence
- › Chapter 13. Europe Market Intelligence
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Part IV — Technology, Innovation and Category-Specific Intelligence

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- › Chapter 20. Emerging and Next-Generation Technology Intelligence
- › Chapter 21. Category-Specific Intelligence Module
- › Chapter 22. Research, Innovation and Funding Landscape

Part V — Company, Competition, Patent and Project Intelligence

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- › Chapter 28. Sustainability Intelligence Suite
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- › Chapter 41. Investment, Sustainable Finance and Bankability Intelligence

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- › Chapter 44. Risk Register, RAG Rating and Anti-Greenwashing Screen
- › Chapter 45. Bottom-Line Verdict and Strategic Recommendations
- › Chapter 46. Implementation Roadmap and Stakeholder Playbooks

Part IX — Annexes, Directories and Reference Material

- › Chapter 47. Methodology Annex
- › Chapter 48. Corporate Directory and Company Intelligence Annex
- › Chapter 49. Patent Directory and Patent Intelligence Annex
- › Chapter 50. Project Intelligence Annex
- › Chapter 51. Forecast Annex
- › Chapter 52. Sustainability KPI Annex
- › Chapter 53. Reference Annexes

COMPETITIVE & INVESTMENT SNAPSHOT

The competitive field spans biological-conversion pioneers, electrochemical and e-fuel specialists, and methanol and materials innovators. Deal activity — M&A, technology acquisition and platform expansion — signals a market consolidating around scalable, bankable, deployment-ready solutions.

Representative players profiled in the full report:

LanzaTech Global, Inc. · Twelve Benefit Corporation · Carbon Recycling International hf. · Sunfire GmbH · Climeworks AG · and further profiled conversion and e-fuel innovators

Investment intelligence: venture, infrastructure, development, climate and blended finance, green bonds and sustainability-linked loans — culminating in a bankability assessment and a clear investment verdict.

KEY QUESTIONS THIS REPORT ANSWERS

- ? How large is the global CO₂ utilisation market, and how fast will it grow to 2032?
- ? Which regions, routes and product categories offer the strongest risk-adjusted opportunity?
- ? How do energy input, conversion efficiency and lifecycle benefit change the economics?
- ? Who leads, and where is the competitive and patent white space?
- ? Is the investment case bankable — and under what conditions?
- ? How does the category align with the SDGs, lifecycle-integrity and disclosure regulation?

WHY ANMD — THE DIFFERENCE

Most market studies stop at tonnes and revenue. This report is built as a sustainability due diligence instrument — fusing market sizing with ESG, SDG, climate, carbon-integrity and natural-capital intelligence and a decision-ready bankability verdict in a single architecture.

- **Triangulated sizing** — every market read three ways (value (US\$), CO₂ utilised (MtCO₂/yr) and reactors) so value, capacity and volume views reconcile rather than conflict.
- **Region-honest forecasting** — Latin America, Africa and the Middle East reported in full, never hidden inside Rest of World, every forecast resolved to the 2025 base year.
- **Integrated evidence base** — company, patent and project databases linked to the analysis, with published-filing patents and FTO treated as an indicator, not a legal conclusion.
- **No-fabrication discipline** — every estimate carries a data-confidence rating and disclosed sources; gaps are flagged for further diligence, never filled with invented numbers.
- **Anti-greenwashing rigour** — SDG-washing and greenwashing screens plus claim-substantiation checks built into the ESG and project analysis.
- **Decision-first structure** — 9 Parts and 53 Chapters culminating in stakeholder playbooks and a clear, conditions-based investment verdict.

WHO SHOULD BUY THIS REPORT

Investors and venture / PE funds, chemical and fuel producers, building-materials makers, e-fuel and electrochemical developers, project developers, CO₂ suppliers, policymakers, lenders and ESG teams, plus strategic corporate planners and decision-makers.

Access the Full Report

The complete report delivers all 53 chapters in full, with every sub-heading, country table, company and patent directory, forecast model and due diligence checklist.

Purchase at www.anewmarketdynamics.com · Standard & Premium licences · Single-Site (SSL) and Global-Site (GSL) options at checkout.

Want the Complete Detailed Table of Contents?

This prospectus lists the nine parts and 53 chapters. The complete detailed table of contents — every sub-heading, country table, exhibit, company and patent directory and annex — is available on request to registered users. To receive it, register with your official company email at www.anewmarketdynamics.com. The full detailed table of contents will be sent directly to your registered company email address.