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

CO_2 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, CO_2 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	SDG 9	SDG 12	SDG 7	SDG 17
Climate Action	Industry & Innovation	Responsible Consumption	Affordable Clean Energy	Partnerships for Goals

Measurable sustainability outcomes assessed:

- Revenue-generating CO_2 offtake and a commercial pull for capture
- Displacement of fossil feedstocks in fuels and chemicals
- Durable mineralised products that lock CO_2 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 CO_2-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.

CO_2 utilisation is moving from lab to first commercial reactors, monetising captured carbon. Demand is driven by e-fuel mandates, low-carbon-materials demand and CO_2-offtake needs, against high energy and hydrogen input cost, scale-up limits and product-market competitiveness. The market is read three ways — value, CO_2 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 CO_2-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 CO_2-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 • CO_2-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 • CO_2-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.

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 CO_2 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$), CO_2 utilised ($MtCO_2$/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, CO_2 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.