

Direct Air Capture Systems

ANMD-MRS14-132 · 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

Direct air capture (DAC) systems extract CO₂ directly from ambient air — the purest form of engineered carbon removal, generating durable, high-integrity credits independent of any emission source. The technology spans solid-sorbent, liquid-solvent, electrochemical and passive-mineral designs, scaling from modular units to megatonne plants. This decision-grade study sizes the global market three ways — value, capture capacity and units — across capture technology, sorbent type, application and end-user, across seven regions and four scenarios to 2032, with outlooks to 2050.

SUSTAINABILITY & SDG IMPACT — THE ANMD LENS

Sustainability is this report’s backbone — durable removal balanced against energy intensity. DAC offers permanent, verifiable removal, but its large energy demand makes renewable pairing essential to a credible claim, with cost reduction the decisive variable for scale.

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
---------------------------------	---------------------------------------	--	---	---

Measurable sustainability outcomes assessed:

- Permanent, verifiable, source-independent CO₂ removal
- Premium carbon-removal credits and a residual-emissions backstop
- Renewable-energy pairing as the integrity condition
- Energy and land footprint, permanence and verification 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. North America is the scale-up leader (United States) on removal credits and DOE hubs; Europe is the technology leader (Switzerland, United Kingdom, Iceland) on leading developers and storage; the Middle East emerges on sovereign investment; other regions assessed on their own merits.

MARKET OVERVIEW

From pilot plants to the first megatonne facilities — where removal goes durable and verifiable.

Direct air capture is moving from pilot plants to first megatonne facilities, funded by removal credits and public investment. Demand is driven by corporate net-zero commitments, removal-credit premiums and policy support, against very high cost per tonne and large energy requirements. The market is read three ways — value, capture capacity and units — and forecast under four scenarios, each region reported separately.

- **North America leads scale-up** — United States and Canada, on 45Q removal credits, DOE DAC hubs and first megatonne facilities
- **Europe drives technology** — Switzerland, the United Kingdom and Iceland, on leading developers and storage pairing
- **Middle East emerges** — sovereign investment, low-cost energy and CO₂-storage potential in the Gulf
- **Cost trajectory is the differentiator** — the path toward US\$100–200/tonne determines which approaches reach scale

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
North America	Scale-up leader	United States, Canada — 45Q removal credits, DOE DAC hubs, megatonne plants
Europe	Technology leader	Switzerland, United Kingdom, Iceland — leading developers, storage pairing
Middle East	Emerging investor	UAE, Saudi Arabia, Oman — sovereign investment, low-cost energy, storage
Asia Pacific	Developing	Japan, Australia — R&D, storage potential
Latin America	Frontier	Brazil, Chile — renewable-powered DAC potential
Africa	Frontier	Kenya, South Africa — geothermal and renewable DAC potential

KEY MARKET DRIVERS & RESTRAINTS

Drivers	Restraints
<ul style="list-style-type: none"> • Corporate net-zero & removal-credit demand • 45Q removal credits & DOE hubs • Durable, high-integrity carbon removal • Sorbent & electrochemical efficiency gains • Low-cost renewable-energy pairing 	<ul style="list-style-type: none"> • Very high cost per tonne today • Large energy & renewable requirements • Scale-up & first-of-a-kind risk • CO₂-storage availability & permitting • Credit-market durability & verification

SEGMENTATION SNAPSHOT

By Capture Technology	Solid-sorbent DAC · liquid-solvent DAC · electrochemical DAC · passive / mineral DAC · modular DAC units
By Sorbent Type	Amine-functionalised solid · hydroxide solvent · electro-swing · mineral
By Application	Power · industrial · atmospheric / removal
By End User	Industrial emitters · corporates · project developers · governments
By Business Model	Equipment sales · EPC · Capture-as-a-Service
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 — Direct Air Capture Systems
- › 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
- › Chapter 14. Asia Pacific Market Intelligence
- › Chapter 15. Latin America Market Intelligence
- › Chapter 16. Africa Market Intelligence
- › Chapter 17. Middle East Market Intelligence
- › Chapter 18. Rest of World Market Intelligence

Part IV — Technology, Innovation and Category-Specific Intelligence

- › Chapter 19. Technology Landscape and Architecture
- › 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

- › Chapter 23. Competitive Landscape
- › Chapter 24. Company Profiles
- › Chapter 25. Mergers, Acquisitions, Partnerships and Ecosystem Intelligence
- › Chapter 26. Patent Landscape and Intellectual Property Intelligence
- › Chapter 27. Project, Deployment and Case-Study Intelligence

Part VI — Sustainability, ESG, SDG, Climate and Natural-Capital Intelligence

- › Chapter 28. Sustainability Intelligence Suite
- › Chapter 29. ESG Intelligence and Double Materiality
- › Chapter 30. ESG and Sustainability Framework Alignment
- › Chapter 31. SDG Intelligence
- › Chapter 32. Carbon, Net-Zero and Climate-Mitigation Intelligence
- › Chapter 33. Water, Biodiversity and Natural-Capital Intelligence
- › Chapter 34. Circular Economy and Resource-Security Intelligence
- › Chapter 35. Social Impact, Human Capital and Community Intelligence
- › Chapter 36. Climate Risk, Adaptation and Resilience Intelligence

Part VII — Supply Chain, Policy, Legal, Economics and Finance

- › Chapter 37. Value Chain, Supply Chain and Geopolitical Intelligence
- › Chapter 38. Policy, Regulation and Incentive Intelligence
- › Chapter 39. Legal, Contracting and Risk-Allocation Intelligence
- › Chapter 40. Unit Economics, CAPEX, OPEX and Return Analysis
- › Chapter 41. Investment, Sustainable Finance and Bankability Intelligence

Part VIII — Scenario, Future Intelligence and Final Due Diligence Verdict

- › Chapter 42. Scenario Analysis and Future Intelligence
- › Chapter 43. Sustainability Due Diligence Framework and Data-Room Index
- › 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 pioneering DAC developers, oil-major-backed ventures, and next-generation electrochemical and mineral 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:

Climeworks AG · 1PointFive, Inc. (Carbon Engineering / Occidental Petroleum Corporation) · Global Thermostat (Zero Carbon Systems, Inc.) · Heirloom Carbon Technologies, Inc. · Mission Zero Technologies Ltd. · and further profiled developers and 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 direct air capture market, and how fast will it grow to 2032?
- ? Which regions, countries and technologies offer the strongest risk-adjusted opportunity?
- ? How fast does cost per tonne fall, and which approaches reach commercial scale?
- ? 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, removal-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\$), capture/abatement capacity (MtCO₂/yr) and units) 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 infrastructure / PE funds, corporate net-zero buyers, DAC developers and EPCs, energy and storage operators, technology licensors, 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.