

Bioenergy with Carbon Capture and Storage (BECCS) Systems

ANMD-MRS14-137 · 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

BECCS systems combine bioenergy with carbon capture and storage — generating energy from biomass while capturing and permanently storing the biogenic CO₂, yielding net-negative emissions. The technology spans biomass-power, biogas, bioethanol, pulp-and-paper and waste-biomass pathways. This decision-grade study sizes the global market three ways — value, capture capacity and units — across feedstock pathway, configuration, 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 — and its sharpest debate. BECCS offers durable removal with energy output, but biomass sustainability and land-use raise serious questions that lifecycle rigour must address before a credible net-negative claim can stand.

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:

- Durable carbon removal coupled with energy or fuel output
- Premium removal credits from net-negative pathways
- Retrofit of existing bioenergy assets
- Biomass and land-use sustainability and lifecycle integrity 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 is the flagship leader (United Kingdom, Sweden) on biomass-power BECCS; North America is ethanol-driven (United States) on bioethanol 45Q and biomass CO₂; Asia Pacific grows on biomass; other regions assessed on their own merits.

MARKET OVERVIEW

From concept to flagship removal projects — where bioenergy goes net-negative.

BECCS is moving from concept to flagship removal projects, driven by negative-emission demand and removal credits. Demand is driven by net-zero pathways, removal-credit premiums and biogenic-CO₂ availability, against biomass-sustainability, feedstock-supply and permanence concerns. The market is read three ways — value, capture capacity and units — and forecast under four scenarios, each region reported separately.

- **Europe leads flagship projects** — the United Kingdom and Sweden, on biomass-power and bioenergy BECCS projects targeting megatonne removal
- **North America scales on ethanol** — United States and Canada, on 45Q credits and low-cost biogenic CO₂ from bioethanol and biomass
- **Asia Pacific grows on biomass** — Japan and Australia, on biomass power with storage and removal ambition
- **Removal permanence is the differentiator** — durable geologic storage of biogenic CO₂ distinguishes BECCS from temporary nature-based removal

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	Flagship leader	United Kingdom, Sweden — biomass-power BECCS, megatonne removal
North America	Ethanol-driven	United States, Canada — bioethanol 45Q, biomass CO ₂
Asia Pacific	Biomass growth	Japan, Australia — biomass power, storage
Latin America	Bioenergy hub	Brazil — sugarcane ethanol BECCS potential
Middle East	Emerging	UAE — emerging removal investment
Africa	Frontier	South Africa — biomass and removal potential

KEY MARKET DRIVERS & RESTRAINTS

Drivers	Restraints
<ul style="list-style-type: none"> • Net-zero & negative-emission demand • Removal-credit premiums & 45Q • Low-cost biogenic CO₂ (ethanol, biomass) • Existing bioenergy-asset retrofit • Storage & hub infrastructure 	<ul style="list-style-type: none"> • Biomass sustainability & land-use concern • Feedstock supply & competition • Storage availability & permanence • Project cost & financing risk • Lifecycle-emissions & accounting scrutiny

SEGMENTATION SNAPSHOT

By Feedstock Pathway	Biomass-power BECCS · biogas / biomethane BECCS · bioethanol BECCS · pulp & paper BECCS · waste-biomass BECCS
By Configuration	Retrofit bioenergy · new-build integrated · co-located storage
By Application	Power · industrial · atmospheric / removal
By End User	Bioenergy operators · 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 — Bioenergy with Carbon Capture and Storage (BECCS) 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
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- › 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

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- › Chapter 25. Mergers, Acquisitions, Partnerships and Ecosystem Intelligence
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- › Chapter 41. Investment, Sustainable Finance and Bankability Intelligence

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

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- › 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 biomass-power operators, bioenergy and agribusiness majors, and capture-technology providers. 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:

Drax Group plc · Stockholm Exergi AB · Mitsubishi Heavy Industries, Ltd. · Aker Carbon Capture ASA · Archer-Daniels-Midland Company · and further profiled operators and technology providers

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 BECCS market, and how fast will it grow to 2032?
- ? Which regions, feedstocks and pathways offer the strongest risk-adjusted opportunity?
- ? How do biomass sustainability, lifecycle emissions and permanence change the removal case?
- ? 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, bioenergy and biomass-power operators, agribusiness and ethanol producers, capture-technology vendors, project developers, CO₂-storage operators, 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.