



2024 CDR Market

Year in review

Executive Summary

Offtake Market Trends

- In 2024, purchases increased by 7.5 million tonnes of CO₂, making the cumulative CDR market 2.4 times larger than it was a year ago.
- **Biomass-CDR leads** the 2024 purchase market with 82% of annual CDR credit purchases, up from 73% in 2023.
- Direct Air Capture (DAC) share decreased from 21% in 2023 to 11% in 2024.
- Growth in lower-priced biomass-CDR credit sales limited the total purchase value increase, despite higher total volumes sold.

Key Buyer Trends

- Continued **portfolio approach** amongst buyers. Top repeat buyers purchased credits from an average of 10 projects each.
- Top 3 buyers represent 90% of purchases: this buyer concentration is limiting diversification and raising concerns about future supply sustainability.

Key Supplier Trends

- Dominated by two **BECCS** suppliers (Stockholm Exergi and Ørsted) securing >70% of 2024 offtakes, reflecting recent EU policy updates (EU CRCF).

Regional Insights

- **Scandinavia and North America** governments lead in subsidising private CDR, with focus on BECCS, biochar, and DAC.
- **80% of 2024 issuances** (a proxy for removals) were realised in the Americas, but **60% of 2023–2024 offtakes** were allocated to European projects.

Funding and Investments Insights

- While Biomass-CDR dominated annual purchases it only received 26% of private funding, benefitting from revenue diversification (e.g., dry biochar and bioenergy sales).
- In contrast **DAC remains the top recipient of private investment**, reflecting strong market confidence in its potential, despite its reliance on achieving economies of scale to become viable.
- **Public support picked up greatly**, with Sweden and Denmark committing a combined \$5 billion of public funds.



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2024 | Pathway Summary

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Q4 2024 | Summary

Removal Pathways covered in this report

Direct Air Capture (DAC)

1,000+ years sequestration

Uses chemical processes to capture and separate CO₂ directly from the ambient air, typically using large fan-like machines. Usually combined with a storage solution such as injection into geological reservoirs

Biomass CDR

300+ to 1,000+ years sequestration

Methods using biomass or seaweed as a carbon vehicle to move CO₂ from the atmosphere (via photosynthesis) into long-term storage, through either combustion (BECCS), gasification (bio-oil), pyrolysis (biochar) or preservation (burial or sinking in deep water)

Enhanced Weathering (ERW) & Mineralisation

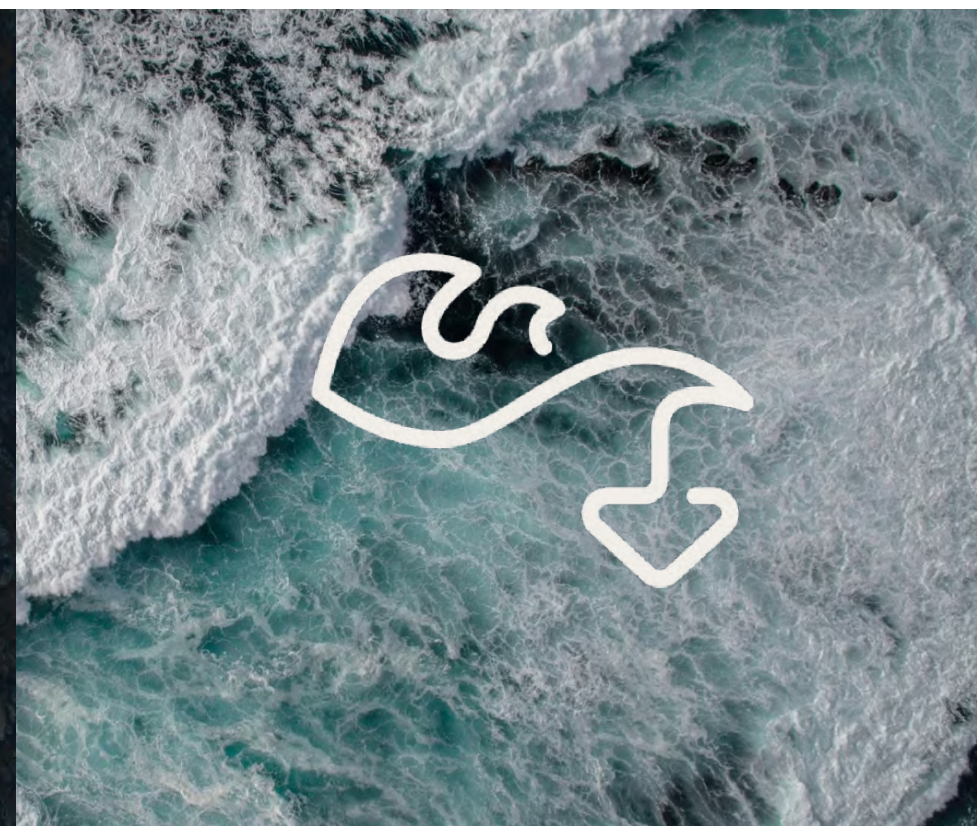
1,000+ years sequestration

Two processes which involve accelerating the natural process of rock weathering or capturing carbon dioxide and storing it in stable mineral forms, effectively locking it away from the atmosphere permanently

Marine CDR

1,000+ years sequestration

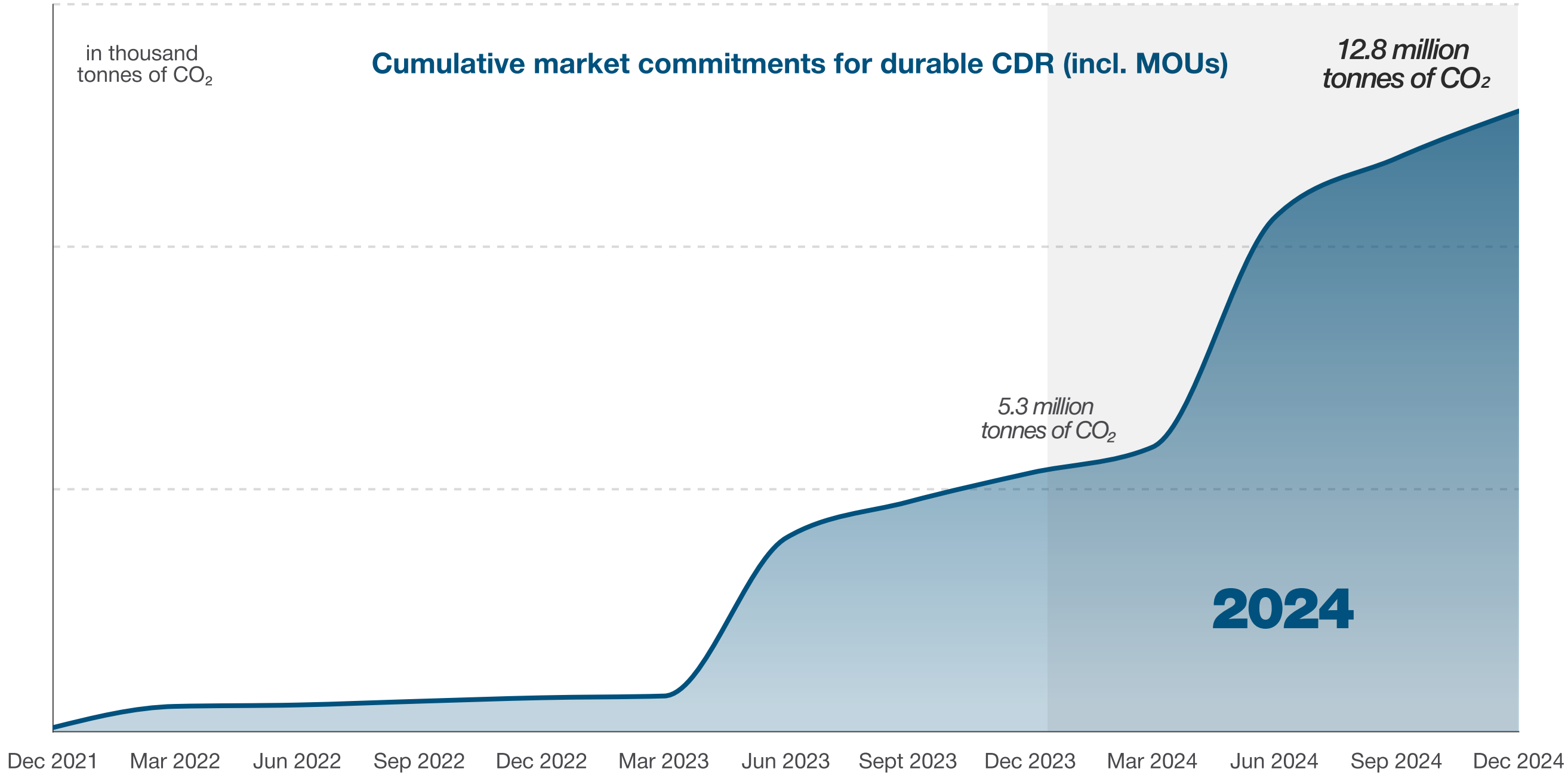
Direct ocean capture involves capturing and storing CO₂ directly from the atmosphere in the deep ocean, while ocean alkalinity enhancement focuses on increasing the ocean's ability to absorb and store CO₂ through the addition of alkaline substances



2024 — Market Trends

01. Market Growth

The cumulative CDR market is now 2.4 times larger than it was a year ago



+7.5Mt

of new CDR contracts in 2024

+61%

Year-on-Year Growth

418kt

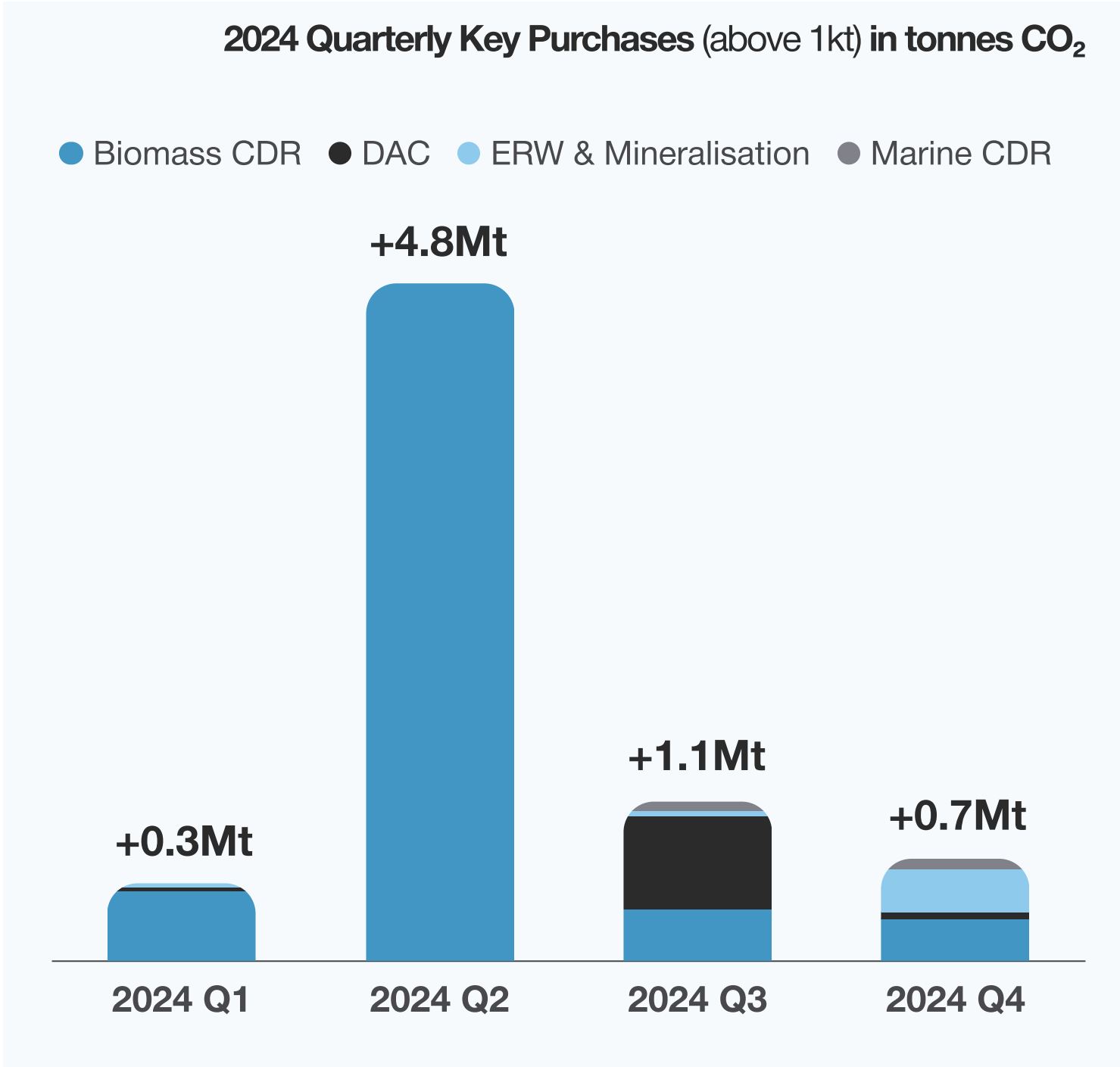
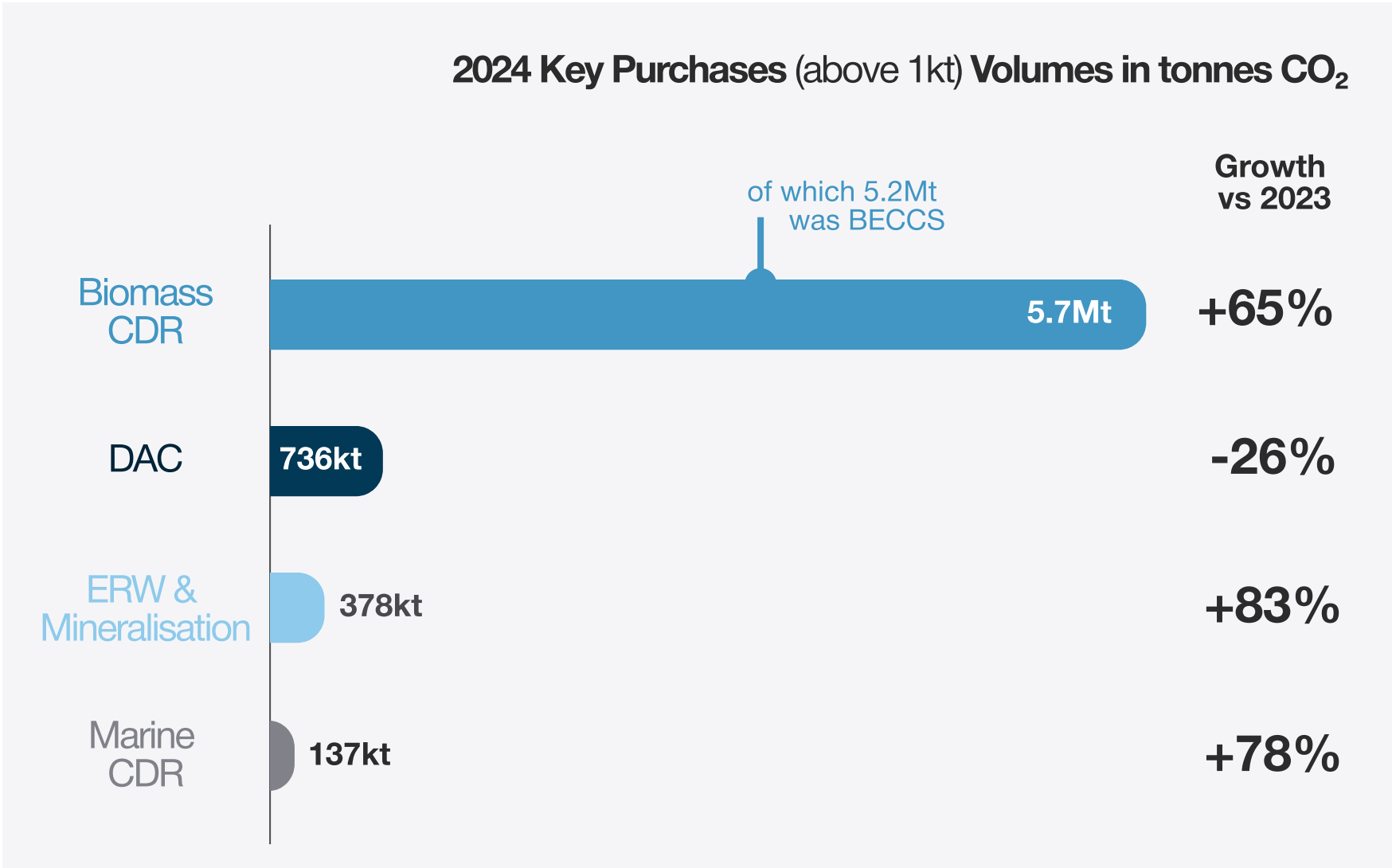
CDR credits issued in 2024

CDR contracts: MOUs, purchases (including pre-purchases, spot purchases, offtake agreements), Source: CDR.fyi

02. Purchase Tonnage

In 2024, Biomass CDR, particularly **BECCS**, leads the purchase market, accounting for 82% of annual carbon removal credit purchases in tonnes (up from 73% in 2023), while DAC's share decreased from 21% to 11%.

7.0 Million tCO₂
key CDR credit purchases* in 2024



Source: ClimeFi analysis, publicly disclosed deals
 Note: * includes only publicly disclosed purchases with identified buyers and specified tonnages, limited to deals exceeding 1 kilotonne.

03 . Purchase Leaderboards

2023

Buyer	Purchased in 2023	% of Total	# projects purchased in 2023
1. Microsoft	3.1Mt	65%	5
2. JP Morgan	0.5Mt	11%	3
3. Amazon	0.4Mt	7%	2
4. Frontier	0.3Mt	7%	6
5. BCG	0.1Mt	3%	2

Supplier	Sold in 2023	% of Total	# buyers sold to in 2023
1. Ørsted	2.8Mt	58%	1
2. CO280	0.5Mt	9%	1
3. Heirloom	0.3Mt	7%	2
4. 1PointFive	0.3Mt	6%	3
5. CarbonCapture Inc.	0.2Mt	4%	3



2024

Buyer	Purchased in 2024	% of Total	# projects purchased in 2024
1. Microsoft	5.0Mt	72%	11 (+120% YoY)
2. Frontier	0.9Mt	13%	8 (+33% YoY)
3. Equinor	0.3Mt	5%	1
4. Google	0.3Mt	4%	2
5. BCG	0.1Mt	1%	8 (+300% YoY)

Supplier	Sold in 2024	% of Total	# buyers sold to in 2024
1. Stockholm Exergi	3.6Mt	52%	2
2. Ørsted	1.3Mt	19%	2 (+100% YoY)
3. 1PointFive	0.5Mt	7%	4 (+33% YoY)
4. Terradot	0.3Mt	4%	2
5. CO280	0.2Mt	3%	1 (+0% YoY)

Key Buyers trends

- Continued **Portfolio approach**. The top repeat buyers (Microsoft, Frontier, BCG) bought credits from an **average of 10 projects** each.
- Top 5 Buyers annual purchases increased 50% from 4.4Mt in 2023 to **6.7Mt in 2024**.
- Top 3 buyers represent 90% of purchases: this buyer concentration is limiting diversification and raising concerns about future supply sustainability.

Key Suppliers trends

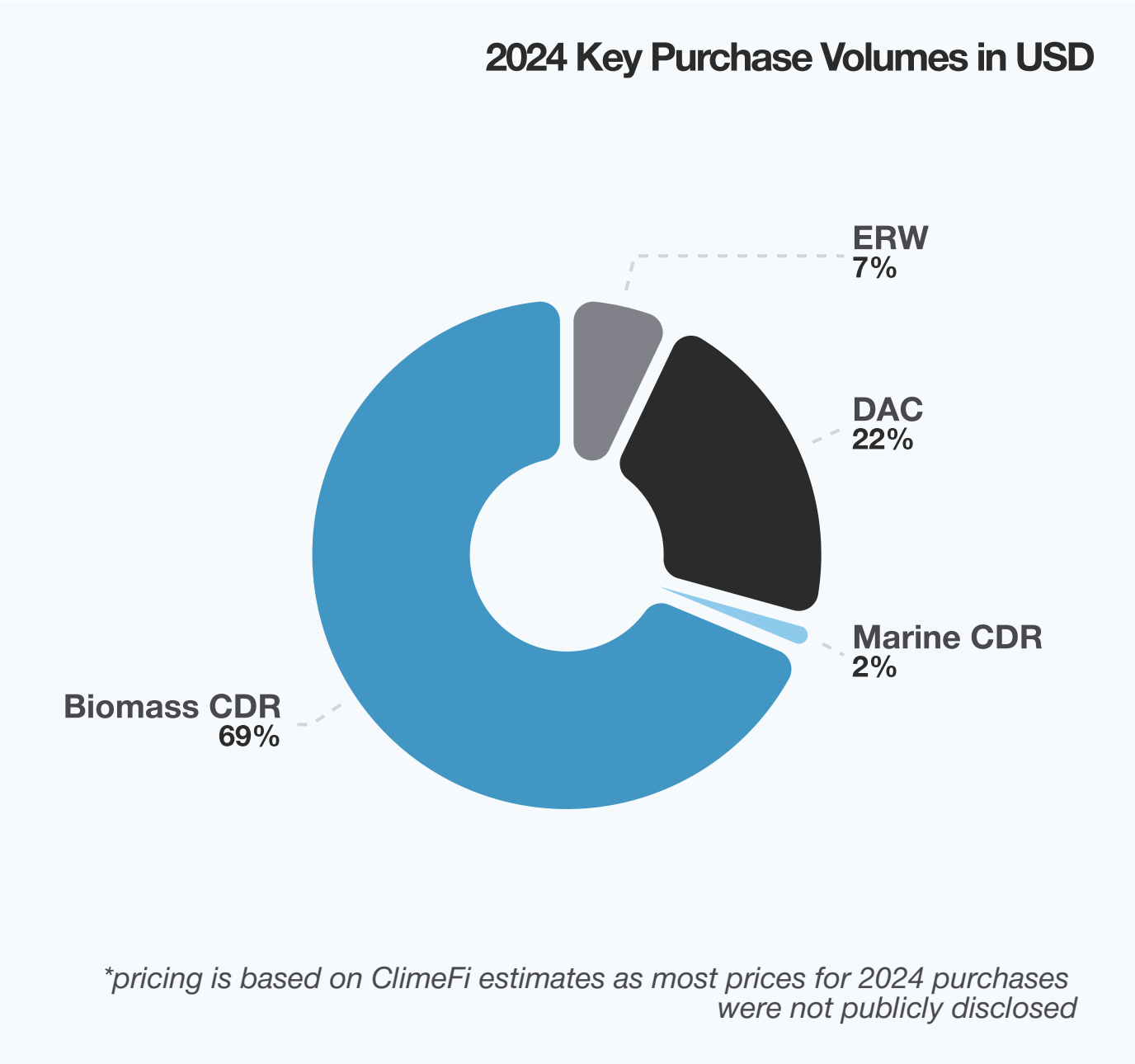
- Still dominated by BECCS (Stockhold Exergi, Ørsted, and CO280) and DAC (1PointFive, Heirloom, CarbonCaptureInc.)
- **Enhanced Weathering** (Terradot) joins the Big League

**These leaderboards include only publicly disclosed purchases with identified buyers and specified tonnages, limited to deals exceeding 1 kilotonne.*

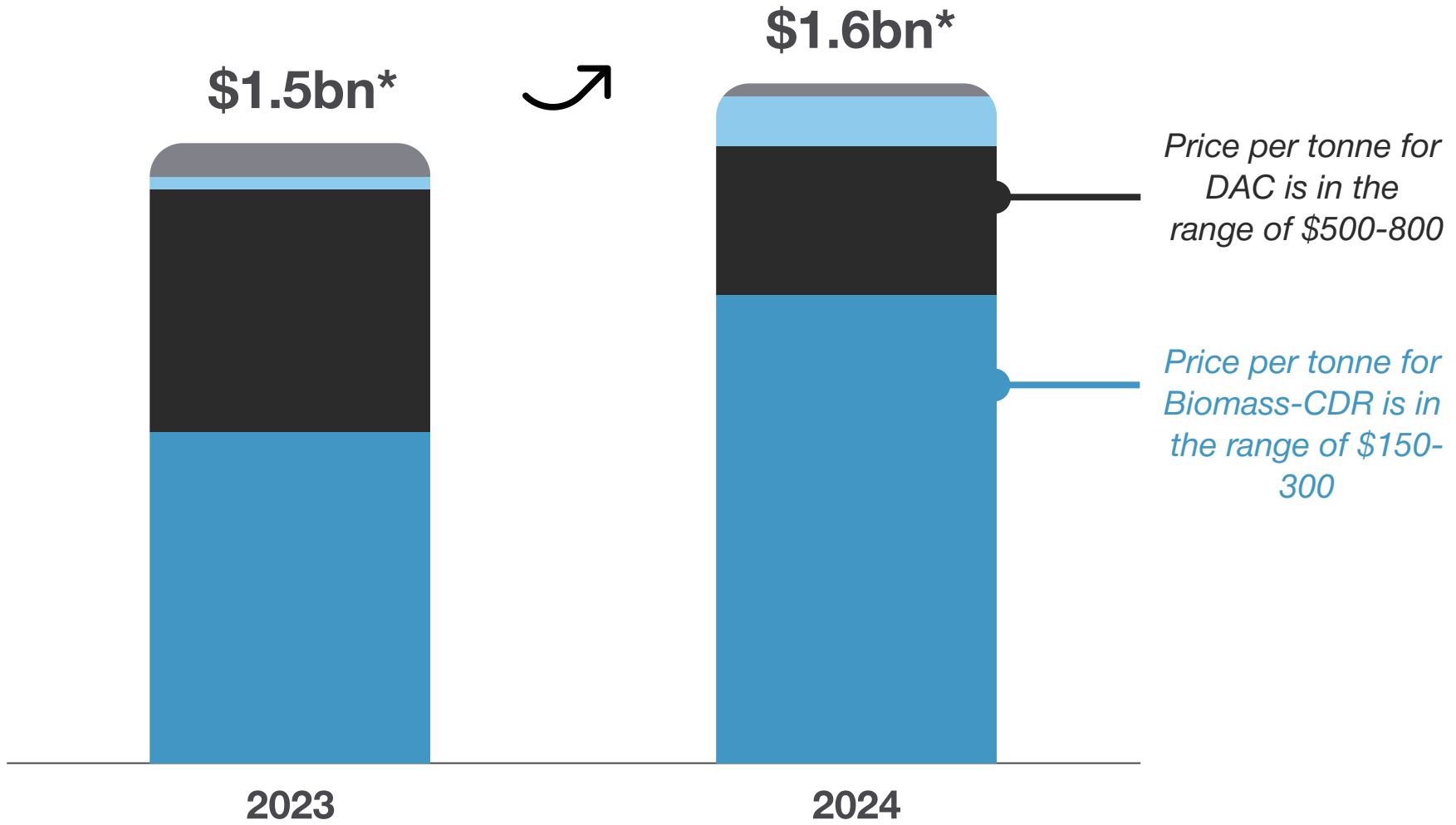
04. Purchase Economic Value

\$1.5 billion - \$1.7 billion*
key CDR credit purchases in 2024

In 2024, the total purchase value saw a **modest increase**, despite higher credit volumes sold, due to the proportionally greater growth of lower-priced Biomass-CDR compared to DAC.



● Biomass CDR ● DAC ● Marine CDR ● ERW & Mineralisation



05 . Public Funding Activity

Scandinavia and North America take the lead in subsidising private carbon removal initiatives, with a focus on **BECCS, biochar and DAC**.

\$7.2 billion
public support announced in 2024



\$3.4bn
public support

- In August 2024, Sweden introduced its much-anticipated [reverse auction system](#) for **BECCS**, allocating **36 billion SEK (\$3.4BN)** over 15 years. It was approved by the European Commission on 2nd July. The call for proposals closed on Nov 21, 2024.
- The Swedish Energy Agency aims to remove 30 million tonnes of CO₂ during this period, making it one of the largest CDR public support mechanisms globally.



\$1.8bn
public support

- On 17 April 2024, the [NECCS fund](#) of **\$370m** was completed, and the Danish Energy Agency awarded contracts to three **BioCCS** companies for a total of \$166 million, including BioCirc and The Carbon Removers.
- On 24 June 2024, Denmark passed a law imposing a [carbon tax](#) on all livestock emissions. Proceeds from this tax will be used to establish the Green Area Fund, **\$1.44bn** of which will be **earmarked for biochar carbon removal**.



\$1.8bn
Notice of Intent

- As part of the Biden-Harris Administration’s Investing in America [agenda](#), the U.S. Department of Energy (DOE) Office of Clean Energy Demonstrations (OCED) issued a [Notice of Intent \(NOI\)](#) on 20th September to fund **up to \$1.8 billion** for the **design, construction, and operation of mid- and large-scale commercial DAC facilities** and infrastructure scaling platforms.
- It remains uncertain how the Trump administration will proceed with this NOI.



up to
\$0.2bn
public support

- In its latest federal budget, the [Canadian Government](#) expanded its **\$135 million Low-Carbon Fuel Procurement Program** to **include permanent CDR solutions** aimed at reducing the transportation fleet's carbon intensity. The program starts in 2024-25 and covers an 8-year period.
- Canada Growth Fund (CGF), a public fund announced on 15th August it will [invest \\$100 million in Svante](#), a solid sorbent-based **capture technology provider leveraged for CCS & DAC**.

06 . Public Policy Updates



In April 2024, the European Parliament [approved](#) the **EU Carbon Removals Certification Framework (CRCF)**, establishing the world's first voluntary certification scheme for carbon removals, including permanent removals, carbon farming, and carbon storage in products. In November, the Council [gave the final green light](#) to a regulation establishing this certification framework



In April 2024, Japan [announced](#) that it would allow carbon dioxide removal credits from four project types, including CCUS, coastal blue carbon, BECCS, and DACCS, in its **GX League** emissions trading scheme, making it the first country to incorporate durable CDR credits into its national compliance framework.



In November the U.S. Senate [introduced](#) the bipartisan Carbon Dioxide Removal Investment Act to expand tax credits for carbon removal. Additionally, the White House released the [National Marine Carbon Dioxide Removal Research Strategy](#) to advance research on Marine CDR.



Government of Canada

Canada enacted legislation in June 2024 implementing an investment tax credit for carbon capture, utilisation, and storage projects, which was first announced in the 2021 federal budget and subsequently updated. It offers a **60% tax credit for DAC expenditures** between 2022 and 2030.



COP29
Baku
Azerbaijan

At COP29 in November 2024, parties finally [agreed](#) on the implementation details for Article 6 of the Paris Agreement, paving the way for **operational carbon markets** and potentially helping to restore trust in voluntary carbon markets.



07 Private Funding Activity

\$909 million
private funding in 2024



of which **\$866 million** equity raised

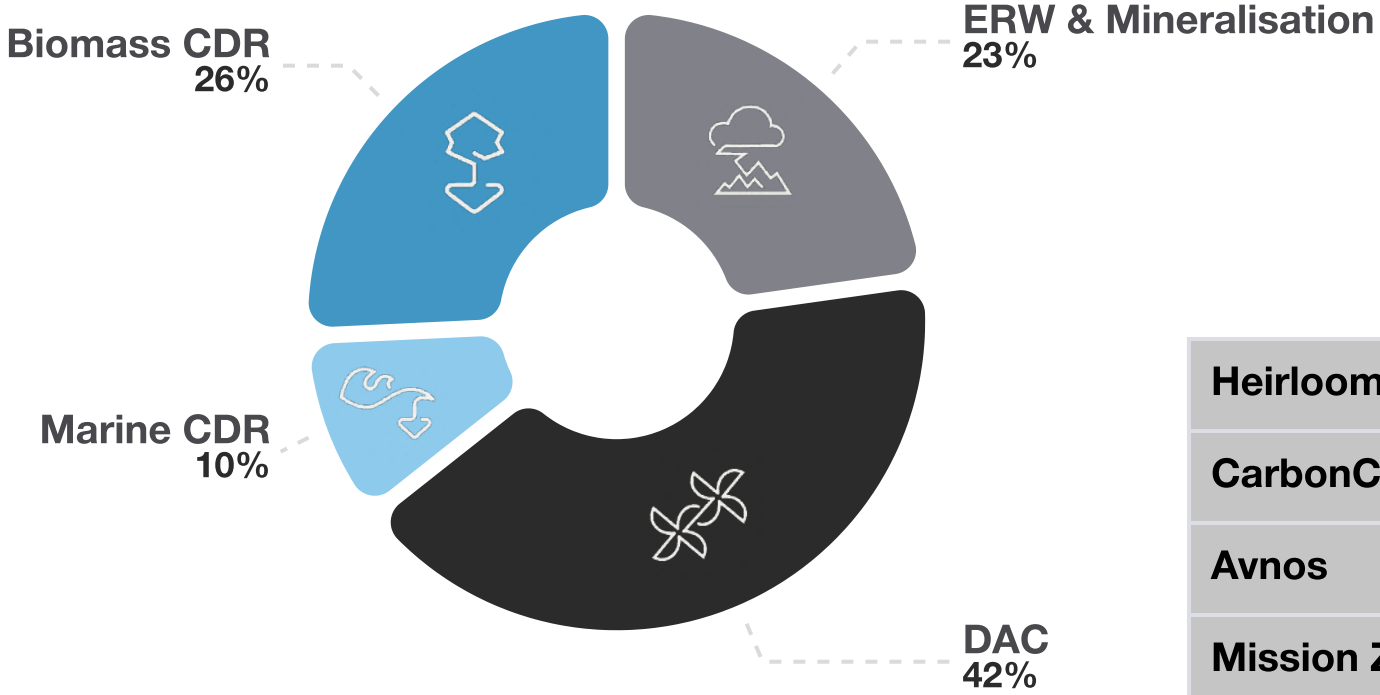
+230%
Year-on-Year Growth

Reverion	\$62,000,000	Series A
Vaulted Deep	\$32,000,000	VC Capital
Graphyte	\$30,000,000	Series A
Novocarbo	\$27,000,000	Growth Funding

Neustark	\$69,000,000	Growth equity
Terradot	\$58,200,000	Seed & Series A
44.01	\$37,000,000	Series A
Paebbl	\$25,000,000	Series A

Captura	\$45,300,000	Series A
Planetary	\$11,350,000	Series A
CarbonBlue	\$10,000,000	Seed
Banyu Carbon	\$6,500,000	Seed

Heirloom	\$150,000,000	Series B
CarbonCapture Inc.	\$80,000,000	Series A
Avnos	\$36,000,000	Series A
Mission Zero	\$28,000,000	Series A



Although **Biomass-CDR** leads in annual purchases and deliveries, it **accounts for only 26% of private funding**. This is largely due to its revenue diversification through co-products like dry biochar and bioenergy sales.


In contrast **DAC remains the top recipient of private investment**, reflecting strong market confidence in its potential, despite its reliance on achieving economies of scale to become viable.


08 . 2024 Issuances

>2MtCO₂
cumulative carbon removed to date

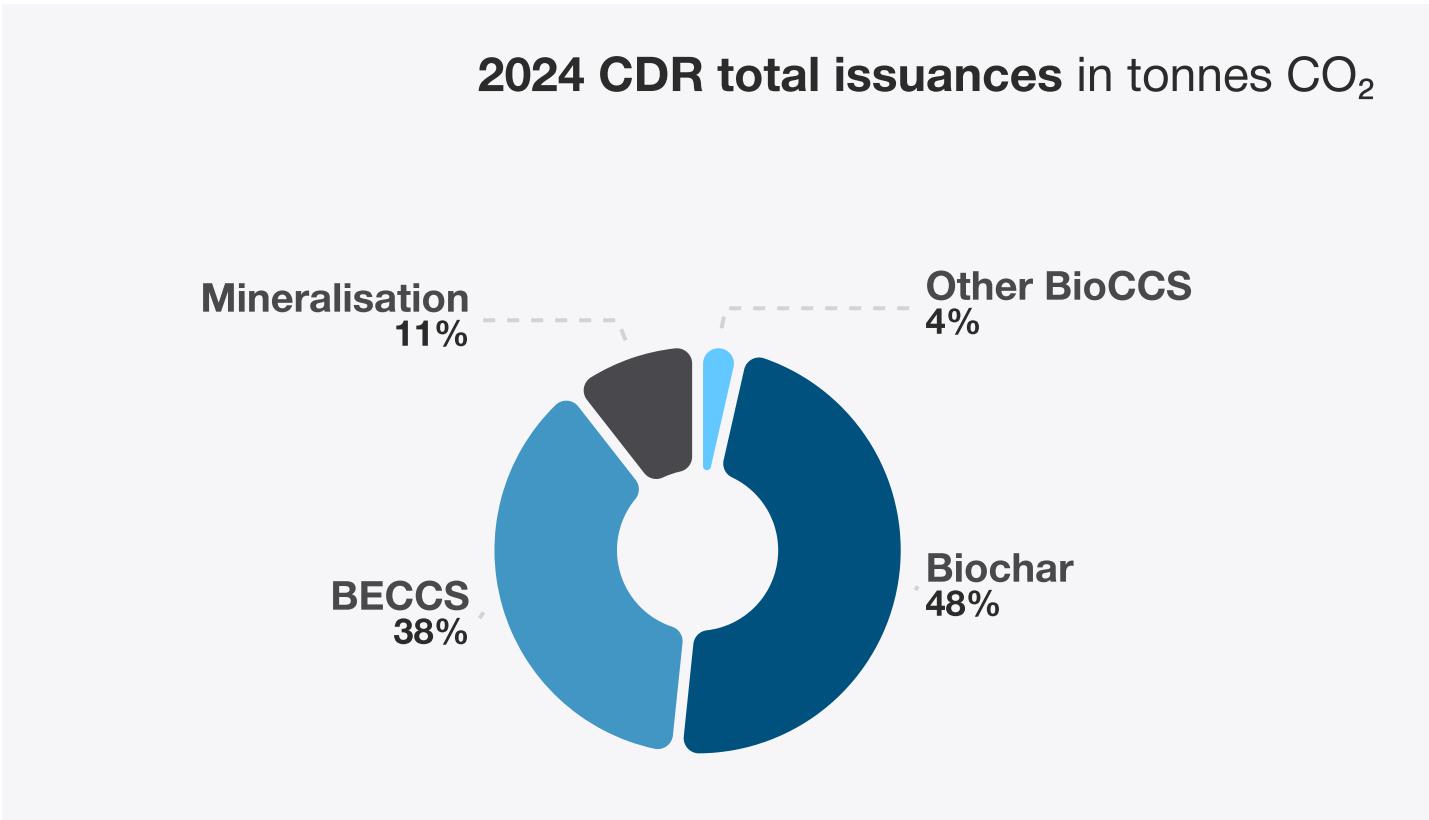
418ktCO₂
CDR credit issuances in 2024

89%
from Biomass-CDR

 **39%**
from Latin America

41%
from USA 

88%
of 2024 credits were issued by 5 projects



Top 5 suppliers (88% of total issuances)	Issued in 2024	% of Total
1. Red Trail Energy (BECCS, USA)	157kt	38%
2. Aperam Bioenergia (Biochar, Brazil)	75kt	18%
3. Exomad (Biochar, Bolivia)	71kt	17%
4. O.C.O Technology (Mineralisation, UK)	44kt	11%
5. Wakefield Biochar (Biochar, USA)	12kt	4%

As of 2024, 80% of CDR is realised in the Americas. However, 60% of 2023 and 2024 offtakes were allocated to European-based projects.

It is worth noting that in 2024, the first issuances were completed for pathways beyond biochar and BECCS, including

- Climeworks (**first DAC credits** under Puro standard),
- Charm Industrial (first **bio-oil credits** under Isometric standard), and
- InPlanet (**first enhanced weathering credits** under Isometric standard).

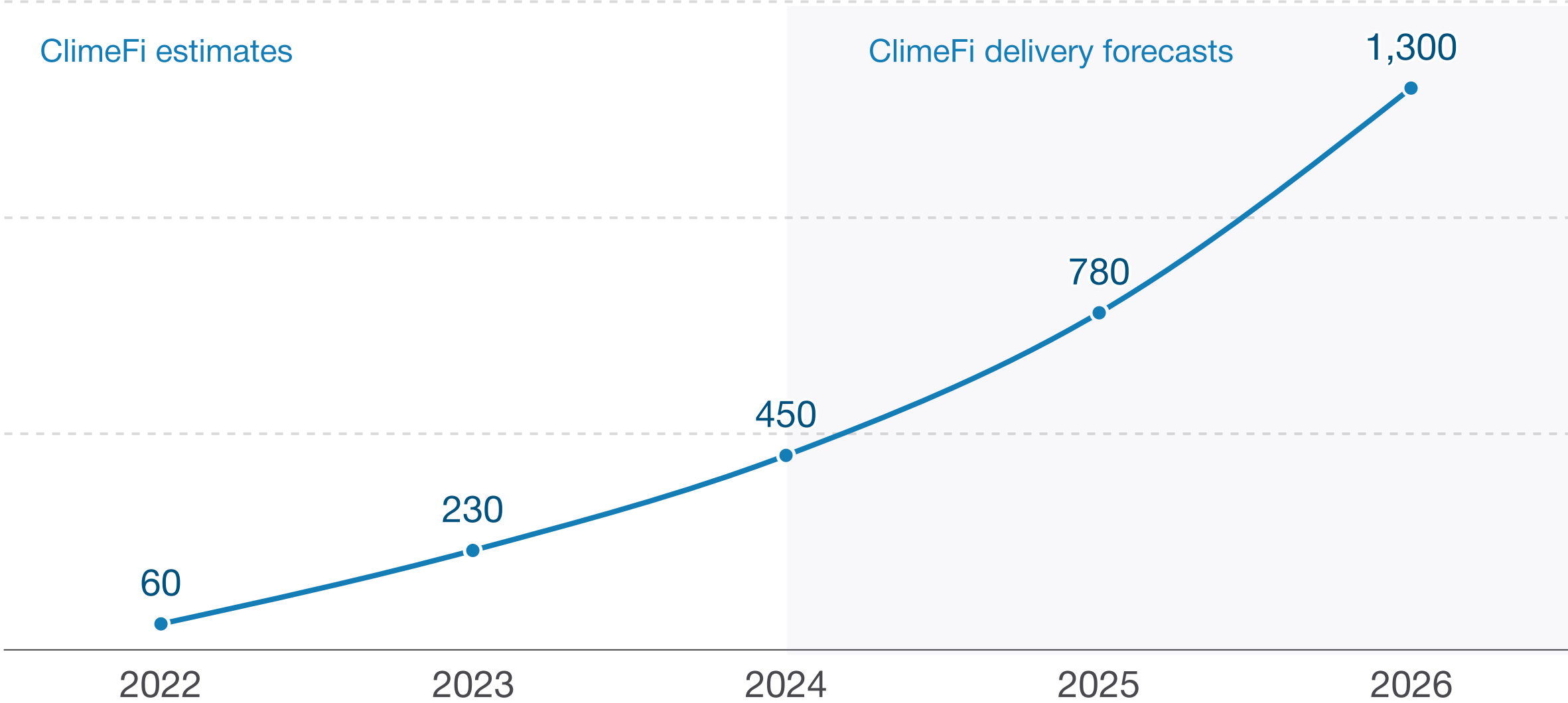
Note: Issuances represent the total number of credits verified and issued by registries to suppliers, while deliveries refer to the credits transferred to buyers. Issuances are a strong proxy for realised removals, as they typically reflect verified removals across most pathways, except for ERW, which may include ex-ante estimates.

Source: ClimeFi analysis based on 1) Puro.earth CORC issuances and 2) Isometric issued carbon removal credits. Pathways attributions were defined by ClimeFi.

09 . Delivery Projections

CDR deliveries expected to **near 1Mt in 2025**, as capacity building in 2024 will bear its fruits.

ClimeFi delivery projection based on key supplier data
in k tonnes of CO₂



Source: ClimeFi analysis. Including artisanal biochar deliveries

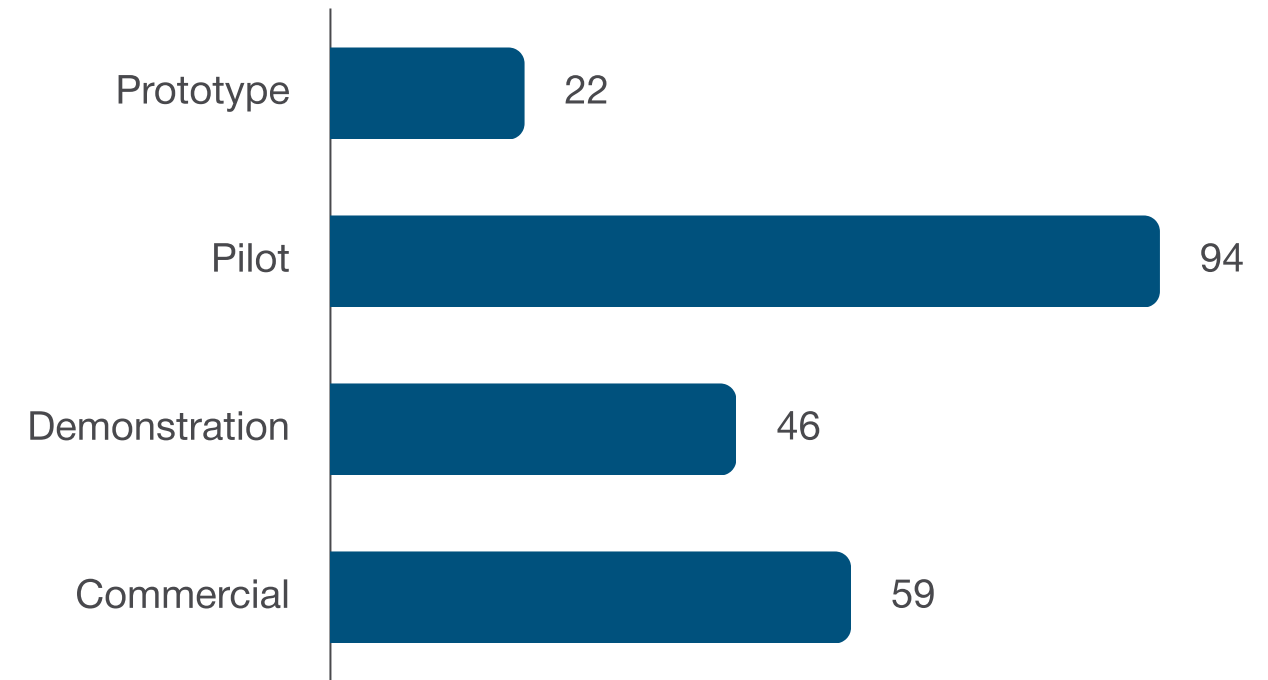


10 . 2024 Market Overview

ClimeFi covers over
| **227 CDR projects**
| **54 projects added in 2024**
| **95% market coverage***
across all CDR pathways

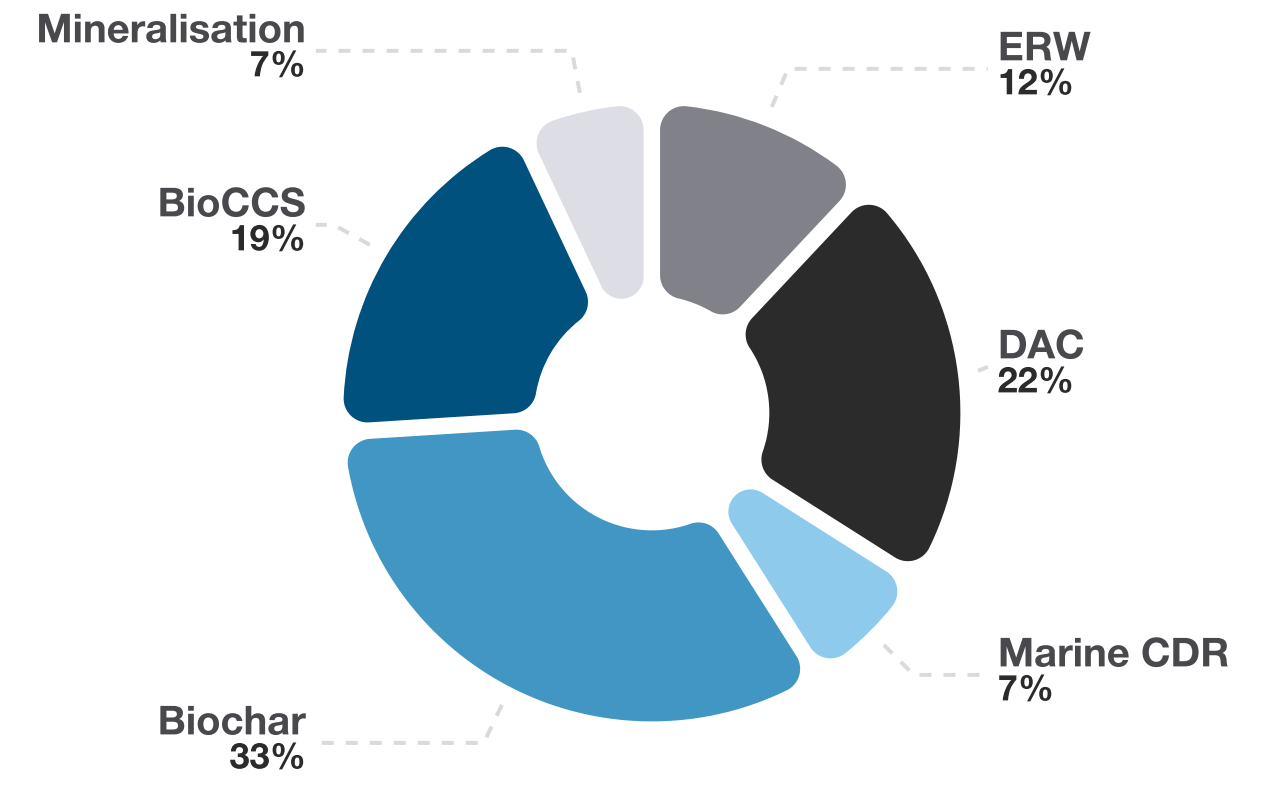
**% of tonnes sold globally from suppliers with whom ClimeFi has commercial relationship*

CDR Distribution (# projects) across development stage



Source: ClimeFi analysis, Note: as covered by ClimeFi - not all projects ready for commercial engagement

CDR Distribution (# projects) across pathways



In 2024, we observed an **upward trajectory** for projects in the **pilot** and **demonstration** stages, as new entrants flourish with more private and government funding flowing into the space.

11 . 2024 Pricing Overview

CDR pricing in 2024 shows an **8% decrease** since 2023 as longer term volumes were sold.

\$ 350

average price per tonne CO₂ as of Dec 2024
— includes SPOT as well as offtake prices

\$95
min price

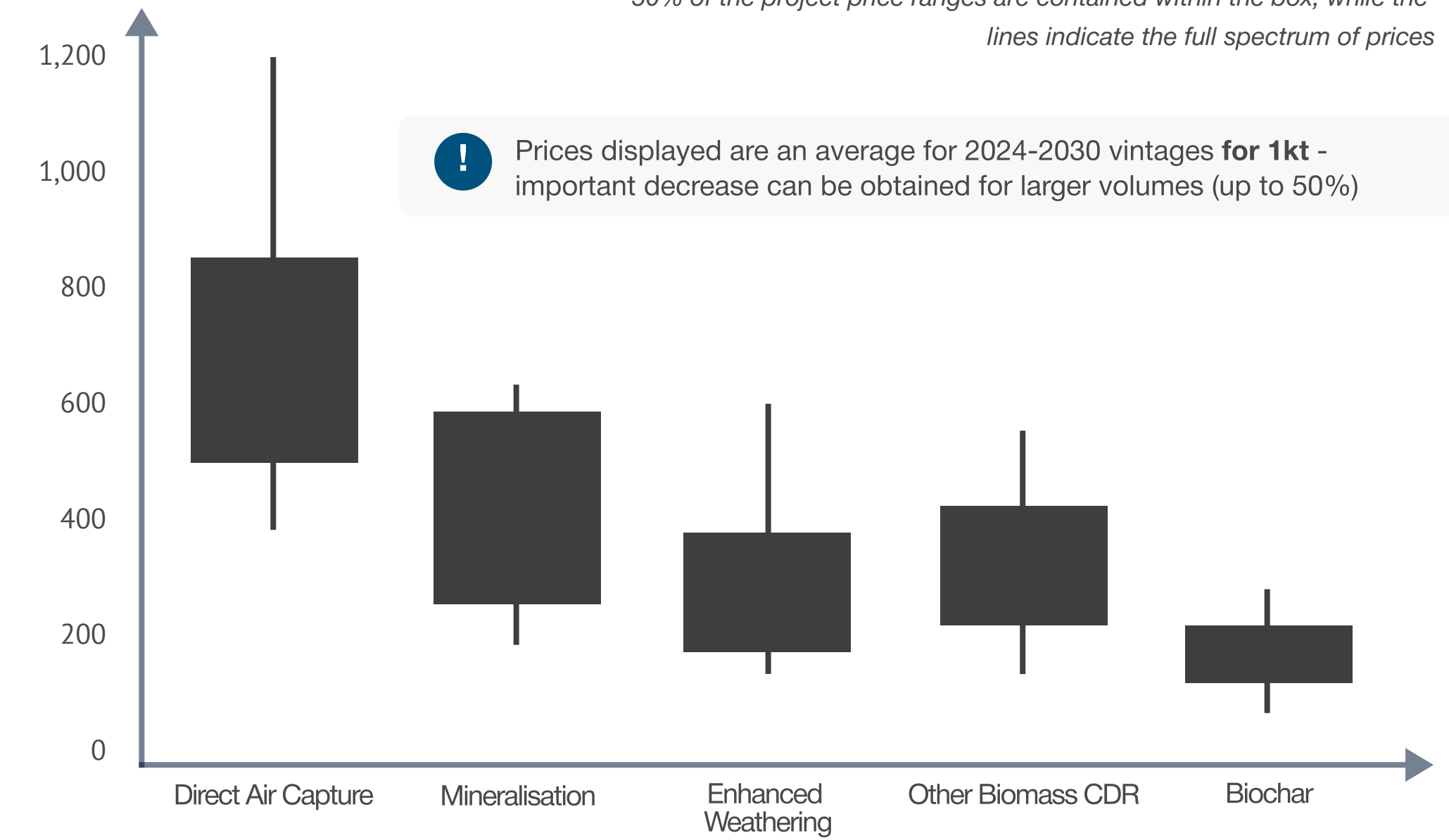
\$1,800
max price

Pathway type	Average sale price USD*
Biochar	\$192
Other Biomass CDR	\$324
Enhanced Weathering	\$327
Mineralisation	\$415
Direct Air Capture	\$665
Ocean CDR	\$803

Price quotes across key removal pathways

50% of the project price ranges are contained within the box, while the lines indicate the full spectrum of prices

\$ price per tonne CO₂

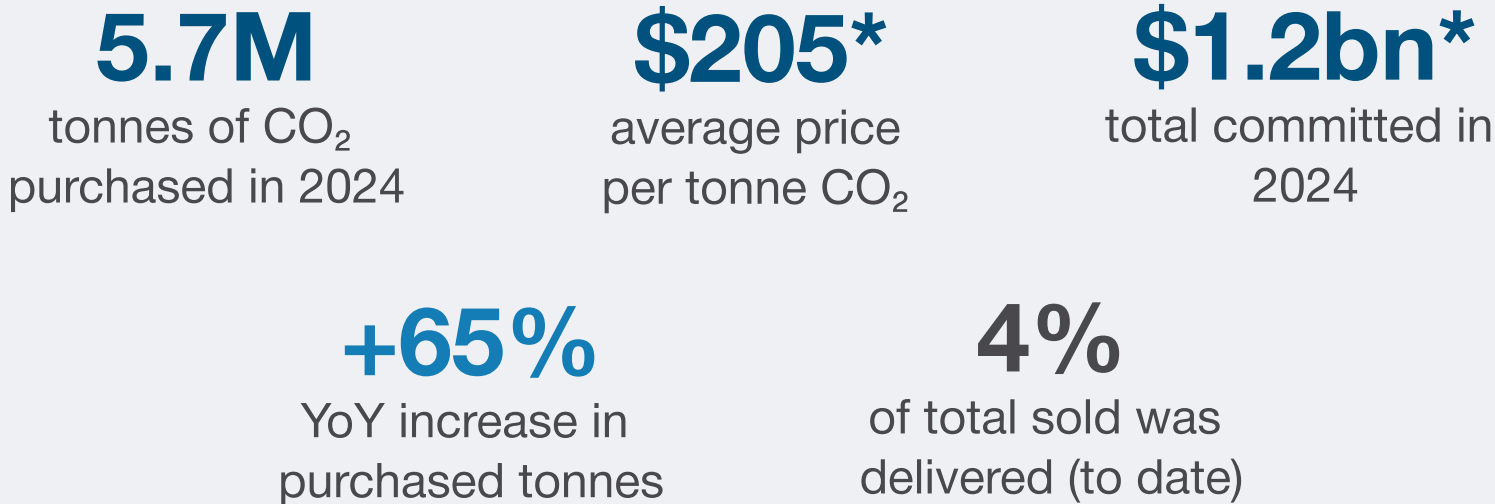


Note: Insufficient market data on Ocean CDR

2024 — Pathway Summary

01. Biomass CDR Summary

Key Datapoints



*Note: *pricing is based on ClimeFi estimates as most prices were not publicly disclosed*

Key Transactions

- **Microsoft** entered into a decade-long offtake agreement with **Stockholm Exergi**, a Swedish energy company installing a carbon removal retrofit on biomass-fueled district heating facility, to buy **3.3 Mt.**
- **Microsoft** extended their current agreement with **Ørsted**, pledging to acquire an **extra 1Mt.** **Equinor** also acquired 330kt. This increase boosted Ørsted's total carbon removal sales to 4Mt.
- **Frontier** entered into a \$58.3 million offtake agreement to purchase 152,480 tonnes of carbon removal from **Vaulted Deep.**

Key Suppliers

CDR contracts in tonnes of CO₂



Key Buyers



Market Insights Swedish BECCS was the star of 2025, with the largest single deal in long-term CDR to date and garnering the largest CDR public support mechanism globally. Overall, 2025 will be pivotal for the European BECCS sector, with most projects reaching their Final Investment Decision (FID) and the release of a dedicated EU BioCCS certification methodology.

02. Direct Air Capture Summary

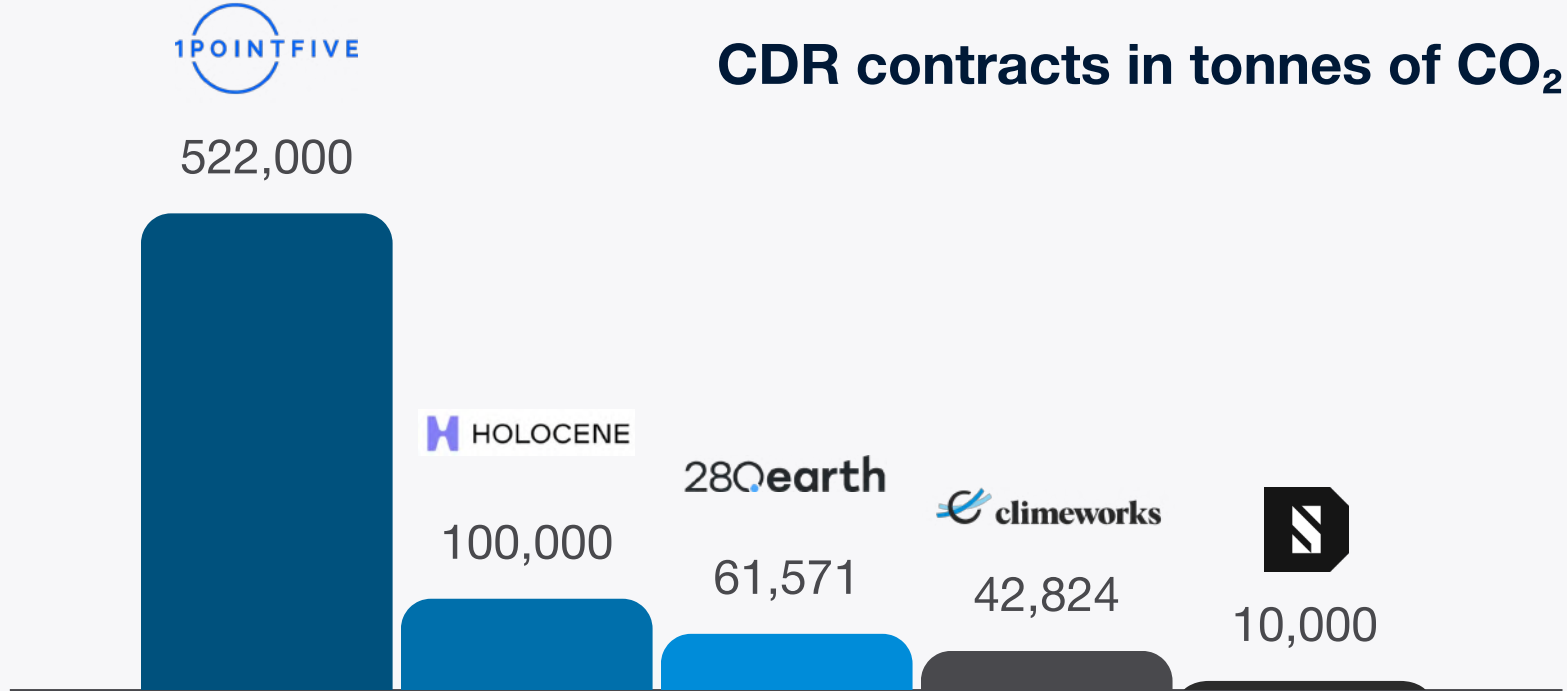
Key Datapoints

<p>740k tonnes of CO₂ purchased in 2024</p>	<p>\$545* average price per tonne CO₂</p>	<p>\$350m* total committed in 2024</p>
<p>-26% YoY decrease in purchased tonnes</p>	<p>0.04% of total sold was delivered (to date)</p>	

*Note: *pricing is based on ClimeFi estimates as most prices were not publicly disclosed*

Key Suppliers

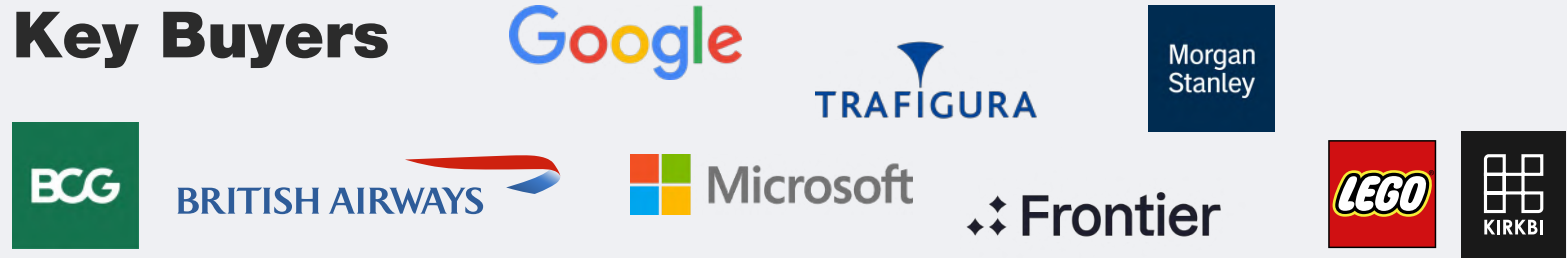
CDR contracts in tonnes of CO₂



Key Transactions

- **BCG** announced a [strategic agreement](#) with **1PointFive**, including the purchase of 21,000 tonnes of CDR credits over three years.
- **Google** [purchased](#) 100,000 carbon credits from **Holocene** for \$10m, marking its first CDR deal. At \$100/t, the price is unusually low, with Holocene targeting \$280 by the 2030s, factoring in \$180/t 45Q tax credit.
- **Morgan Stanley** [purchased](#) its first DAC carbon credits, to remove 40,000 tonnes of CO₂ from **ClimeWorks'** Project Cypress supported by the U.S. Department of Energy.

Key Buyers



Market Insights DAC saw a slowdown in momentum in 2024 versus a booming 2023. That being said, new key buyers such as Google entered the space. Also capacity building is picking up speed as developers are launching commercial-scale operations. 98% of DAC purchases in 2024 were for projects located in the US, which highlights the importance of the 45Q tax credit in fostering the CDR market.

03 . ERW & Mineralisation Summary

Key Datapoints

<p>378k tonnes of CO₂ purchased in 2024</p>	<p>\$310* average price per tonne CO₂</p>	<p>\$115m* total committed in 2024</p>
<p>+83% YoY increase in purchased tonnes</p>	<p>3% of total sold was delivered (to date)</p>	

*Note: *pricing is based on ClimeFi estimates as most prices were not publicly disclosed*

Key Transactions

- **Terradot** simultaneously raised \$58m of series A funding and sold 290,000 tonnes of CDR credits to **Google** and to **Frontier**. Terradot sources basalt from quarries across southern Brazil, transports it to nearby farms where it is spread on farmland to absorb CO₂.
- **AXA Switzerland** purchased from two CDR projects from 2026 to 2030: one in ERW (**InPlanet** for 1,950 tonnes) and one in mineralisation into concrete (**Neustark** for 1,800 tonnes)

Key Suppliers



Key Buyers

Market Insights 78% of ERW & Mineralisation purchased credits in 2024 were for projects located in Brazil, highlighting the need for large spreading surfaces and local access to minerals. The pick-up in purchases was mainly thanks to Terradot's recent momentum in equity funding and offtake offering.

04 Marine CDR Summary

Key Datapoints

137k
tonnes of CO₂
purchased in 2024

\$550*
average price
per tonne CO₂

\$60m*
total committed in
2024

+78%
YoY decrease in
purchased tonnes

0.1%
of total sold was
delivered (to date)

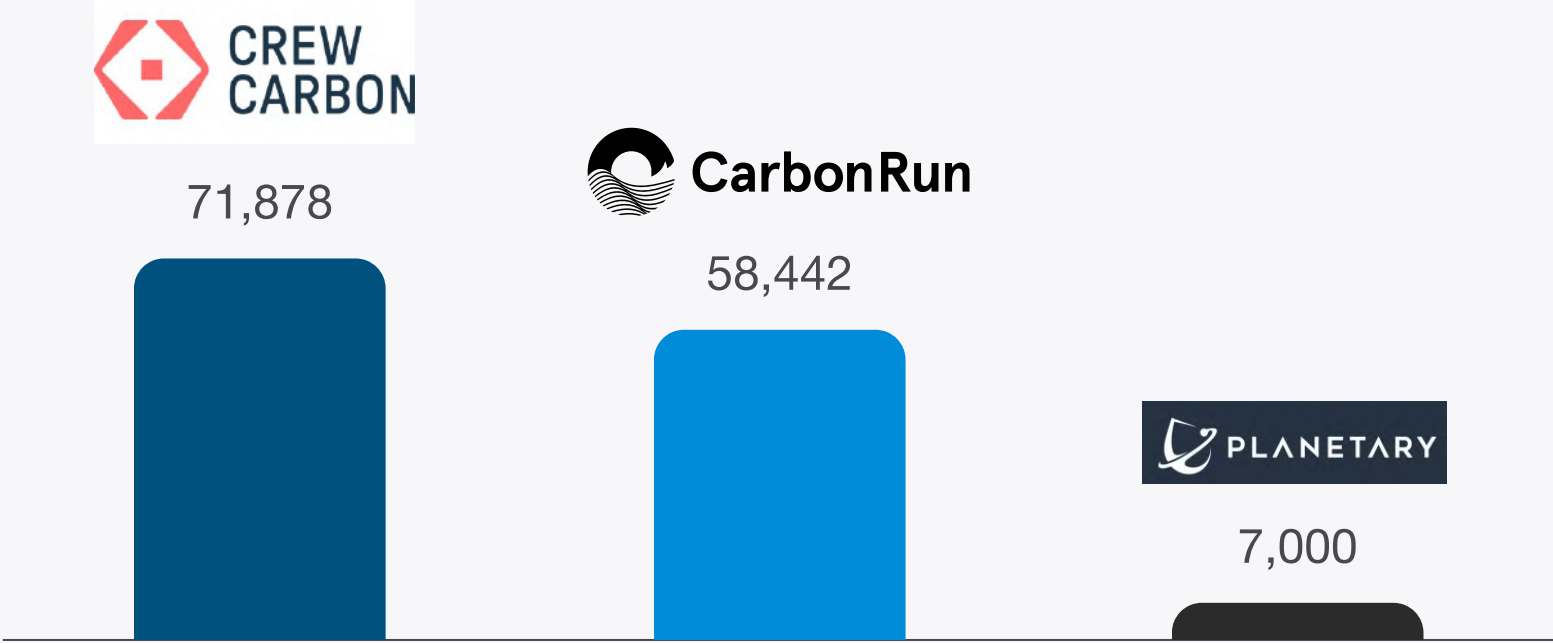
*Note: *pricing is based on ClimeFi estimates as most prices were not publicly disclosed*

Key Transactions

- **CREW Carbon** secured \$32.1 million from **Frontier** buyers to capture 71,878 tons of CO₂ using limestone filtration at municipal wastewater treatment plants.
- **Frontier** buyers will pay river alkalinity enhancement project **CarbonRun** \$25.4 million to remove 55,442 tons of CO₂ between 2025 and 2029. CarbonRun is adding limestone to boost rivers' natural ability to extract CO₂ from the air.

Key Suppliers

CDR contracts in tonnes of CO₂



Key Buyers



Market Insights

Marine CDR continues its year on year expansion in 2024, reaching removal contracts totaling 137k, up from 77k in 2023 and 5k in 2022.

Q4 2024 — Summary

Q4 Key Single Purchases

+908kt CO₂
total CDR credit purchases in Q4 2024

of which **729kt CO₂**
are publicly announced single purchases

+138%
Year-on-Year Growth

Frontier buyer coalition was the biggest purchaser of CDR credits in Q4 2024, with the following purchase agreements:

- Frontier will pay **\$27 million** to enhanced weathering company **Terradot** to remove **90,000 tonnes** of CO₂ from 2025 to 2029
- **CO280** was awarded **\$48 million** to remove **224,500 tonnes** of CO₂ from 2028 to 2030, using oil field CCS technology at paper mill smokestacks
- **CREW Carbon** secured **\$32 million** to capture **71,878 tonnes** of CO₂ using limestone filtration at municipal wastewater treatment plants

386kt
removal commitment

Google purchased **200,000 tonnes** from **Terradot** with the tonnes expected to be delivered by the early 2030's

200kt
removal commitment

Boston Consulting Group (BCG) announced purchases of **50,250 tonnes** of CDR, in a deal facilitated by **ClimeFi**:

- The portfolio of suppliers includes **Andes**, **Euthenia Energy**, **Exomad Green**, **Graphyte**, **Lithos Carbon**, and **O.C.O Technology**
- This is the second largest durable CDR purchase by BCG to date with delivery to be completed by 2026

50kt
removal commitment

Morgan Stanley purchased its first DAC carbon credits, to remove **40,000 tonnes** of CO₂ from **Climeworks**' Project Cypress supported by the U.S. Department of Energy

40kt
removal commitment

Frontier

Google

BCG

through **ClimeFi**

Morgan Stanley

Secure your climate journey



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