



Voluntary Carbon Markets, Overview

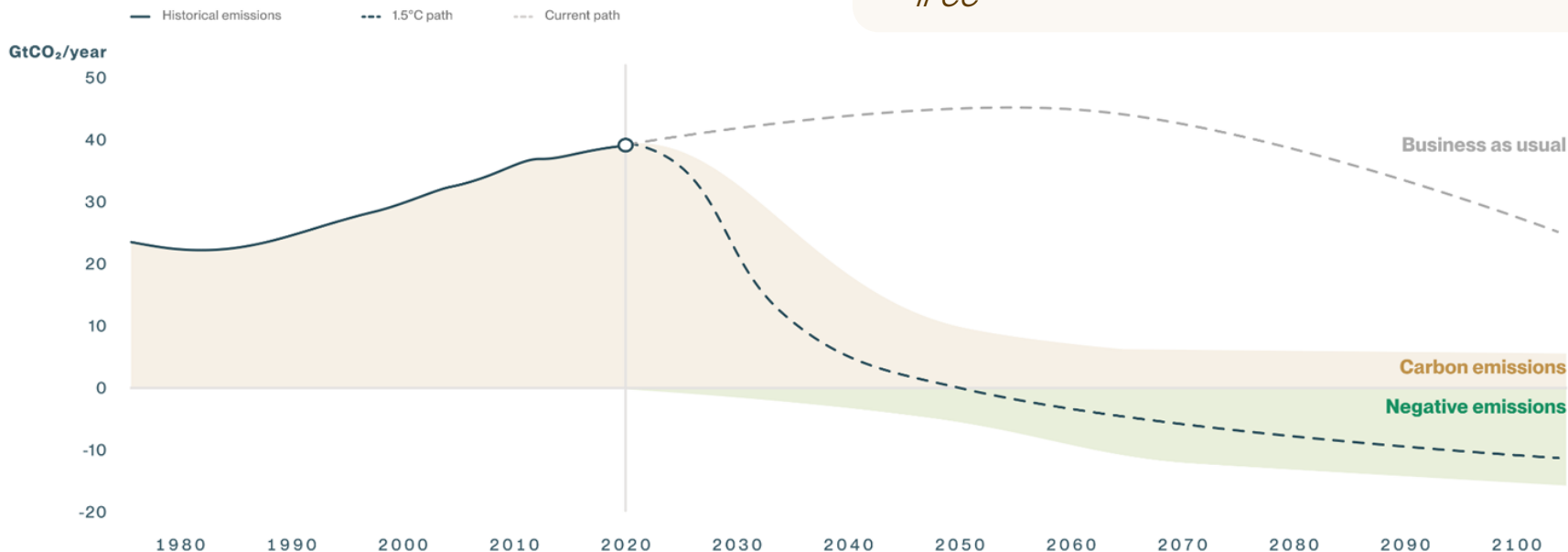
Prepared for JRC Summer
School on Sustainable Finance
June, 2024

If the Paris Agreement is to be achieved, we must not only reduce CO₂ but also *remove* it.

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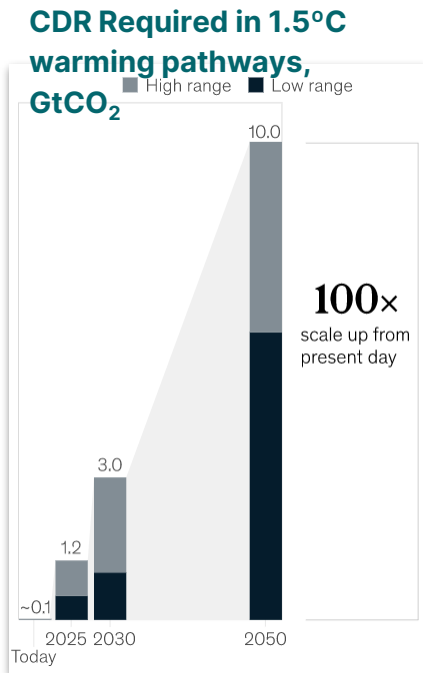
Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in carbon dioxide occur in the coming decades. **All pathways project the use of carbon dioxide removal to compensate for residual emissions.**

IPCC¹



1. IPCC, "Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change", (2021), <https://www.ipcc.ch/report/ar6/wg1/>.

Corporate carbon management strategies can address market deficiencies and accelerate high-impact climate action.



Sources: Carbon Direct; McKinsey, [“How negative emissions can help organizations meet their climate goals”, \(2021\).](#)

We need to build an industry twice the size of the global oil and gas industry, but running in reverse. **Corporate carbon management and commitments play a crucial role.**

Diverse CDR solutions occupy a spectrum from managed ecosystems to engineered solutions.

Higher risk investment opportunities



Ocean Alkalinity Enhancement (OAE)



Advanced Plant Cultivars



Novel Soil Tech



Macroalgae Cultivation

Opportunity to increase confidence with investment



Soil Carbon



Engineered Wood Products



Green Tree Burial



Carbon Mineralization

Technologically ready, continuing to improve



Afforestation/Reforestation



Peatland & Wetland Restoration



Improved Forest Management (IFM)



Biochar



Blue Carbon



Direct Air Capture (DAC)

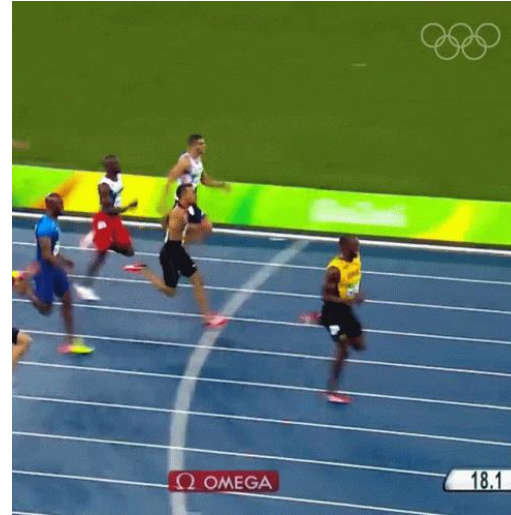


Bioenergy with Carbon Capture & Storage (BECCS)

Where we are...



...Where we're going



Voluntary Market Trends

MARKET TRENDS

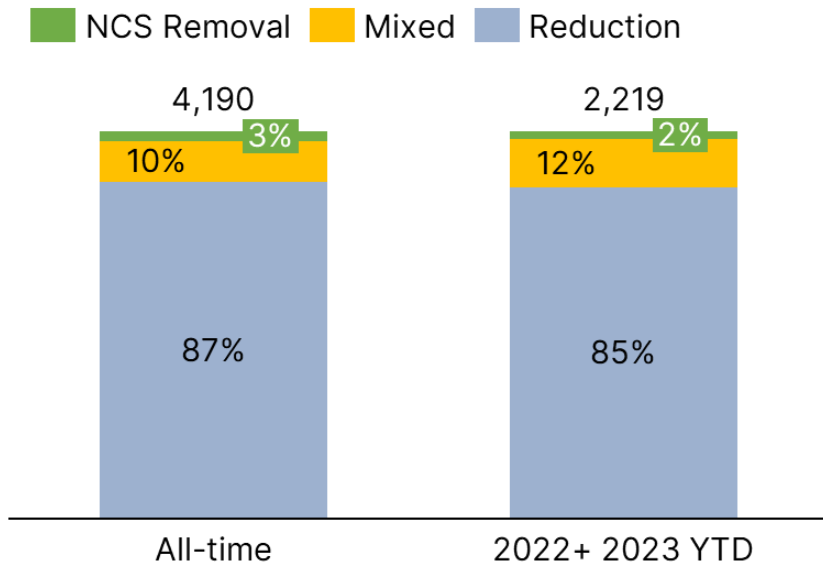
As the VCM continues to mature, the following trends are emerging.

1. Low-quality market.
2. Market is drawing scrutiny.
3. Market structures are disaggregated.
4. Nature-based removals will remain dominant in the near term.
5. High-durability CDR technologies are expected to reduce in cost through 2030.



01. The market is growing but majority of the market is low-quality, and there are relatively few removals available.

Projects issuing credits on major VCM registries,



- Market grew to about 2.4 billion USD in 2023. Carbon removal credit purchases increased 5x 2021 to 2023, from 3.1 million to 15.1 million tonnes.
- Removal credits represent a small fraction of the market.
- REDD+ and grid-scale Renewable Energy projects are >60% of total.

Sources: [Berkeley Public Policy, The Goldman School, Voluntary Registry Offsets Database, \(2022\).](#); [The Guardian, "Revealed: more than 90% of rainforest carbon offsets by biggest certifier are worthless, analysis shows", \(2023\).](#); [TIME, "Bogus Carbon Credits are a 'Pervasive' Problem, Scientists Warn", \(2023\).](#); [The Washington Post, "Airlines want you to buy carbon offsets. Experts say they're a 'scam'", \(2023\).](#) Note: RE = renewable energy, YTD = year-to-date. * Mixed credits refer to credit categories that may contain some volume of removals, but are largely reductions (e.g., Improved Forest Management).

02. The low-quality market has drawn much needed scrutiny; market leaders have reinforced their high-quality criteria in response.

Scrutiny of carbon credits has grown...

Revealed: more than 90% of rainforest carbon offsets by biggest certifier are worthless, analysis shows

Investigation into Verra carbon standard finds most are 'phantom credits' and may w

TIME

Bogus Carbon Credits a 'Pervasive' Problem, Scientists Warn

A study covering almost 300 carbon offset projects found that the industry's top registries have consistently allowed developers to claim...

Mar 21, 2023

The Washington Post

Airlines want you to buy carbon offsets. Experts say they're a 'scam.'

Spending a few dollars to offset the carbon footprint of your flight may sound too good to be true because it is, climate experts say.

Apr 17, 2023

...leading corporate buyers and other groups to begin setting their own criteria for high-quality.

Criteria for  Microsoft
high-quality carbon
dioxide removal

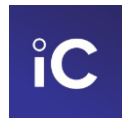
Carbon Removal: How Shopify Is Leading the Charge on Corporate Responsibility

by Dayna Winter - Sustainability
Feb 12, 2023 - 8 minute read

COMPANIES SCIENCE

JPMorgan Chase Releases Its Carbon Market Principles White Paper

by Petya Trendafilova - June 7, 2023 - 3 minute read



Integrity Council launches global benchmark for high-integrity carbon credits

Sources: [Berkeley Public Policy](#), [The Goldman School](#), [Voluntary Registry Offsets Database](#), (2022).; [Carbon Direct](#), [Microsoft Criteria for High Quality Carbon Removal](#), (2023).; [Shopify](#), "Carbon Removal: How Shopify Is Leading the Charge on Corporate Responsibility", (2023).; [Voluntary Carbon Markets Integrity Initiative](#), [VCMi Claims Code of Practice](#), (2023).; [The Integrity Council for the Voluntary Carbon Market](#), "Integrity Council launches global benchmark for high-integrity carbon credits", (2023); [Carbon Herald](#), [JPMorgan Chase Releases Its Carbon Market Principles White Paper](#)", (2023).

03. Market structures are disaggregated. Quality-focused buyers are working to plan and execute procurement far in advance.

Corporate buyers currently struggle with:

- Scarcity of quality removals
- An expectation of higher costs
- Market volatility in pricing

To address these gaps, corporate buyers are engaging in new commercial structures

Catalytic forward contracting:

1PointFive announces agreement with Airbus for the JPMorgan Chase to spend \$200 million tonnes of carbon dioxide removals

By Susanna Twidale

May 23, 2023 7:34 AM PDT · Updated a month ago



Advance payment/ investment:

Microsoft Inks Deal to Pay for CO2 Stored Below the Sea

- Microsoft backs Danish project to capture and store CO2
- Orsted will trap CO2 at two plants and send it to Norway

Project origination:

Apple and partners launch first-ever \$200 million Restore Fund to accelerate natural solutions to climate change

UPDATE:
April 11, 2023

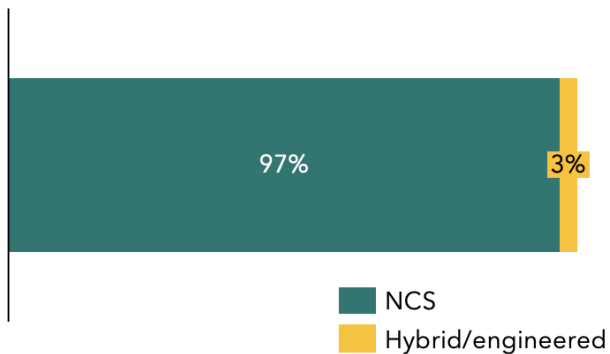
Apple expands innovative Restore Fund for carbon removal

A new fund with Climate Asset Management adds another

Sources: 1PointFive, "1PointFive announces agreement with Airbus for the purchase of 400,000 tonnes of carbon removal credits", (2022).; Reuters, "JPMorgan Chase to spend \$200 million on carbon dioxide removals", (2023).; Bloomberg, "Schlumberger New Energy, Chevron, and Microsoft Collaborate on Carbon Negative Bioenergy", (2021); Bloomberg, "Microsoft Inks Deal to Pay for CO₂ Stored Below the Sea", (2023).; Apple Newsroom, "Apple and partners launch first-ever \$200 million Restore Fund", (2021); Apple Newsroom, "Apple expands innovative Restore Fund for carbon removal", (2023).

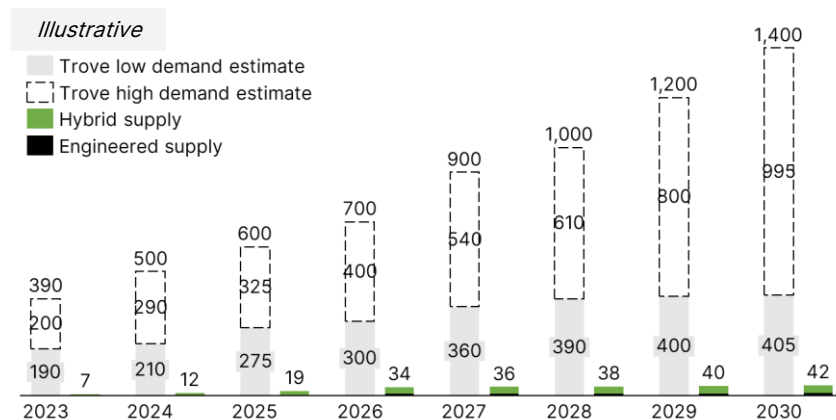
04. Natural climate solutions will remain dominant in the near term.

Removal tonnes issued by category in 2023, %



Today, NCS removal credits make up the vast majority of tonnes issued (97%).

Supply and announced durable demand for high quality credits, MtCO₂/yr¹



The **scale of expected demand far outstrips expected plans in hybrid and engineered supply** today. Larger scale potential of NCS removals will be key to meeting expected demand.

Sources: [Berkeley Public Policy](#), [The Goldman School](#), [Voluntary Registry Offsets Database](#), (2022).; [puro.earth](#); [cdr.fyi](#); [carbon-standards.com](#); [trove-research.com](#).

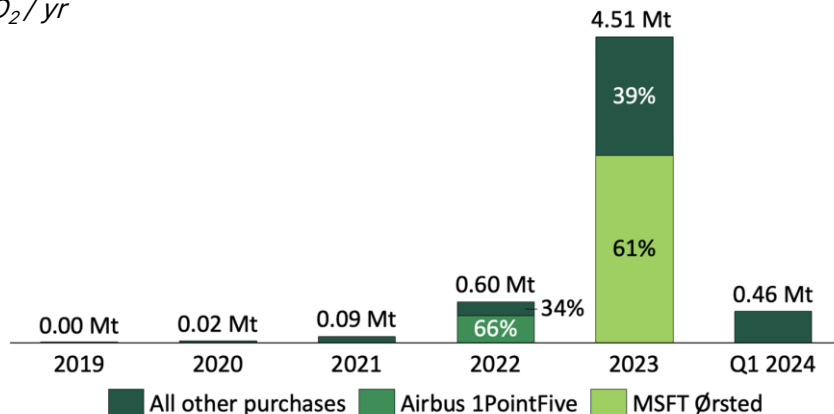
1. Supply analysis based on Carbon Direct analysis, including public announcements of investments, forward procurements and purchasing. Announced supply will continue to scale beyond shown values.

MARKET TRENDS

05. Hybrid and engineered purchasing rises are driven by a few large purchases. Continued growth and incentives have the potential to drive prices down.

Announced intentions to purchase engineered and hybrid credits¹

Mt CO₂/yr



Sources: [Berkeley Public Policy](#), [The Goldman School](#), [Voluntary Registry Offsets Database](#), (2022); [puro.earth](#); [cdr.fyi](#); [carbon-standards.com](#).

Notes: 1. Graph only includes known tonnes/purchases and only hybrid/ engineered removal types. Year refers to year of announcement, not necessarily vintage.

MARKET TRENDS

To mitigate risk and ensure quality, carbon projects must be evaluated across multiple criteria.



Additionality and baselines

Makes a genuine climate impact against a counterfactual



Avoids leakage

Avoids causing GHG emissions elsewhere



Carbon accounting

Accurately represents tonnes of CO₂



Monitoring, reporting, and verification

Adheres to regulations and protocols with long-term monitoring



Durability

Keeps CO₂ out of the atmosphere



CARBON INTEGRITY

Does the credit represent a real reduction or removal with robust carbon accounting?



Harms & benefits

Safeguards communities against environmental harm



Environmental justice

Promotes equitable environmental decision-making



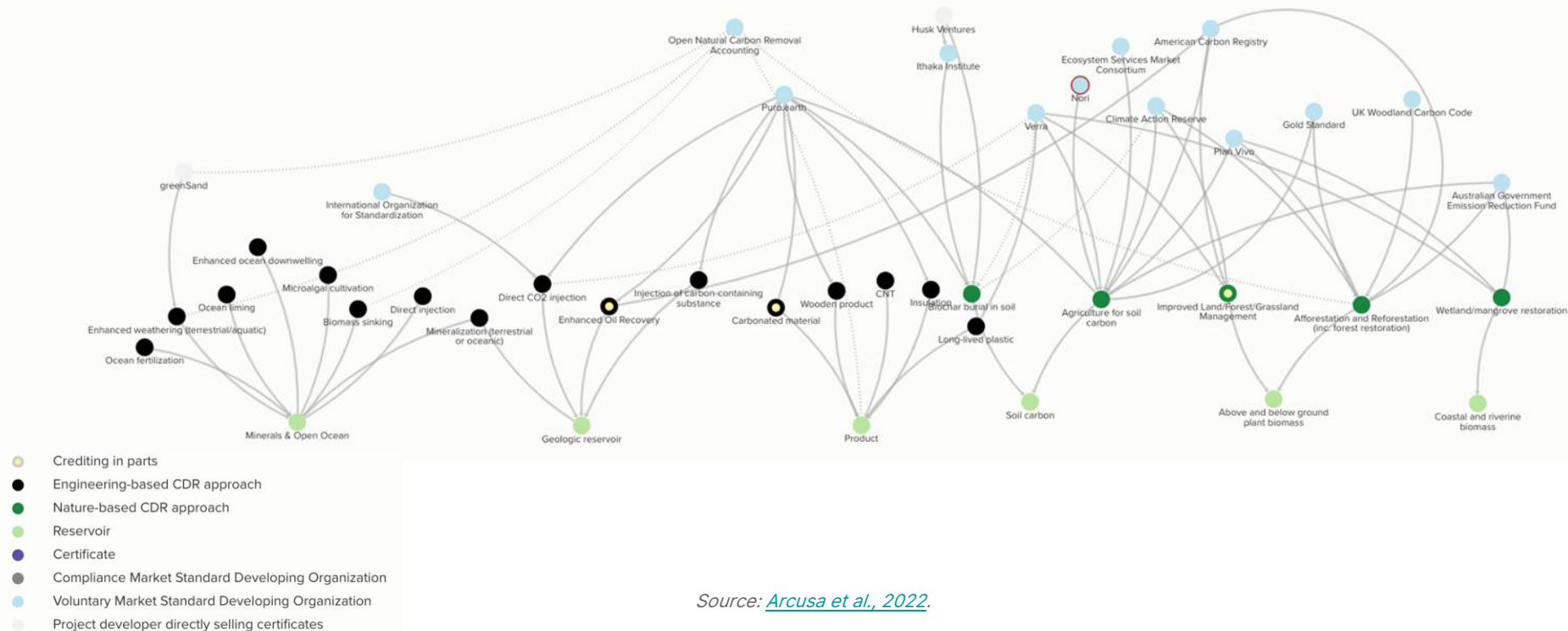
HARMS, BENEFITS, AND JUSTICE

Is the credit produced in a non-harmful way, and does it generate equitable benefits?

Source: [Carbon Direct, Criteria for High-Quality Carbon Removal, \(2023\), carbon-direct.com.](#)

Thank you!

The VCM today is a complicated unregulated market ecosystem with potential to scale climate mitigation, although quality remains an issue.



Source: [Arcusa et al., 2022](#).