What Are Carbon Credits?

Carbon Markets 101

Prepared for COPA
April 2024
About Us:

The Carbon Containment Lab is a tax-exempt nonprofit working on novel and neglected climate solutions. Our work on lifecycle refrigerant management focuses on resolving system-wide bottlenecks that are holding back mitigation, including financing mechanisms such as the carbon market. We were founded at Yale University in 2020 and became an independent nonprofit in February 2024.
What’s the Problem?

1. Polluters need to reduce emissions but can’t eliminate all their emissions immediately or at low cost.

2. Polluters reduce some of their direct emissions, but also pay for emissions reductions elsewhere to “offset” their residual emissions.

*Example:* The polluter pays for a reforestation project and receives carbon credits in exchange.
Credits can also help fulfill other purposes:

- Financing for early stage activities and technologies that would otherwise have no market (i.e., carbon dioxide removal, methane mitigation from abandoned oil wells)
- Revenues supporting communities in which the projects occur and generate co-benefits (i.e., access to clean cookstoves, biodiversity protection)
Overview to Carbon Markets

Vocabulary, market architecture, and methodologies
What Exactly is a Carbon Credit?

A carbon credit (“offset”) is a tradeable certificate each representing 1 metric ton CO$_2$e avoided, reduced, or removed. Credits are not physical – instead, they can be bought and sold on online platforms for a price, like a stock.

Currently, the most common use of a carbon credit is as an “offset” for residual emissions – allowing companies to achieve regulatory compliance or claim “net zero” without eliminating their direct emissions.
Different Types of Carbon Credits

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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| Avoidance    | • Credits fund a change in a behavior/actions that would have otherwise led to emissions  
               • **Examples:** forest conservation (avoided deforestation), HFC reclamation                                                      |
| Reduction    | • Credits reduce baseline emissions of a technology or process  
               • **Examples:** Methane mitigation from landfills, coal mines, rice paddies, etc.                                               |
| Removals     | • Credits pay for the removal of CO\textsubscript{2} from the atmosphere  
               • **Examples:** Reforestation, direct air capture, biomass carbon removal and storage                                          |
Recently, carbon credits have received significant attention – and controversy.

**Why it’s more important than ever to invest in the voluntary carbon market**

‘Regulated carbon markets are worth a trillion dollars a year and cover 25% of global emissions — they are raising climate ambition worldwide’

**Carbon Offset Market Faces Chaos as African Mega-Project Collapses**

The breakup of the partnership behind one of the world’s biggest carbon projects in Zimbabwe raises new doubts about the carbon market’s ability to backstop failures.

**Carbon credit speculators could lose billions as offsets deemed worthless**

Many credits in the voluntary market going unused, with study finding some offsetting could make global heating worse

**Cooking the books: cookstove offsets produce millions of fake emission cuts**
The world is relying on carbon markets to function well and to scale to meet climate targets. Credits are widely acknowledged to be a critical tool for climate finance.

<table>
<thead>
<tr>
<th>Market/Year</th>
<th>2030</th>
<th>2050</th>
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<tbody>
<tr>
<td>Voluntary Market</td>
<td>2 billion</td>
<td>13 billion</td>
</tr>
<tr>
<td>Carbon Removals</td>
<td>&lt; 1 billion</td>
<td>10 billion</td>
</tr>
</tbody>
</table>

Sources: McKinsey VCM, Scientific American Carbon Removals
The Architecture of the Carbon Market

- Credits’ underlying emissions are functionally invisible
- Commodifying credits requires sophisticated market infrastructure
- Interactions between Buyers and Suppliers ("project developers") are mediated by registries.
- Registries serve the important function of ensuring 1) the uniqueness of each credit, and 2) the quality of each credit.
- Registries set standards for emissions reductions and removals and approve Validation and Verification Bodies (VVBs) to police suppliers’ projects.
Who are the registries?
Voluntary vs. Compliance Markets

**Voluntary Market**
- Composed of corporations, institutions, and governments – often who make “net zero” claims using credits
- By far the largest market in terms of credit volume and dollar value
- Registries include Verra, American Carbon Registry, and Gold Standard
- Functionally unregulated (participation is voluntary)

**Compliance Market**
- Composed of regulated emitters (often large industrial players)
- Emitters must reduce emissions, but can use a certain quantity of credits for compliance
- Government determines which projects are eligible
- Examples: European Union Emissions Trading Scheme, New Zealand Emissions Trading Scheme, California cap-and-trade
What Makes a Good Carbon Credit?

The underlying quality and integrity of carbon credits is the cornerstone of a well-functioning carbon market.

1. **Additional**: Would the emissions reductions occur in the absence of the carbon credit incentive?
2. **Permanent**: Is there risk that the emissions reduction could be reversed?
3. **Measurable**: Is crediting accurate, conservative, and defensible?
4. **Transparent and traceable**: Are project activities well documented?

Unfortunately, credits on the market today often meet only a few of these criteria.
Guarding Against Perverse Incentives

Perverse incentives have previously plagued some carbon market projects.

• **Buyers and seller behavior:** Buyers want as many cheap credits as possible, whereas sellers want to make as much profit as possible. These desires can drive down credit quality in the absence of a regulated market.

• **Project-specific:** The value of selling a credit can result in undesirable behavior (ex. HFC-23 destruction)

Market architecture – including methodologies and registries – can reduce risk of perverse incentives

• Perverse incentives are a serious concern for markets, but aren’t inherent to market mechanisms
The Role of Methodologies

- Registries establish standards for credit quality through documents called **methodologies**.
- Methodologies are the rulebooks that project developers must follow when seeking to generate credits (and that verifiers check developers against).
- Methodologies provide requirements for all aspects of the project, from quantification to underlying additionality.
- Methodologies are often developed by the suppliers/project developers who implement the projects.
Safeguarding Credit Quality

• Groups such as the Integrity Council for the Voluntary Carbon Market (ICVCM) are attempting to govern the global voluntary carbon market
• Most scrutiny has fallen on avoidance and reduction credits, particularly for additionality and quantification
• The voluntary carbon market is voluntary – meaning that credit quality tends to be a “race to the bottom” unless buyers have incentive to care
Today, there are several available platforms for carbon financing, including for lifecycle refrigerant management projects.

Corporate Buyers + Facilitators

- Voluntary Carbon Market
- Compliance Market (e.g., New Zealand ETS, California)

Government Buyers + Facilitators

- Paris Agreement Article 6 (formerly CDM)
- Japan Joint Crediting Mechanism (Vietnam, Thailand, Philippines)
Quick Overview of Article 6 of the Paris Agreement

Market and non-market international climate finance
Thank you!
Any questions?

Tilden Chao, tilden.chao@cclab.org
Associate, Carbon Containment Lab

carboncontainmentlab.org/projects/refrigerants
Extra Slides

Lifecycle Refrigerant Management and Carbon Markets
The **market supports a wide range of LRM activities**, but some activities have low coverage.

Operating Equipment:
- Advanced Refrigeration Technology*
- Infrared Leak Detection
- Reclaimed HFCs*

End-of-life Equipment:
- ODS Destruction

*only in USA, Canada, and Mexico.

Read more: [CC Lab Fact Sheet on Fluorocarbon Methodologies](#), 2023.

No large-scale eligibility for HFCs, except in New Zealand and Mexico.
Last May, we published a Draft Methodology for HFC Recovery and Disposal for Article 5 Countries, which is available for public comment.*

Notable Sections:
- White paper, Section III: Documenting recoveries to improve credit legitimacy
- White paper, Appendix III: Understanding effects of destruction on production and baseline consumption

*expected version 2, May 2024
Many of our peer reviewers and public commenters focused on risk of *perverse incentives* from HFC destruction.

- Selling virgin gas fraudulently labeled as “recovered” for destruction
- Destroying gases that would have otherwise been reused, creating excess production
- Increasing production to compensate for destruction
- Delaying progress on regulatory measures, such as extended producer responsibility
Our research suggests that **some of these risks are manageable.**

- Selling virgin gas fraudulently labeled as “recovered” for destruction – **stringent chain of custody requirements**
- Destroying gases that would have otherwise been reused, creating excess production – **ensuring baseline of venting**
- Increasing production to compensate for destruction – **Ozone Secretariat reporting data**
- Delaying progress on regulatory measures, such as EPR or product stewardship – **project viability contingent on transition to non-credit finance**
Looking ahead:

1) More platforms

2) Better technology

From Recoolit OEWG 45 presentation