Voluntary Carbon Offsets Directory Research

An initial prototype based on data from the Berkeley Carbon Trading Project is live at https://opentaps.org/offsets, and the code is available on github. Here is what it looks like:

Research Paper

Our market research on the Voluntary Carbon Offsets Market is now completed and published as Voluntary Carbon Offsets: An Empirical Market Study on SSRN

Background

Carbon offsets are claims of activities which reduce carbon emissions, such as investments in renewable energy generation, improved forestry and land management, circular economy and reuse, and carbon capture and sequestration. Carbon offsets are either part of mandatory schemes, such as the European Emissions Trading Allowance, industry schemes, such as CORSIA, and voluntary purchases by primarily corporate buyers and some individuals.

Mandatory carbon trading regimes are often limited in scope and region, and in the past have suffered large swings in activity due to political shifts.

Therefore, to reach Paris Climate goals, a robust voluntary carbon offsets market is needed. The voluntary carbon offsets market is currently a highly fragmented, illiquid market with poor transparency and questionable quality. The goal of this project is to bring forward a blockchain-based solution which will allow greater transparency, price discovery, and ultimately higher quality. Through interviews with key stakeholders, we will identify the key issues, fine tune a solution, and bring on initial participants to launch it.

If you would like to participate in this research project, please start with the Carbon Offsets Research Questionnaire.

Current Ecosystem

Carbon offsets are created by

1. A developers invests in projects, such as renewable energy or forestry management
2. Claims about the emissions reduction of the project is calculated under a methodology published by a verification body. These methodologies are based on the CDM methodologies.
3. The project is registered with a verification body.
4. A Validation and Verification Bureau (VVB) validates the project.
5. On an ongoing basis, the VVB reviews the data and independently verifies aspects of the project, to certify the amount of emissions reduced.
6. The verified emissions reductions are sold as carbon offsets, through brokers or directly to buyers.

The Players

Verification Bodies:

- Gold Standard - More focus on community and co-benefits
- VERRA - largest, highest volume traded
- Global Carbon Council - new standard body based in Qatar looking to issue first batch in July 2021
- American Carbon Registry
- CAR
- Woodlands Trust

Validation and Verification Bureaus

See for example Gold Standard's approve auditors list

Buyers

Major corporations such as Microsoft

CORSIA - eligibility criteria for airlines to purchase credits

CarbonFund.org

ICROA

IETA

Pricing References

Since the market trades directly or over-the-counter, most of the information is not available. However, a few references are:

- CME Global Emissions Offsets futures
- Gold Standard Marketplace - really very small and not representative of the market
- Forest Trends EcoSystem Marketplace

- EcoSecurities Price Index

Challenges

- Very heterogeneous market with different project types (forestry, renewables, etc.) and different regions
- Different offsets trade vastly differently, from under $1 to nearly $50 per ton, even though they're all denominated in tons of CO2 emissions
- Lack of transparency in pricing
- A lot of different registries makes it difficult for buyers to track
- Risk of double selling, where the same project is listed on different registries and the offsets are sold several times
- Buyers question the validity of the offsets

Proposed Solution

A blockchain based platform to provide a central directory of voluntary offsets based on a decentralized architecture. The decentralized permissioned architecture allows recognized participants around the world and in different functional roles (developers, brokers, buyers, verification bureaus, standards organizations) to contribute data about voluntary carbon offsets. Members of the network could contribute data about voluntary carbon offsets, including the projects details, quantity issued, background documentation, and any trades that occur. We could use IPFS or another decentralized storage mechanism to store documentation of the offsets and use md5 to verify that documents have not been altered.

The solution would be an open source code base which includes smart contracts, scripts to access the network, plus a basic web UI for demonstration purposes. Initially the data could come from the Berkeley Carbon Trading Project of different offsets registries, so the schema would be based on their data as well. A proposed governance and incentive structure:

- This decentralized network would involve members contributing and verifying data.
- Each transaction such as issuance, retirement, or trading of offsets, would require verification.
- As members verify transactions they earn more reputation tokens.
- If they provided or verified incorrect information, they will lose reputation tokens.
- Different levels of reputation tokens are required for different transactions on the network.

An incentive structure for contributions similar to the Multiple Listing Service for residential real estate would be based on:

1. A verification process would be set up to validate the data from the participants. For example, members could challenge listings and trades. The challenged member would then need to prove them to a neutral DAO panel. If the challenge is successful, the failing party would lose reputation tokens; if the challenge fails, the challenging party would lose reputation tokens. Eventually if party has too few tokens it loses access to the directory.
2. Public listing of offsets purchased by end user organizations looking to prove their purchases.
3. Published leader boards of top dealers and purchasers, which would help their reputations.
4. Listing service for sale of future offsets.

This directory would not directly allow trading between participants. It is for information purposes only. However, even without trading, this directory could greatly enhance the voluntary offsets market place by:

- Providing a price discovery service
- Allow peer review of quality of offsets
- Identify possible duplicate selling of projects

References

- Securing Climate Benefit: A Guide to Using Carbon Offsets
- Voluntary Ecological Markets Overview by IWA - this document is really about carbon offsets despite its title.
- EDF Trends in Voluntary Carbon Offsets Market
- These Countries have Prices on Carbon. Are they working? (NY Times)
- Taskforce for Scaling Voluntary Carbon Markets Final Report
- Microsoft Carbon Removal - Lessons from an Early Corporate Purchase
- Microsoft Criteria for high-quality carbon dioxide removal

Ratings and Criticisms of Carbon Offsets

- A buyer's guide to soil carbon offsets - Carbon Plan
- BeZero Carbon Ratings Methodology
- The World Needs Better Climate Pledges
- Comments on the Initial Recommendations of the Taskforce on Scaling Voluntary Carbon Markets (TSVCM) from Berkeley Carbon Trading Project and affiliated groups
- Startup That Rates Carbon Offsets Finds Almost Half Fall Short
- Top Airlines' Promises to Offset Flights Rely on Phantom Credits
- NPR Reporting on Forest Carbon Credits Gets It Wrong in 5 Ways
- Carbon Direct Commentary on Release of the Voluntary Offsets Database
- How Additional is the Clean Development Mechanism

Ecosystem Analysis

The Case for Starting Your Project with an Ecosystem Map: https://spin.atomicobject.com/2018/03/19/why-ecosystem-map/

How to Get Ecosystem Buy-In: https://hbr.org/2017/03/how-to-get-ecosystem-buy-in

Methodology Of Business Ecosystems Network Analysis: A Field Study In Telecom Italia Future Centre http://www.diag.uniroma1.it//~nonino/Publications/CI20.pdf

BEAM: A framework for business ecosystem analysis and modeling: https://ieeexplore.ieee.org/document/5386541

Business ecosystem analysis framework: https://ieeexplore.ieee.org/document/7341356

The Delicate Balance of Making an Ecosystem Strategy Work: https://hbr.org/2019/11/the-delicate-balance-of-making-an-ecosystem-strategy-work

Mapping and Strategising Across Business Ecosystems: https://www.europeanbusinessreview.com/mapping-and-strategising-across-business-ecosystems/

Other

This project is part of the Documentation and Use Cases for Climate Action mentorship. For updates on this project, see the Project Plan - Documentation and Use Cases for Climate Action.