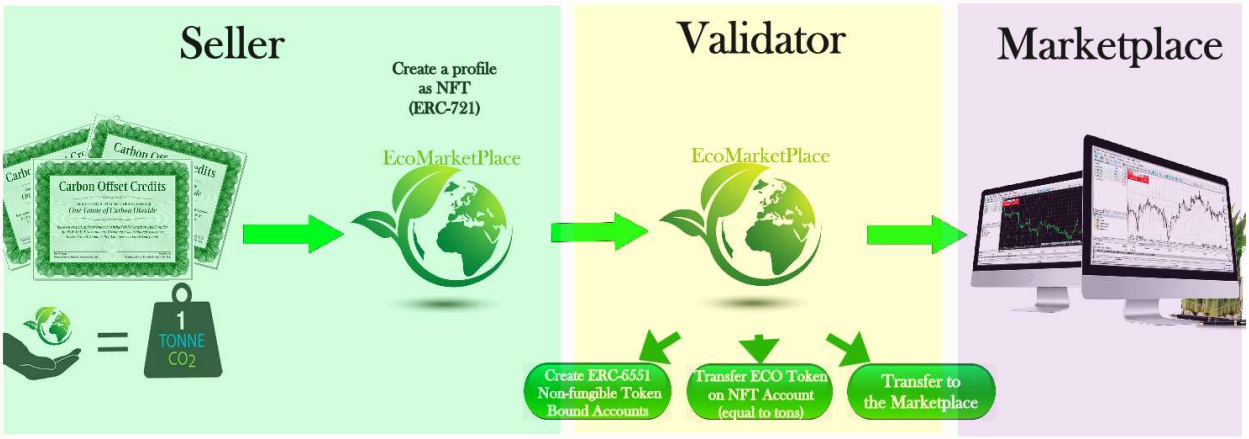
Description

In a world increasingly concerned about climate change, carbon credits have emerged as a valuable tool for incentivizing environmental responsibility. These credits represent a reduction in greenhouse gas emissions and can be bought and sold to help mitigate the impact of climate change. Carbon Credit trading markets are usually designed to incentivize and reward efforts to reduce greenhouse gas emissions. Each carbon credit represents one metric ton of C02 equivalent emissions reduced or avoided. However, the process of trading carbon credits has often been complex and centralized. In response, a visionary project has emerged: EcoMarket, a decentralized exchange platform for carbon credit trading, powered by NFT technology.

This groundbreaking platform allows users to tokenize their carbon credits, making them easily tradable assets. Central to this innovation is the integration of NFT ERC-721 profile accounts, each of which has its own ERC-6551 token-bound account. This allows each NFT to operate as wallets themselves. This approach provides transparency and security to both buyers and sellers in the carbon credit market.

The platform's back-end is built using Solidity, a programming language for creating smart contracts on the Ethereum blockchain. A series of smart contracts have been developed to manage the marketplace and the ERC-6551 token bound accounts. To maximize efficiency, these smart contracts have been deployed on the Arbitrum blockchain, a Layer 2 solution for Ethereum, to reduce transaction costs and increase scalability.

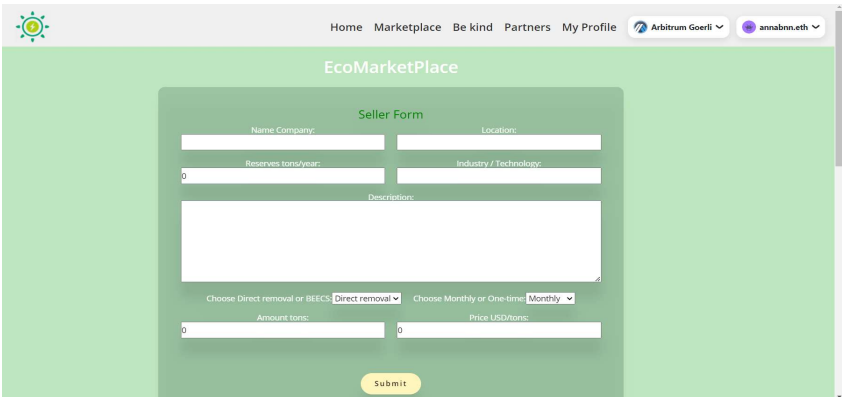


Here's a brief overview of the role of key players in a typical Carbon Credit Trading markets:

1. Sellers: These are typically entities such as businesses, organizations, or even countries that are taking measures to reduce their carbon emissions. They generate carbon credits based on the emissions they've avoided or reduced through activities like renewable energy projects, energy efficiency improvements or afforestation projects. These credits represent a quantified reduction in carbon dioxide (CO2) or other greenhouse gases.

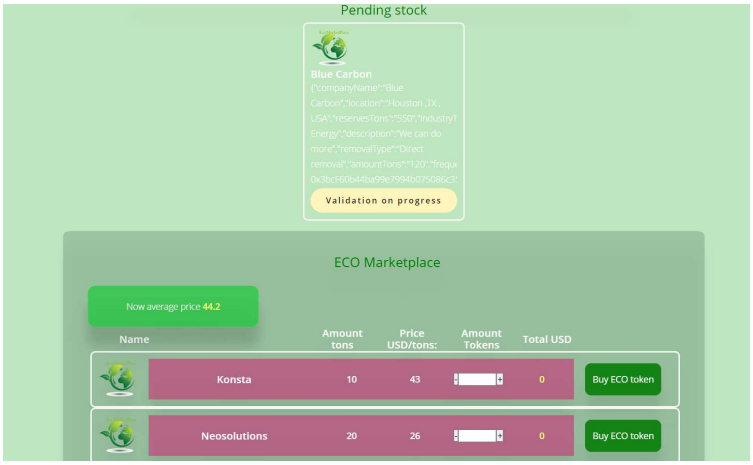
2. Buyers: Buyers are entities that purchase carbon credits to offset their own emissions. This can include companies like electric coal plants seeking to meet carbon reduction targets or individuals looking to reduce their carbon footprint. Buyers often use carbon credits as a way to balance out their emissions by supporting projects that reduce or capture carbon.

3. Validators: They are independent third-party organizations or experts licensed by the government of regulatory agencies who have access to the EcoMarket platform. They are responsible for auditing, evaluating and verifying the emission reduction activities of the sellers. They assess whether the emission reductions claimed by the seller are real, measurable, and adhere to established regulatory standards. Validators play a critical role in ensuring the integrity of the carbon credit markets.

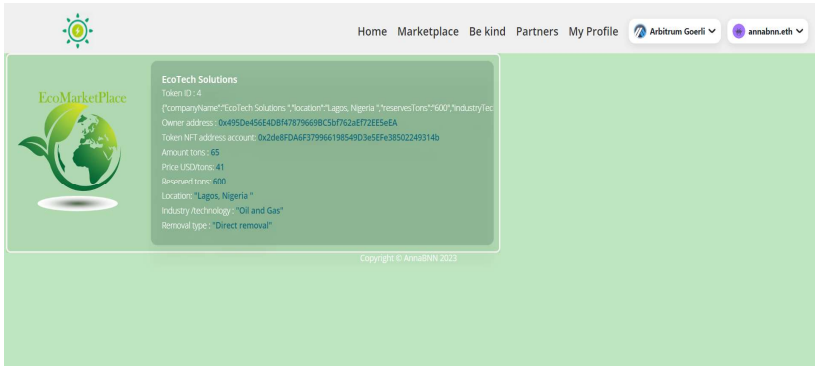


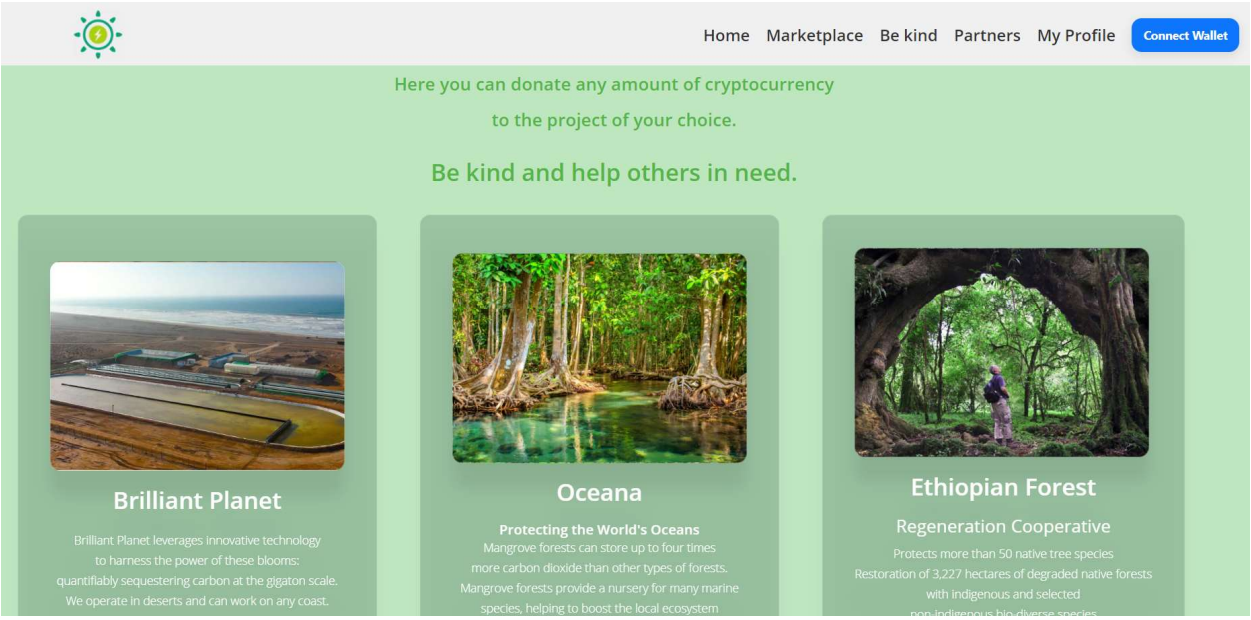
Sellers, whether they acquire carbon credits from auctions or receive them from the government, must create a profile account on the platform. This account is unique, as it contains crucial metadata that cannot be altered. Once the account is created, it is minted as an NFT ERC-721 token, a process that ensures the immutability of the seller's information. All NFT metadata is stored on WEB3.storage, an IPFS storage service to safely secure and make your data available enhancing data integrity and security. An additional validation process is implemented for sellers who possess unused carbon credits.

Once validation is successful, the emission reduction project is registered and carbon credits are issued in the form of ECOTokens which are ERC-20 fungible tokens which is used as a medium of exchange on the EcoMarket platform. The conversion rate is set at 1 ton of carbon dioxide (C02) to 1 ECO Token. To accomplish this, the validator first creates an ERC 6551 wallet account for the Seller's NFT profile and then the validator transfers an equivalent amount of ECO tokens to the account. Finally, the NFT with the ECO token balance is published on the marketplace trading platform by the validator.



Buyers can purchase ECO Tokens using ETH, with the smart contract employing a Chainlink Oracle to convert USD to ETH so the prices are displayed in US dollars simplifying the transaction process. Any user with an ETH wallet balance can participate in the marketplace. They can choose sellers based on the best prices or explore sellers' profiles to support specific industries or projects that align with their values. The platform also includes a carbon emissions calculator, enabling users to assess their carbon footprint. Users can then make donations to various projects on the platform that aim to reduce carbon emissions using Celo blockchain.





The decentralized exchange platform for carbon credits represents a major step forward in the effort to combat climate change. By combining NFT technology with blockchain and smart contracts, it streamlines the process of trading carbon credits, making it more accessible and secure for all stakeholders. With a focus on transparency, efficiency, and environmental impact, the EcoMarket platform has the potential to revolutionize the carbon credit market, ultimately contributing to a healthier planet for future generations.

How it's made

The front-end of my project is built using Next.js. We used Celo Composer CLI to get started with building a Next.js application, and I used ConnectWallet, Wagmi, and RainbowKitProvider to connect to the blockchains and manage user wallets.

The back-end of our project is built using Solidity. We wrote a number of smart contracts to handle the donation form, the marketplace, and the ERC-6551 token bound accounts. We deployed our smart contracts to the Celo and Arbitrum blockchains.

We used a number of partner technologies in our project, such as ConnectWallet, ChainLink, XMTP, Quiknode, and WEB3.storage. These technologies made it easier for us to build and deploy our project, and they also gave us access to a number of features that would have been difficult or impossible to implement on my own.

The donation process is facilitated through the Celo Blockchain, with the smart contract utilizing a Chainlink oracle to convert USD to Celo currency.

To foster engagement, the platform incorporates XMTP for user-to-project owner messaging, allowing users to directly communicate with the creators of the environmental initiatives they support. We used XMTP to create a donation form that allows users to send messages to the project owner.

We used WEB3.storage to collect data about my ERC-721 NFTs and their corresponding ERC-6551 token bound accounts.

The platform uses QuickNode, web3 development platform which simplifies blockchain infrastructure. Their lightning-fast global API provides access to 22+ blockchains and 35+ networks. We use the QuickNode API for minting and display NFTs, allowing users to easily display their assets on the marketplace.

ConnectWallet made it easy for us to connect to the Celo and Arbitrum blockchains and manage user wallets.

We used a technique called "token bound accounts" to allow users to create their own ERC-6551 accounts from their NFT ERC-721 accounts. This allows users to manage their credit carbon tokens more easily and efficiently.

We also used a technique called "ChainLink" to convert Celo and ETH currency to USD. This makes it easier for the project owner to track and manage donations and for users manage their expenses