Green Tracker

Environmental assets tokenization for regenerative finance (#ReFi)

https://www.greentracker.io

Powered by EnergyLab

May 1st, 2023

Introduction

Monitoring, Reporting and Verification processes (MRVs) are one of the critical ingredients of climate action. No carbon market, mitigation outcomes (ITMOs) exchanges, national contributions (NDCs) reporting or even voluntary actions could be properly claimed if no suitable MRV systems are implemented. A condition that gets even more relevant when it comes to developing countries, where common practices, at the public and private sector, are not used to the standards that OCDE countries have promoted for carbon accounting at project-by-project bases.

MRV design flaws, data losses, "typos" and measurements and calculations overestimations are some of the main challenges that Green Tracker is tackling; in order to eliminate MRVs traditional friction at a wide range of sectors, while also reducing operational costs and human interventions. Then, this system brings in attributes like transparency, traceability, immutability and automation, making it a very attractive tool for tracking GHG mitigation outcomes and several types of environmental results, like renewable power generation, electromobility, materials management and recycling, energy efficiency, water efficiency, fuel switching and green hydrogen production, among others.

The solution

Green Tracker solution is based on international MRVs methodologies and *state-of-the-art* technologies like IoTs, AI and blockchain, allowing it to automate the monitoring, reporting and verification process for most of the activities that produce measurable environmental benefits. Its main components contribute in the following way:

1. International methodologies: MRV protocols, developed by United Nations and other reputed international institutions, are used for defining monitoring requirements, cross-checking practices, data management and storage, auditing recommendations and public reporting processes.

2. IoTs: Internet of things allow the system to preferably collect data directly from monitoring meters, through different API connections, avoiding or reducing data losses risk and human interventions.

3. AI: Artificial intelligence aims to assist on-site monitoring and verification tasks; in order to help users and auditors to identify potential mistakes and/or data inconsistencies and deviations.

4. Blockchain: A hybrid *blockchain-as-a-service* system enables data security, where its "hybrid" design allows the system to gets the best of the private and public chains combination, keeping operational costs controlled, a great environmental performance (with very low energy consumption) and the corresponding data immutability assurance. The private chain aims to back up the raw data, while the public chain serves a registry for the environmental results.

Green Tracker applications

By now, Green Tracker is operating with three project types, related to renewable power generation, EV fleets and residues management and materials recycling facilities. And it is being conceptually tested on water savings, energy efficiency, methane leakages reductions and green hydrogen projects.

Renewable energy	Electromobility	Materials management
Solar PV and wind power plants are being monitored, where primary and secondary power generation meters are remotely read and displayed in real time. Eventual power consumption, meters calibrations and deviations can be set within the system, in order to get the CO_2e emissions reductions that are generated by each of these facilities.	EV fleets are being tracked through their GPS systems, where driven distances are remotely collected and displayed in real time. These fleets run for executive transportation as well as last mile delivery services. The corresponding baselines are based on local authorities' criteria, so the common practice vehicles are used for CO_2e emission reductions calculations.	Materials management and recycling are key activities for circular economy developing, being now monitored in a dedicated facility for residues segregation and classification. On-site operators get images of managed materials, which are recognized by an AI model, and where the materials quantities are manually recorded and displayed on real time.
To date, four large scale power plants (one PV and three wind mills) and five micro scale PV facilities are being monitored by Green Tracker. With annual CO2 reductions of 500.000 tons and renewable energy attributes of about 650.000. All of the projects are located in Chile, however there are advanced conversations to apply the solution in facilities operating in Colombia and Argentina.	Green Tracker is now monitoring three EV fleets, working on executive transportation and last mile products delivery, with more than 40.000 kilometers tracked. While there also are undergoing negotiations for its application on two of the largest private EV fleets in Chile (on light vehicles and passenger buses).	By now, Green Tracker is being tested on a residues management facility located in Santiago, Chile. Where about 20% of the materials can be recognized and tracked by the system. The next steps are related to adding the rest of the materials to the AI algorithm, while also incorporating some features to facilitate the residues internal administration.

Key attributes and benefits

Green Tracker design and technology integration allow it to achieve key attributes and interesting benefits for environmental MRVs, which are especially critical for climate reporting and environmental markets:

- Automation: MRV processes can be totally automated, enabling real time monitoring, environmental benefits tokenization and interoperation with national registries. In case of projects operating under international standards, Green Tracker allows them to strengthen their MRV procedures, gaining certainty and simplifying auditors' tasks.

- Accuracy: On site data is collected from IoT devices (when available), so MRV's accuracy is strongly determined by the monitoring equipment precision and calibration. Conservativeness criteria are also embedded and implemented following international best practices.

- Traceability: Relevant raw data is fully backed up at the private chain, while mitigation outcomes and other environmental benefits are tracked at Green Tracker's public registry, which is based on a public blockchain.

- Transparency: Private chain is accessible for Green Tracker's users, authorities, stakeholders and potential buyers (under request in some cases), while mitigation outcomes are publicly available once they are verified within the system.

- Immutability: Once data is backed up at the blockchain it cannot be modified, corrupted and/or tampered.

- Flexibility: Several type of MRVs can be deploy through Green Tracker, requiring very low or no additional coding for its initial set up.

- Cost efficiency: According to our internal estimations, Green Tracker implementation may reduce project developers' operational costs in about 80%, while also eradicating potential flaws and token losses due to human mistakes and/or protocols deviations. The system should also reduce auditing costs in about 50%, allowing them to be performed remotely and assisted by an effective and seamless auditing module.

Main features

Green Tracker has several features that aims to simplify its operation and widen its application fields:

- Results tokenization: Any environmental result can be tokenized, so it can be publicly displayed, tracked, transferred and/or cancelled through Green Tracker public registry. So, tons of CO_2e reduced, kilometers driven by electric vehicles, tons of plastics recycled, cubic meters of saved water, MWh of renewable power generated, among several other, can be handled and managed in a robust and transparent platform. Assuring no double counting, double claiming and double selling.

- Components management: The system can administrate projects with several components, helping them to consider different efficiencies, emission factors, and/or specific considerations in every of the components, while allowing all of them to contribute with their environmental results to the main project.

- IoTs and APIs integration: IoTs are the key component for collecting most of real time monitored data, where the ones that use API REST protocol can be integrated with no (or low) coding requirements, while other APIs schemes can be added with some additional coding.

- AI based monitoring: For non-structured data monitoring, like residues management, an artificial intelligence algorithm has been trained, alleviating on-site registering tasks while also assisting ex-post auditing activities.

- Verification module: The online verification module assures Green Tracker users and auditors that originally recorded data is consistent with the one presented at auditing processes. The system also allows them to make online calculations, results checking and/or conversion factors, while also reviewing calibration certificates and any other type of relevant information and supporting documentation.

Figure A. Login screen for accessing to Green Tracker's permissioned data and features.

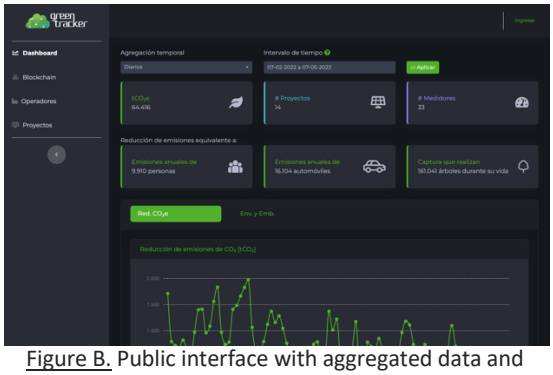

Figure B. Public interface with aggregated data and main eco equivalences.

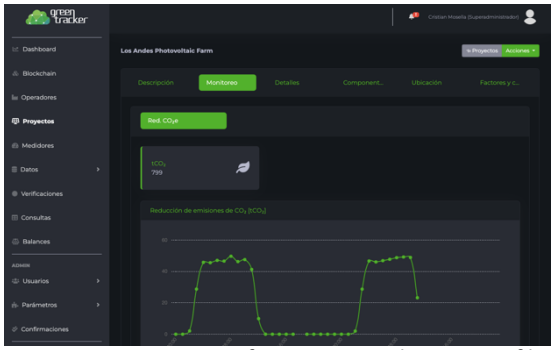

Figure C. IoT monitoring for emission reductions profile for a PV power plant.

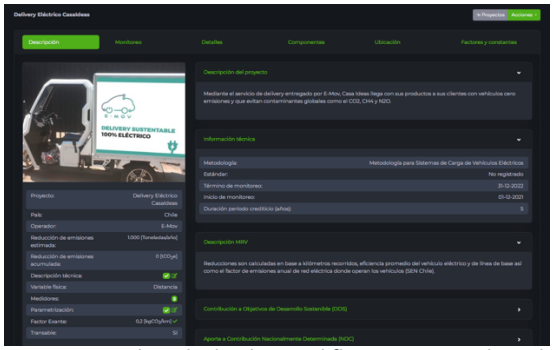

Figure D. Light vehicle electrical fleet project technical and environmental description.

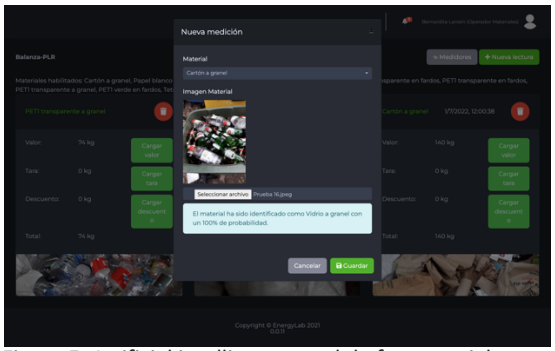

Figure E. Artificial intelligence module for materials type recognition.

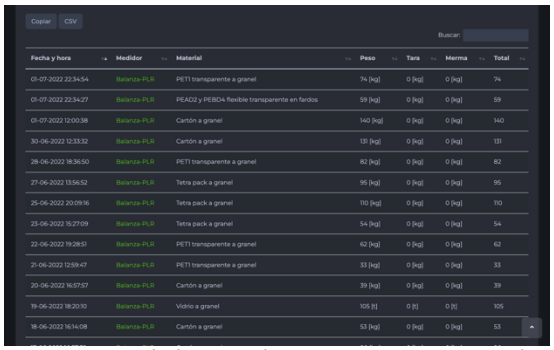

Figure F. Recycled materials types, timestamps, weights, tares and losses data base.

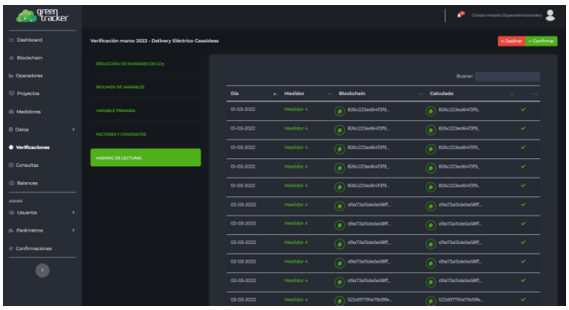

Figure G. Blockchain recorded hashes review for verification and auditing purposes.

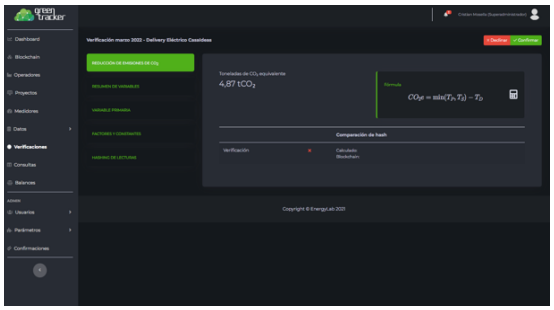

Figure H. Verification module with aggregated results previous to final tokenization and public registration.