



BLOCKCHAIN/AI BASED CO₂ EMISSIONS MONITORING AND TRADING SYSTEM (CARBO MT)

Technical Solution

Data Collection

IoT Sensor Network

Implementation of an IoT sensor network strategically deployed in industrial, urban and natural areas to measure CO₂ emissions in real time.

Captured data will include CO₂ concentrations, emission patterns and other relevant environmental indicators.

Observation Satellites

Use of low-orbit satellites capable of capturing high-resolution images and collecting global atmospheric data.

Allows monitoring of emissions in hard-to-reach areas and verification of information collected on the ground.

Technologies for Data Collection

IoT Sensor Network

IoT Hardware: Own electronic boards, air quality sensors (such as MQ-135 for CO₂ and PM2.5 particles).

Communication Protocols: MQTT, LoRaWAN, and HTTP/HTTPS for data transmission.

IoT Platforms: AWS IoT Core or Google Cloud IoT for real-time data handling.

Edge Computing: Local processing on IoT devices to minimize latency and send only relevant data to the cloud.

Observation Satellites

Satellite Imagery: Access to satellite constellations.

Processing Software: Google Earth Engine or our software for initial analysis of satellite images.

Data Storage: Use of distributed storage services such as Amazon S3 or Azure Blob Storage.



27 Old Gloucester Street
London, WC1N 3AX, UK



info@h2purus.com



getacall@h2purus.com



www.h2purus.com



DATA PROCESSING WITH AI

Satellite Image Analysis

 Application of deep learning algorithms to process images and detect sources of CO₂ emissions.

Accurate identification of patterns and concentrations in the monitored areas.

Image Processing Libraries:

OpenCV, Rasterio.

AI Models: Networks specialized convolutional neural networks (CNN), such as U-Net, for image segmentation and emission source detection.

AI Frameworks: TensorFlow and PyTorch for model building.

Data Fusion

Combining satellite data with data from IoT sensors to create an integrated and detailed map of global emissions.

Improves the accuracy and reliability of measurements.

Big Data Frameworks: Apache Spark for integration and analysis of large volumes of data from sensors and satellites.

Databases: PostgreSQL/PostGIS for geospatial data management.

Emissions Prediction

Implementation of AI-based predictive models to anticipate future emissions trends.

These models consider historical patterns and environmental variables, providing valuable information for decision making.

Predictive Models: LSTM (Neural Networks Recurrent) for time series analysis.

Programming Apache Spark for integration and analysis of large volumes of data from sensors and satellites.

Databases: PostgreSQL/PostGIS for geospatial data management.



27 Old Gloucester Street
London, WC1N 3AX, UK



info@h2purus.com



getacall@h2purus.com



www.h2purus.com



BLOCKCHAIN PLATFORM



Emissions Record

Immutable storage of verified Smart Contracts

Automation of the issuance, emissions data on a public blockchain to ensure transparency and prevent manipulation.

Blockchain network: Ethereum or Hyperledger Fabric for creating a public or private ledger, depending on privacy requirements.

Integration Modules: Infura (for Ethereum)

Complementary Database: IPFS (InterPlanetary File System) for storing large amounts of data, data volumes related.



Tokenization of Carbon Credits

Converting verified emission reductions into carbon credit tokens, facilitating their exchange and management in a decentralized market.

Smart Contracts: Programmed in Solidity (for Ethereum) or Chaincode (for Hyperledger Fabric) to automate the issuance and management of carbon credits.



Smart Contracts

Automation of the issuance, trading and withdrawal of carbon credits through smart contracts, reducing intermediation and operational costs.

Encryption Algorithms

Data Encryption: AES-256 to encrypt data stored on the blockchain.

Digital Signatures: ECDSA (Elliptic Curve Digital Signature Algorithm) to validate transactions and ensure authenticity.

Secure Communication Protocol: TLS 1.3 to ensure data transmission between nodes.



27 Old Gloucester Street
London, WC1N 3AX, UK



info@h2purus.com



getacall@h2purus.com



www.h2purus.com



CO2 DATA MARKET

Trading Platform

Development of a decentralized platform that allows companies, governments and other entities to buy and sell tokenized carbon credits in a secure manner.

Development Languages: Node.js for backend and React.js for frontend.
RESTful API: Built with frameworks like Express.js or Flask to integrate the platform with other systems.

Automated Verification

Using AI to validate and verify transactions and the authenticity of carbon credits in real time, ensuring market integrity.

Verification Systems: AI-based data matching algorithms (SVM or Random Forests) to validate in real time the transactions.

Traceability

Full traceability guarantee through blockchain, allowing users to track each credit from its generation to its withdrawal or final use.

Blockchain Explorer: Blockscout to provide visibility into blockchain transactions and their history.



27 Old Gloucester Street
London, WC1N 3AX, UK



info@h2purus.com



getacall@h2purus.com



www.h2purus.com



SYSTEM OPTIMIZATION

Continuous Improvement

Integration of reinforcement learning algorithms to optimize measurement accuracy and improve market efficiency.

Reinforcement Learning: Algorithms like Deep QLearning to optimize the system dynamically.

Training Platform: Google Colab or AWS SageMaker to train iterative models.

Anomaly Detection

Implementation of AI to detect irregularities in emission patterns or suspicious activities within the carbon credit market.

Anomaly Models: Autoencoders to identify deviations in issuance patterns and suspicious transactions.

Language: Python with libraries such as Keras and PyOD for implementation.

Traceability

Full traceability guarantee through blockchain, allowing users to track each credit from its generation to its withdrawal or final use.

Blockchain Explorer: Blockscout to provide visibility into blockchain transactions and their history.

Impact and Competitive Advantages

Transparency and Trust

The use of blockchain ensures an immutable and verifiable record of issues and transactions.

Accuracy in Monitoring

The combination of IoT sensors, satellites and AI provides accurate and reliable data.

Operational Efficiency

Automation through smart contracts reduces costs and time in carbon credit trading.

Promoting Sustainability

An accessible and efficient market encourages the reduction of emissions and promotes investments in green projects.



27 Old Gloucester Street
London, WC1N 3AX, UK



info@h2purus.com



getacall@h2purus.com



www.h2purus.com



INFRASTRUCTURE AND SECURITY



Cloud Infrastructure

Cloud Provider: Google Cloud Platform (GCP) for end-to-end services including storage, processing, and analytics.

Scalability: Kubernetes for Docker container orchestration, ensuring the platform can scale efficiently.



Additional Security

Authentication and Authorization: OAuth 2.0 and OpenID Connect to manage secure access

Audits: Use monitoring tools such as Grafana to continuously audit the system and detect failures or intrusion attempts.



Cloud Infrastructure

Google Cloud Platform (GCP) for end-to-end services and Kubernetes for scalability.



Robust Security

OAuth 2.0, OpenID Connect, and continuous monitoring tools to ensure system security



27 Old Gloucester Street
London, WC1N 3AX, UK



info@h2purus.com



[getacall@h2purus.com](tel:02074040000)



www.h2purus.com