CONFERENCE OMAINTEC 2026 EXHIBITION FM

The 23rd International Asset Facility and Maintenance Management Conference

Leveraging AI & DT for Carbon Emissions Trading & Net-Zero Achievement in KSA

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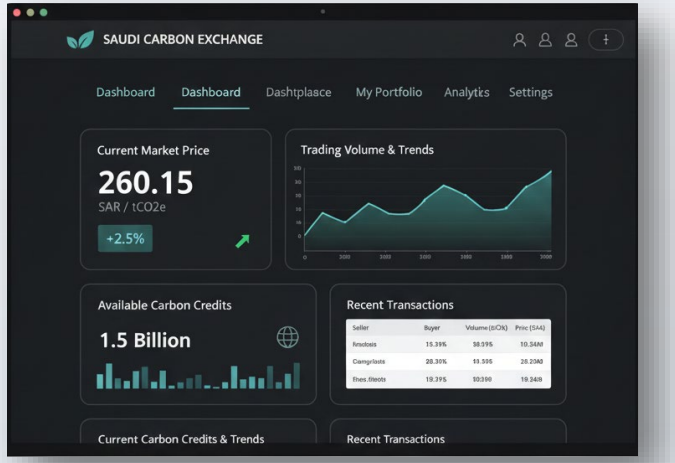
PROLOG

Outline of a strategic framework for implementing Artificial Intelligence (AI) and Digital Twin (DT) to ensure a sovereign, efficient, and globally integrated carbon market in Saudi Arabia.

Historic Transformation: Saudi Arabia stands at a historic inflection point, pivoting towards sustainability under Vision 2030.

Saudi Green Initiative (SGI) Targets:

- Reduce carbon emissions by **278 Mtpa by 2030**.
- Achieve **Net-Zero** emissions by **2060**.



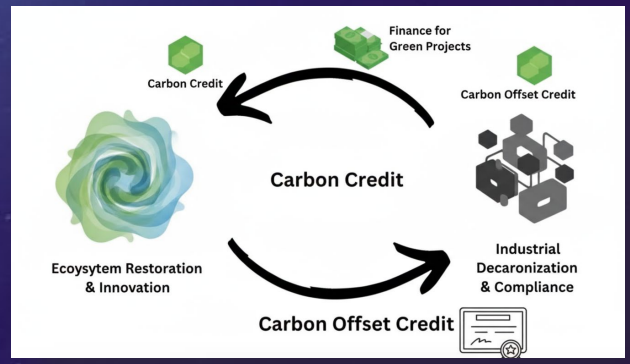
An Al-native digital ecosystem to support managing the entire carbon credit lifecycle

Projected Benefits:

- **60-75%** Reduction in MRV Costs
- **25-40%** Decrease in Compliance Costs

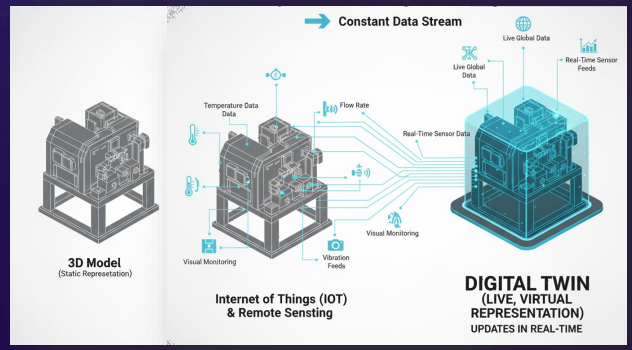
THE CORE CONCEPTS

A Carbon Credit is a tradeable permit representing the removal or avoidance of one metric ton of carbon dioxide (CO2) from the atmosphere.

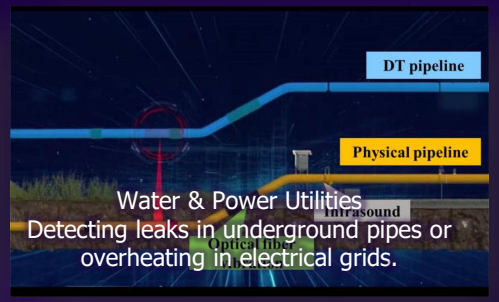


A Digital Twin is more than just a 3D model; it is a live, virtual representation of a physical asset that updates in real-time.

IoT and Data Acquisition: To make a Digital Twin "live," it needs a constant stream of data. This is achieved through the Internet of Things (IoT) and remote sensing technology.

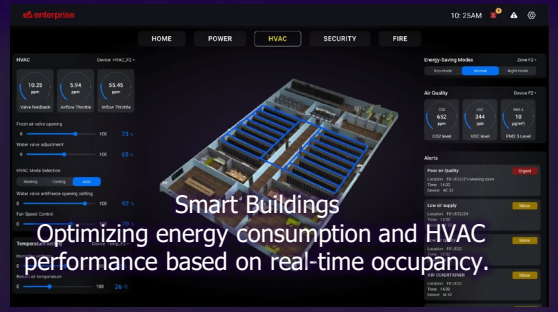


Bridges & Highways
Monitoring structural integrity and traffic load impacts.



Water & Power Utilities
Detecting leaks in underground pipes or overheating in electrical grids.

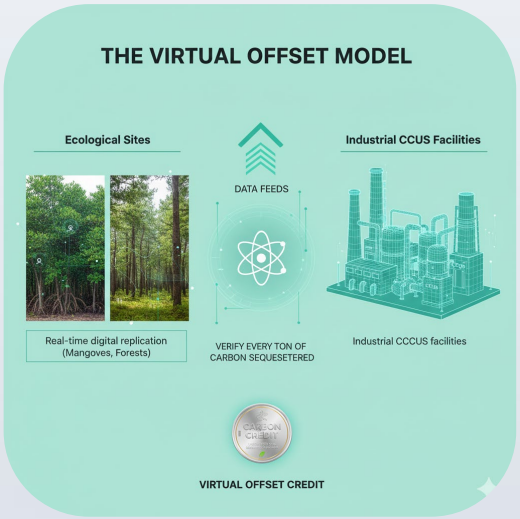
Industrial Plants
Tracking the wear and tear of high-value machinery to prevent production stops.



Smart Buildings
Optimizing energy consumption and HVAC performance based on real-time occupancy.

AI-Powered Digital Twins: Precision Carbon Assets

To achieve Saudi Vision 2030 sustainability goals, We integrates Artificial Intelligence and Digital Twin technology to transform static carbon reports into dynamic, tradeable financial assets.



Real-time
Monitoring

The "Virtual Offset" Model

Real-time digital replication of ecological sites (Mangroves, Forests) and Industrial CCUS facilities to verify every ton of carbon sequestered

Intelligence Layer

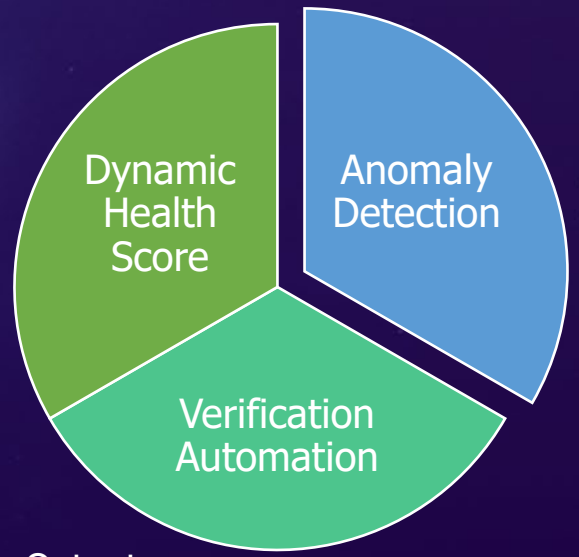
Processing Satellite imagery, IoT sensors, and Market data to ensure 99.9% verification accuracy

ML-Based
Verification

MODULE: AI FOR MONITORING & EVALUATION

Predictive Sequestration: Uses machine learning to forecast the carbon absorption potential of KSA reforestation projects over a 20-year horizon based on soil and climate data.

- Anomaly Detection: Automated identification of project "leakage" or ecological degradation via satellite-fed AI vision, triggering immediate credit adjustments.
- Verification Automation: Replaces manual audits with "Smart Verification" bots that cross-reference sensor data against global carbon standards (Verra, Gold Standard).
- Dynamic Health Score: Assigns a live "Asset Health Index" to every carbon credit, reflecting the real-time stability and risk level of the underlying project.



Platform Output.

Verified Emission Reductions (VER)Digital

MRV Dashboards

DIRV Dashboards

IoT-to-Blockchain Logging

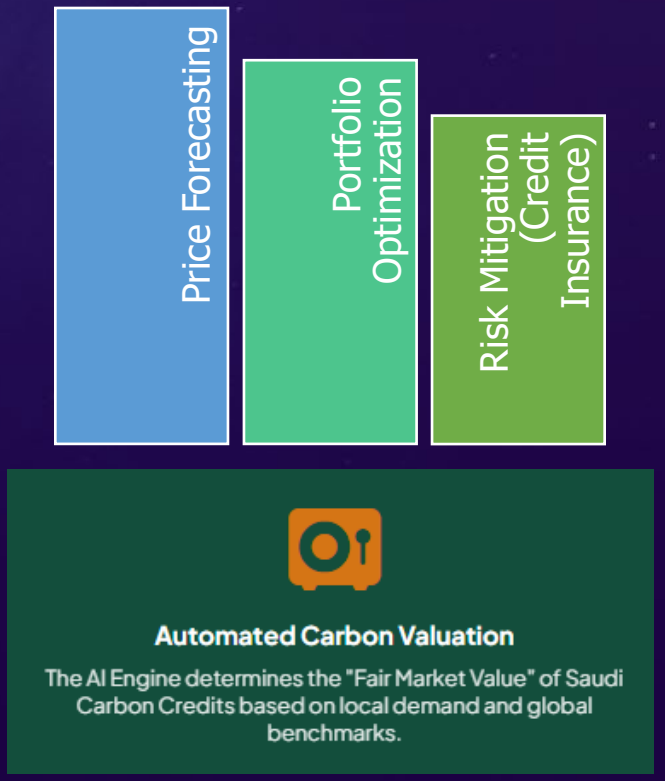
Compliance Readiness Reports

MODULE: FINANCIAL & MARKET INTELLIGENCE

Price Forecasting: Predictive analytics to help Saudi entities decide whether to "Hold" or "Trade" credits based on seasonal market trends and policy shifts.

Portfolio Optimization: Algorithms that recommend a mix of Nature-based and Technology-based offsets to maximize financial returns and ESG ratings.

Risk Mitigation (Credit Insurance): AI-driven financial risk modeling to determine "buffer pool" requirements to cover project failures or climate events.



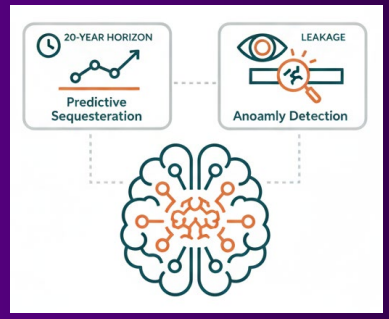
METHODOLOGY FOR IMPLEMENTING AI & DT

Define Objective & Scope

Identify specific operational outcomes

Data Infrastructure & BIM

Multi-dimensional (BIM) as foundation. Deploy IoT and satellite feeds -"live" data stream.



The Intelligence Layer (AI)

Forecasting over a 20-year Identify structural degradation or "carbon leakage" in real-time.

Integration & Scaling

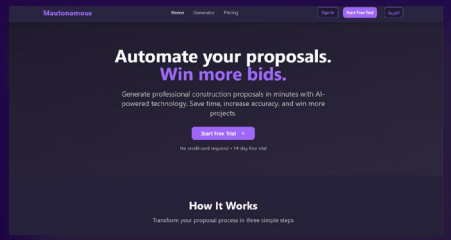
Connect the Digital Twin to financial systems (like blockchain) for transparent logging and credit issuance.

Implementation is a phased journey that moves from defining a "**Descriptive Twin**" to an "**Autonomous Twin.**"

CURRENT AND FUTURE WORK

SCAN ME

AI Based Tenders Proposal Generator

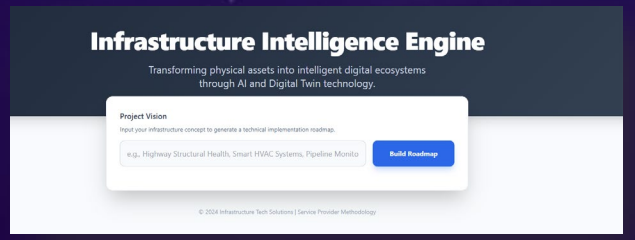


Technical Proposal Generating
Financial & Human Resources

https://mautonomous.fly.dev/

SCAN ME

AI/DT PBC Management Platform

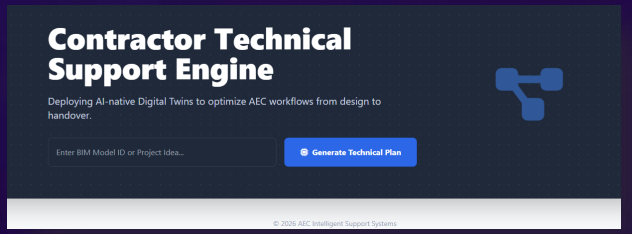


Guaranteed Outcomes
Smart Verification Bots

https://lockwoodandwallace.uk/AI_Agents/AIPBCM.html

SCAN ME

AI based Contractors Technical Support



Clash Detection &
Risk Mitigation /Safety & Logistics
Automated Valuation

https://lockwoodandwallace.uk/AI_Agents/AICTS.html

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THANK YOU!

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