ESG, Blockchain, and TYS
Why Blockchain is Essential for ESG?
June 9, 2023

Trust Your Supplier

CHAINYARD
an IT People Company

WE TURN TECHNOLOGY INTO BUSINESS RESULTS.

Achnowledgements

- Trust Your Supplier
- Chainyard
- Hyperledger Foundation (Climate SIG)
- Specials thanks to Jim Mason (DTCC) and David Boswell (Hyperledger)

About Chainyard

- Boutique Enterprise Blockchain and Web3.0 Consulting and Advisory Services

- Founded and Based in Morrisville, North Carolina, USA

- Global Offices in India, Philipines, and Vietnam with activities in Europe (Ireland) and the Middle East (Dubai)

- More than 50 Engagements in Enterprise Blockchain and Public Web 3.0 Solutions

- Active contributors and members of Hyperledger Foundation (Opensource Enterprise Blockchain)

- Support Lenovo, IBM, Governments of Dubai, Saudi Arabia, and Bahrain, US Federal, and other major customers

- Conceived, Designed, Implemented and, now Operate and Govern the "*Trust Your Supplier*" consortium

3

The ESG Framework

Environment:

- Degree to which an entity adheres to sustainable practices

- Measures impact of activities on the planet such as the exploitation of natural resources like water, forests, and minerals, emissions of greenhouse gases like CO_2, damage to the environment, etc.
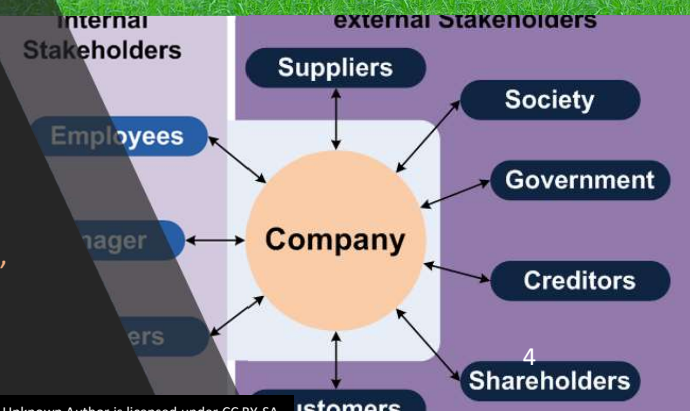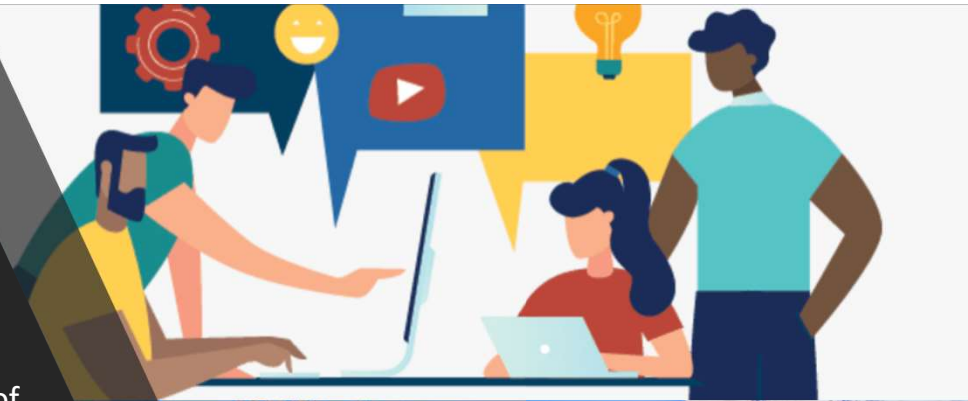
Social:

- A Business Entity's relationship and behavior with people both internal to the company and external to its customers and supply chain partners

- How well workers are treated, do they get fair wages, do they engage in unfair labor practices, give back to served communities, etc?

Governance:

- Management of corporate ESG ethical, regulatory, and legal compliance and reporting

- Establishment of policies, procedures, guidelines, and measurement frameworks

"Customers also indicated that rising customer expectations, environmental, social, and governance (ESG), and future of work, are the trends expected to affect their business the most" – Moody's 2022 Survey

Internal Stakeholders · external Stakeholders

Suppliers

Society

Employees

Government

Manager

Company

Creditors

ers

Shareholders

stomers

4

CHAINYARD

- **Compliance Reporting**

- **Emission Reduction**
  - Carbon Farming and Sequestering
  - Migration to electrical energy
  - Transition from Fossil Fuels to Renewable sources
  - Carbon Offsets and Credits to compensate for emissions
  - Carbon Insetting through corporate self-improvement initiatives

- **Plastics Management**
  - Plastic Waste collection, sorting, recycling, and disposal
  - Discontinue single-use plastic items.
  - Measuring the impact of micro-plastic pollution

- **Land and Water Management**
  - Forest management
  - Restoration and protection of coastal wetlands and marine life
  - Carbon-Friendly Agriculture

- **Waste Management**
  - Efficient and effective collection, sorting, and recycling of industrial and household waste.
  - Reprocessing electronic waste.
  - Excess inventory sharing by enterprises with others.
  - Manufacturing products using sustainable processes and raw materials

Environment-Friendly and Responsible Applications

5

Approach - Simplified

Commit	Measure	Validate/Verify	Monitor
$	&	&	&
Init Projects	**Report**	**Account**	**Control**

Commit
- Companies commit to ESG targets
- Companies Fund Internal and Public/External Projects
- E.g. Vera, Moss

Measure
- Standards bodies and Non-Profits establish guidelines and methods
- Project Outcomes are measured and Reported
- E.g. GHG Protocol

Validate/Verify
- Recognized Third Parties validate and verify outcomes
- Account progress against targets, retire Offsets
- E.g. Ecovadis, PWC

Monitor
- Projects are monitored for ROI
- Controls and Feedback mechanisms regulate projects

Carbon Offset Tokenization & Lifecycle

- Corporations offset their own emissions by funding Carbon related internal & third party projects

- Blockchain records the lifecycle of those offset-credits including cryptographically verifiable proofs

- 1 Carbon Offset Token = 1 Metric ton of CO2e (3 mths of Car or 40 years of a tree)
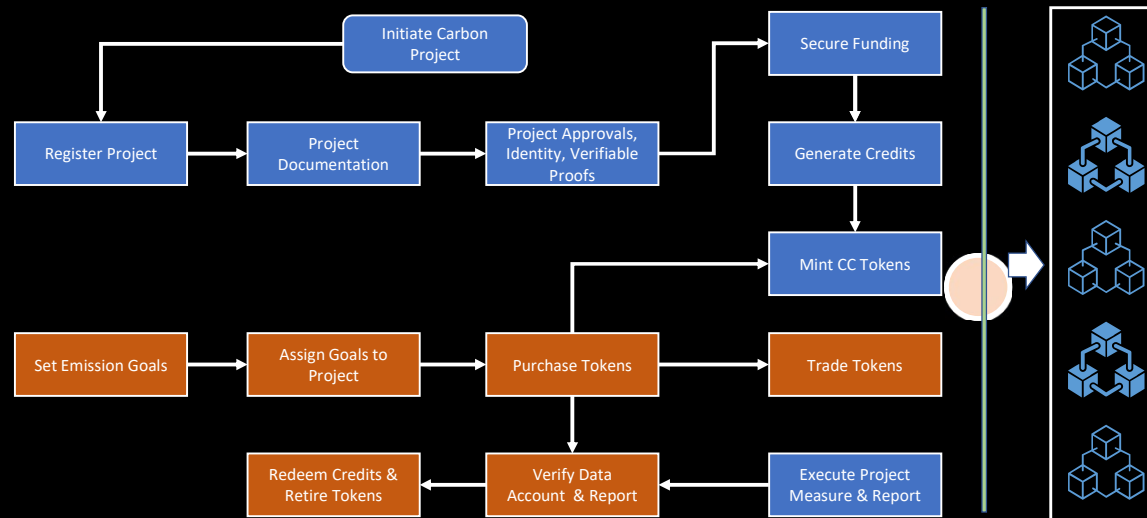
- Reforestation and afforestation
- Forest conservation and management
- Wind farms, hydropower projects, solar power plants, and other renewable energy projects
- Landfill gas capture and management
- Providing energy-efficient cookstoves and appliances to local communities
- Farm power, methane capture, and biogas production
- Waste management
- Blue Carbon Projects

7

Carbon Insetting and Reporting

- Insetting refers to a Business Entity reducing its own emissions through changes in technology, improvements in processes and practices and bringing efficiency

- Insetting is more important as it enables a company to take ownership and responsibility for its emissions
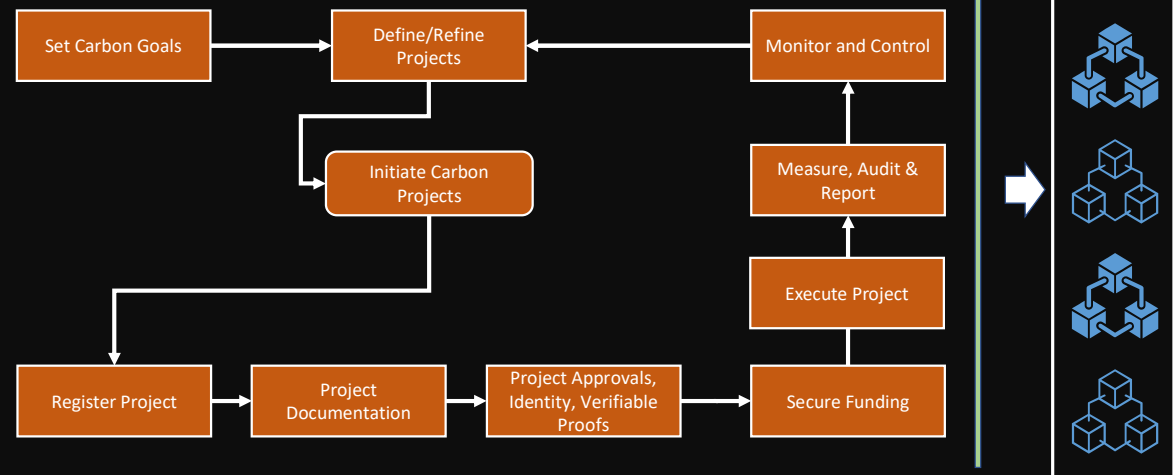
Regulated Carbon Credits (Cap-n-Trade)

- The *Government* or a *Regulatory Body* sets "Environment Goals" for a group of states or industries

- Goals translate into "*Emission Limits*" which get broken further into units called "*Allowances*"

- These allowances are *allocated* as "*Carbon Credits*" to impacted entities for the purchase

- for purchase as *Business entities* are assigned allowances on how much emissions are allowed

- *Business entities* purchase "Carbon Credits"

- *Allowances* are gradually reduced over time

Buy Offsets (--)

Buy Credits

allowance

Sell Credits (+)

Three ESG Blockchain Use Case Patterns

- Provenance, and Track & Trace of ESG Projects

- Facilitating the Trading and Trusted Record-keeping of Carbon offsets and credits (tokens)

- Supporting Risk, Audit, and Compliance reporting

These patterns cut across many domains such as supply chain, health care, real estate, and energy

ESG-Related Blockchain Projects - Examples

- Trust Your Supplier - Chainyard
- DitchCarbon -- Carbon Accounting
- Digital Credentials for Carbon Accounting –Energy & Mines Digital Trust
- Resilinc, EcoVadis, Greenly
- Moody's Analytics

Ratingss, Audit & Reporting,

- Integrity Next
- IBM Supply Chain Intelligence Suite
- Tinium

Track & Trace

- MOSS Project
- Toucan
- Plastic Bank
- Save The Planet
- Klim DAO

Projects, Offsets, and Credits

Trust Your Supplier

GLOBAL BLOCKCHAIN-BASED SUPPLIER INFORMATION MANAGEMENT

Manage multiple, complex risk areas efficiently, with historical, predictive, and prescriptive insights into risk management

PROCUREMENT MEMBERS

IBM · NOKIA · Lenovo · Red Hat · BT · gsk GlaxoSmithKline · Pearson · vodafone · Schneider Electric

BUSINESS PARTNERS & DATA PROVIDERS

dun & bradstreet · RAPIDRATINGS · LexisNexis RISK SOLUTIONS · resilinc · Verisk Maplecrof · ecovadis · cybervadis · TRADESHIFT · KYC SiteScan · supplier.io · Comply Advantage · GDC GLOBAL DATA CONSORTIUM · LEI LEGAL ENTITY IDENTIFIER

Provides Immediate Benefits

Discover trusted suppliers

Risk profile of your entire supplier base

Reduce cycle time

Monitor changes in supplier risk

Answers the Questions

Who am I doing business with?

Can their data be trusted?

Are they acting responsibly?

Are they reputable?

Are they sustainable?

✓ Risk Insights

✓ Automation

✓ Workflows

CASE STUDY

82% cycle time reduction

41% reduction in risk & compliance validations

43% quality assesments & performance audits reduction

Blockchain Complements TYS & ESG

- **Immutable** Recording of Data
- **Smart Contract** driven
- **Digital Identity**
- **Proof-of-**Existence / Proof of Verification
- **Cryptographic** Verification
- **Consensus** and consistency of the ledger
- **Transparency**
- **Privacy** and Anonymity
- **Tokenization** and Incentivization

Digital Identity ● Verifiable Credentials ● Tokenization ●
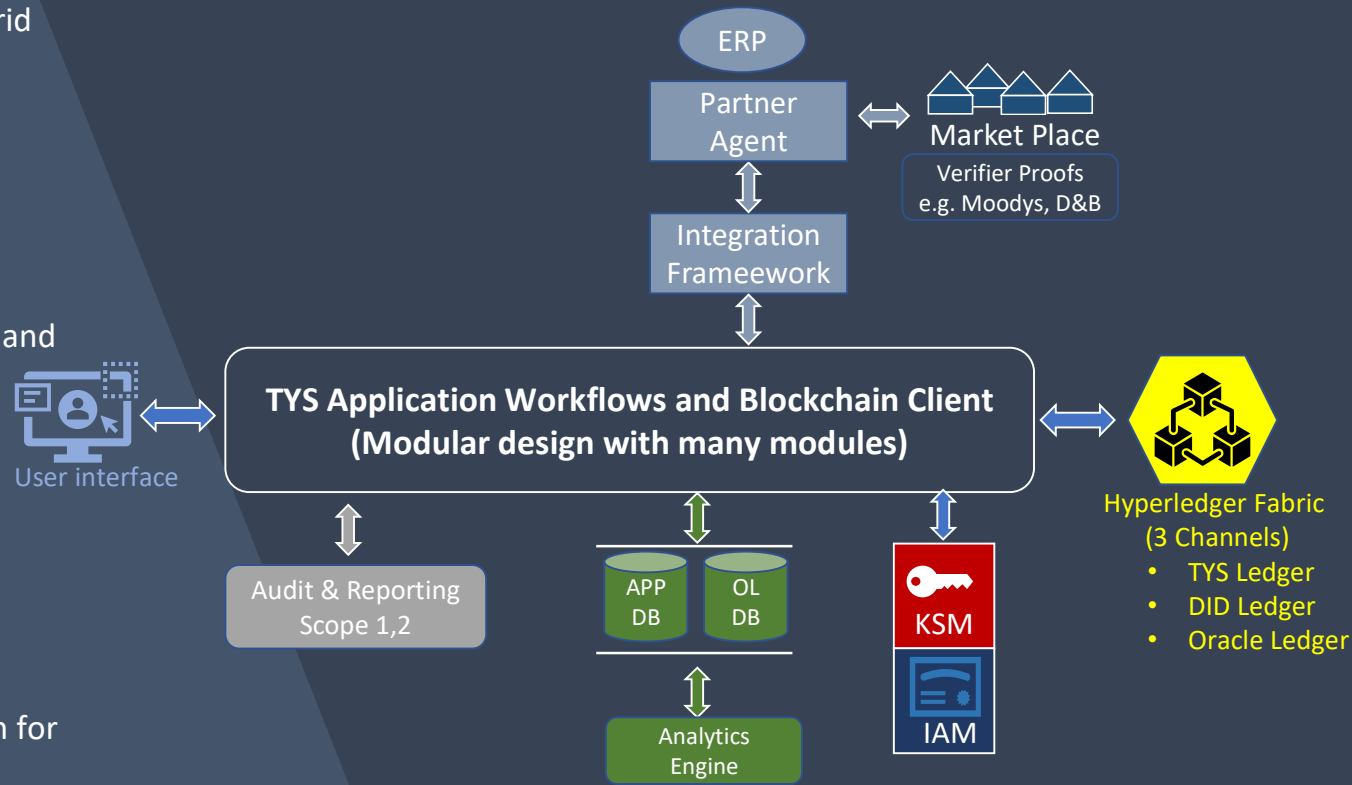ERC 20 ● ERC 721 ● Wallet ● Asset ● Consensus

Trust ● Transparency ● Smart Contracts ● Privacy ●

Trust Your Supplier

Trust Your Supplier

Architecture Overview

- Hyperledger Fabric Blockchain enabled Hybrid Decentralized Network with Fabric CA

- **NodeJS & FabricSDK**-based client

- Off-Chain Database based on **MongoDB**

- Globally resolvable Digital Identity W3C standards with Enterprise Digital Wallet

- Key Management Services support Supplier and human-user Public/Private Keys based on ECDSA

- Non-Invasive integration framework
  - Supports Third Party Market Place
  - Integrates with Enterprise ERPs and Solution

- A Rich UI/UX built with React JS

- Analytics Database with PowerBI integration for dashboards and analytics

User interface

ERP

Partner Agent

Market Place
Verifier Proofs
e.g. Moodys, D&B

Integration Frameework

TYS Application Workflows and Blockchain Client (Modular design with many modules)

Hyperledger Fabric (3 Channels)
- TYS Ledger
- DID Ledger
- Oracle Ledger

Audit & Reporting Scope 1,2

APP DB

OL DB

KSM

IAM

Analytics Engine

CHAINYARD

14

TYS, Blockchain & ESG

- Captures ESG Information via Generic & Custom Questionnaires on
  - Environment, Social, and Governance Practices established by business entities
  - Enables businesses to upload reports that are validated by Third Parties
  - Enables ratings on ESG from Ecovadis, Moodys, D&B, and others
- Ready to support Scopes 1 & 2
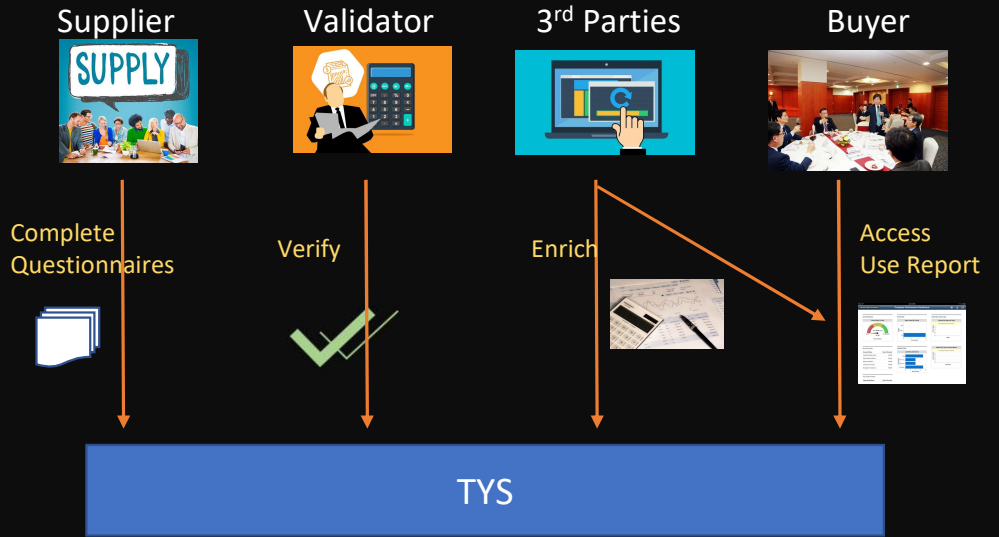
"Customers also indicated that rising customer expectations, environmental, social, and governance (ESG), and future of work, are the trends expected to affect their business the most" – Moody's 2023 Survey

Supplier	Validator	3rd Parties	Buyer
Complete Questionnaires	Verify	Enrich	Access Use Report

TYS

Trust Your Supplier, ESG & Blockchain

Trust Your Supplier is a Hyperledger Blockchain-enabled decentralized network

ESG and TYS (Trust Your Supplier)
TYS Questionnaires capture key ESG information from suppliers
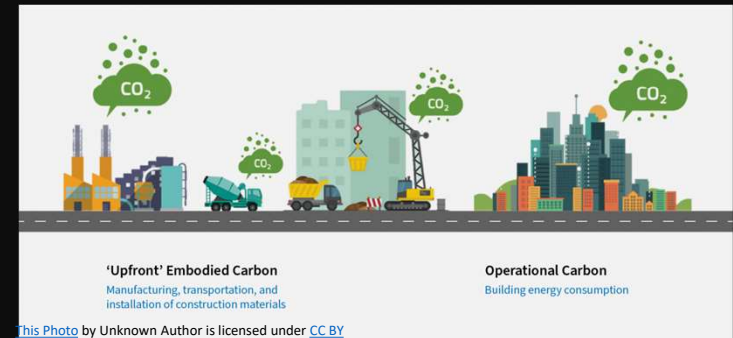
Environment

1. Goal, Commitments, Actuals, Offsets Purchased
2. Practice sustainable manufacturing processes
3. Use of renewable energy
4. Management of resources such as water and raw materials
5. Reduce, Reuse, and Recycle waste matter
6. Emission of carbon dioxide and other pollutants

Social

1. Corporate labor practices
2. Relationships with the community and stakeholders
3. Treatment of employees such as healthcare, fair wages, benefits
4. Treatment of partners in the supply-chain journey

7

Information is rated by third parties such as Moodys, Ecovadis, D&B, etc.

Governance

1. Establishment of guidelines, policies, and procedures
2. Commitment to carbon emission reductions via offsets, credits, and insets
3. Implementation of Monitoring and Controls
4. Compliance, Disclosures, and Reporting practices
5. Business Risk Management

'Upfront' Embodied Carbon
Manufacturing, transportation, and installation of construction materials

Operational Carbon
Building energy consumption

CHAINYARD

The scopes have been defined such that there is no double counting

Scope 1, 2, 3

Emissions type	Scope	Definition	Examples
Direct emissions	Scope 1	Emissions from operations that are owned or controlled by the reporting company	Emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment
Indirect emissions	Scope 2	Emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the reporting company	Use of purchased electricity, steam, heating, or cooling
	Scope 3	All indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions	Production of purchased products, transportation of purchased products, or use of sold products

Source: GHG Protocol

Upstream or downstream	Scope 3 category
Upstream scope 3 emissions	1. Purchased goods and services 2. Capital goods 3. Fuel- and energy-related activities (not included in scope 1 or scope 2) 4. Upstream transportation and distribution 5. Waste generated in operations 6. Business travel 7. Employee commuting 8. Upstream leased assets
Downstream scope 3 emissions	9. Downstream transportation and distribution 10. Processing of sold products 11. Use of sold products 12. End-of-life treatment of sold products 13. Downstream leased assets 14. Franchises 15. Investments

List of Scope 3 Categories

Upstream and Downstream Reporting Categorization

Source: GHG Protocol

ESG Bodies and Institutions

- American Carbon Registry

- CSA Group Registries

- Climate, Community & Biodiversity (CCB) Standards: Certification to the Climate, Community & Biodiversity (CCB) Standards demonstrates that a project simultaneously addresses climate change, supports local communities and smallholders, and conserves biodiversity

- Task Force on Climate-related Financial Disclosures (TCFD) - Increased reporting of climate-related financial information.

- Verra - SD-VISta The Sustainable Development Verified Impact Standard (SD VISta) - Premier standard for certifying the real-world benefits of social and environmental projects, from gender equity and economic development to affordable clean energy and restoration of wildlife.

- The United Nations' Sustainable Development Goal 7 (SDG 7) focuses onreliable and clean energy modern energy services, as defined in its Target 7.1

- Paris Accord on Scope 1/2/3 reporting

- United States – Environmental Protection Agency

- European Commission (2020) Circular Economy Action Plan

- Open Earth Foundation

- Hyperledger Foundation – Climate SIG

Climate Action Reserve

GHG Protocol

The Gold Standard

Verra

Verra Registry

- Verified Carbon Standard
- Plastic Waste Reduction Program
- Climate Community and BioDiversity Standards
- Sustainable Development Verified Impact Standard
- California Offset Project Registry

GHG Protocol

- GHG Protocol supplies the world's most widely used greenhouse gas accounting standards.

- The Corporate Accounting and Reporting Standard provides the accounting platform for virtually every corporate GHG reporting program in the world.

- GHG Protocol follows the same type of global, inclusive, and open multi-stakeholder process used to develop the

  - Cross-sector tools: Applicable to many industries and businesses regardless of sector.
  - Country-specific tools: Customized for particular developing countries.
  - Sector-specific tools: Principally designed for the specific sector or industry listed, though they may be applicable to other situations.
  - Tools for countries and cities: These help city, province and cities track progress toward their climate goals.

- Forest Land and Agriculture (FLAG) in partnership with WWF and updated GHG guidance from the WBCFSD (World Business Council for Sustainable Development)

The role Blockchain beyond Reporting
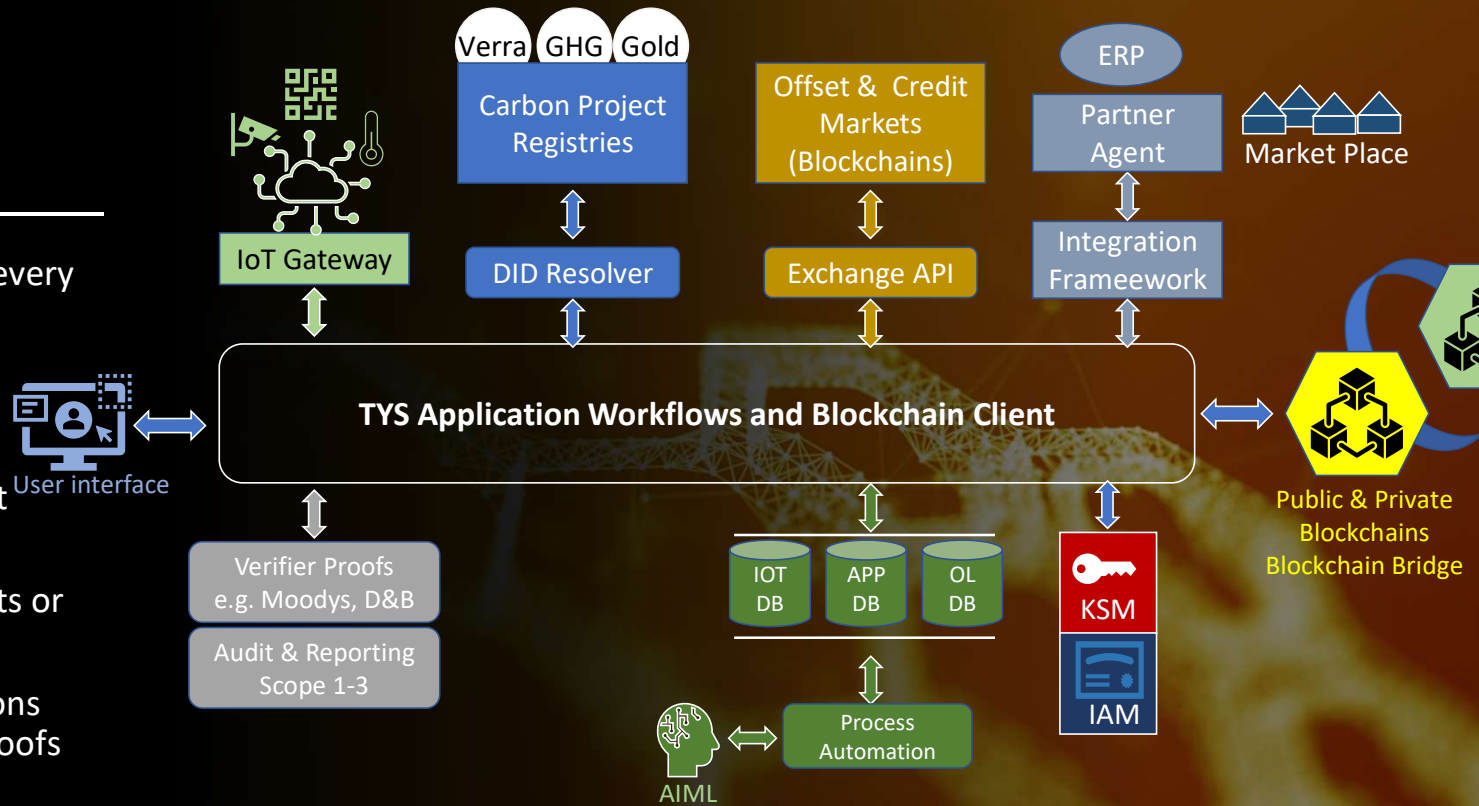
- Consistency in the application of policies and regulations

- Environment management transcends beyond CO_2 emissions

- Double Spend (Accounting) of credits and offsets

- Traceability of ownership and retirements of Offsets & Credits

- Proving Voluntary Carbon Market-related Project Benefits & Status

- Verifiable and Trusted Regulatory Reporting

CHAINYARD

Trust Your Supplier
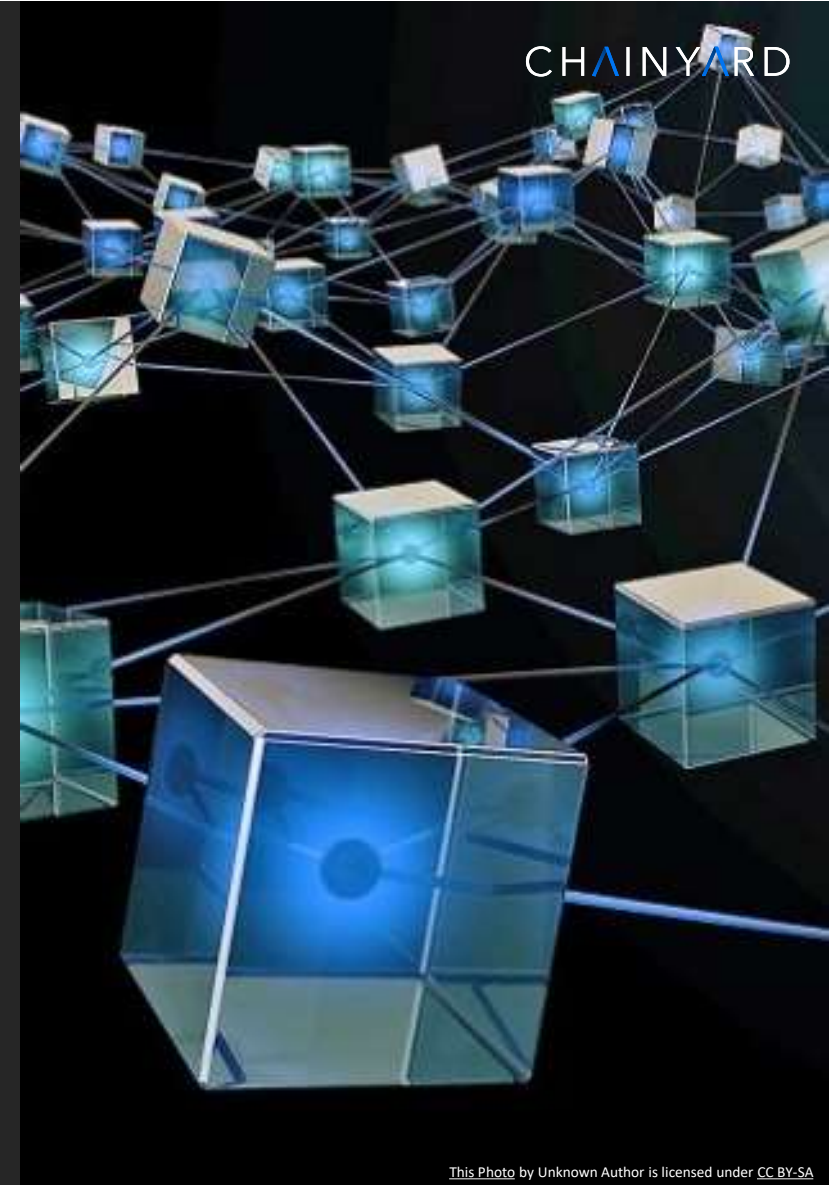
TYS positioned to add value to VCMs

- Digital Identity assigned to every Carbon Project so that it is universally identifiable and digitally verifiable

- API Layer to connect with appropriate "Carbon Project Registries"

- API Layer to purchase Credits or Offsets from Exchanges

- API Layer to records emissions (Hashes) and verification proofs

User interface

IoT Gateway

Verra | GHG | Gold

Carbon Project Registries

DID Resolver

Offset & Credit Markets (Blockchains)

Exchange API

ERP

Partner Agent

Integration Frameework

Market Place

TYS Application Workflows and Blockchain Client

Public & Private Blockchains Blockchain Bridge

Verifier Proofs e.g. Moodys, D&B

Audit & Reporting Scope 1-3

IOT DB | APP DB | OL DB

KSM

IAM

AIML

Process Automation

Net Zero Versus Carbon Neutral

- **Net zero** refers to the amount of greenhouse gases (GHGs) – such as carbon dioxide (CO_2), methane, or sulfur dioxide – that are removed from the atmosphere is equal to those emitted by human activity.
  - It may include carbon offsetting and carbon avoidance activities among others

- **Carbon Neutral**: Refers to the removal of CO_2 emitted across the supply chain through investment in projects associated with *Carbon Sinks* such as forests and blue-carbon ecosystems
  - Mangrove Forests (Mangroves for instance can store up to 10 times more carbon per acre than land-based forests)
  - Seagrass
  - Salt Water marshlands

Thank You

Contacts:

- Mohan Venkataraman
- Sai Nidamarty

CHAINYARD

Please note

Chainyard's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice and at Chainyard's sole discretion.

Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.

The information mentioned regarding potential future products or services is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products or services may not be incorporated into any contract.

CHAINYARD IS A CONSULTING & ADVISORY SERVICES COMPANY AND AN IBM BUSINESS PARTNER BASED IN MORRISVILLE, NC