Empirical Energy:
Scaling Alterative Energy

A Case Study Featuring PureWest Energy and Gunvor Group

CleanConnect.ai

Visual Automation

Downstream Buyers Want Certified Bio-Methanol, Bio-Plastics, Blue Hydrogen, LCFS, Low-CI LNG

GUNVOR

$150B/yr Global Energy Trader

*As of November 2024. 52 of the Members have given consent for displaying their logos.
A complete list of all ISCC Association Members can be found on the Membership List web page.

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Challenges Between PureWest & Gunvor

Downstream Buyers Want Certified Bio-Methanol, Bio-Plastics, Blue Hydrogen, LCFS, Low-CI LNG

Stuck With Default CI Score

Needs Mass Balance Certification

Different Reporting Standards

Subpart W, OGMP, MMRV, ISCC

Default CI

Scores

PureWest Energy

Wyoming Gas Producer

Gunvor Group

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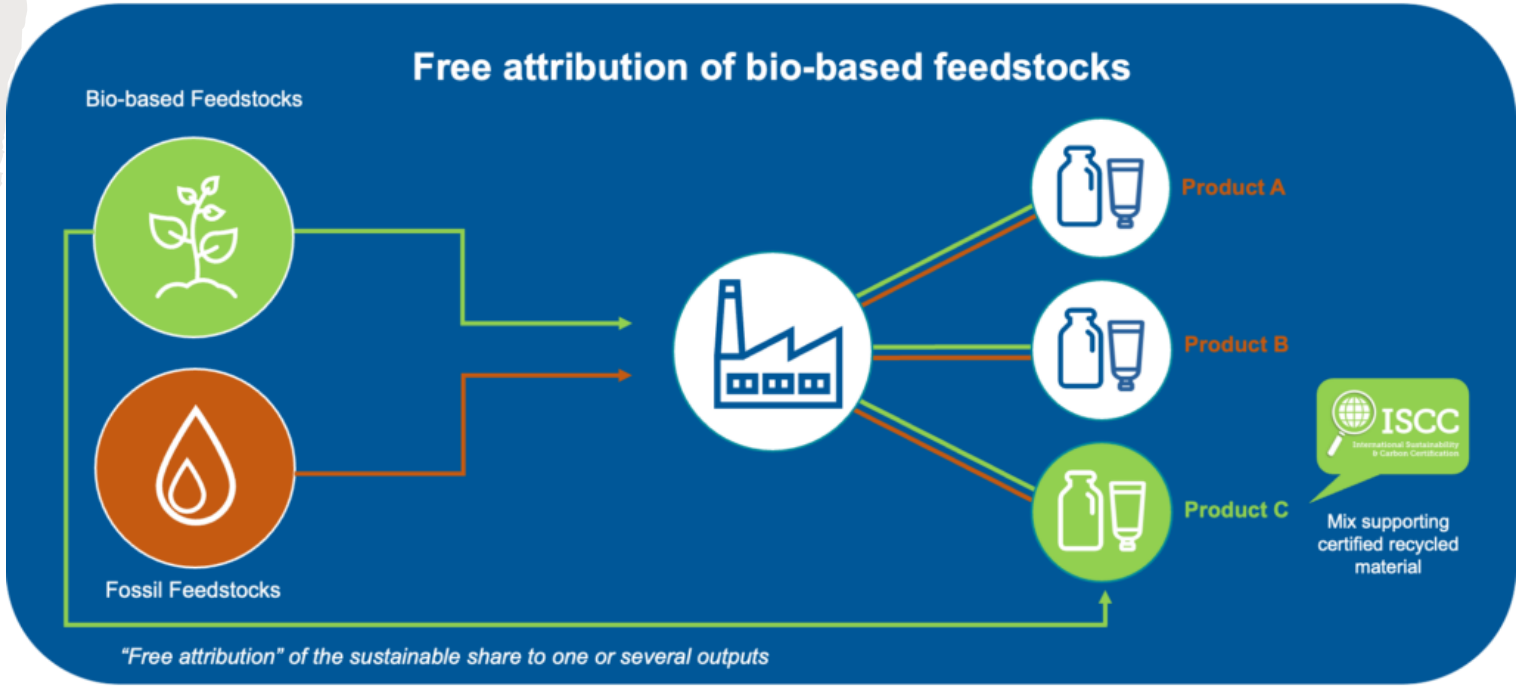
Standard Gas Has High CI Score

RNG is Expensive & Low Supply

Buyer Wants ISCC Certified Feedstock Blend w/Low CI Score

ISCC-PLUS

- Certified entity is allowed to handle certified feedstocks
- Each certified feedstock must be ISO 14067 with mass balance
- The entire supply chain must have data tracking, tracing and transparency
- The ETH blockchain and NFT's fit this data handling criteria



ISCC
International Sustainability & Carbon Certification

Empirical Energy Platform

Transforming Emission Factors into Empirical Energy

Producer (seller)

Emission Factors

MONITOR

10x Control Room

Gas, Liquid, Fire, Smoke, PPE, Gate Guard, TLM

MEASURE

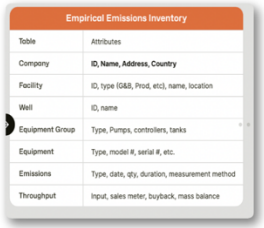
Flow Meters

ProMax

Mass Balance

Production Intelligence

REPORTING



OGMP Subpart W MMRV

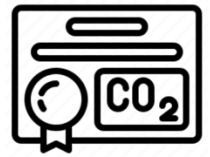
VERIFICATION

ISO 14067

ISCC International Sustainability & Carbon Certification

3rd Party Verified Empirical Energy

TRADING



NFT - Feedstock Blending

Empirical Energy Trading on Blockchain

GUNVOR

Empirical Energy Buyer

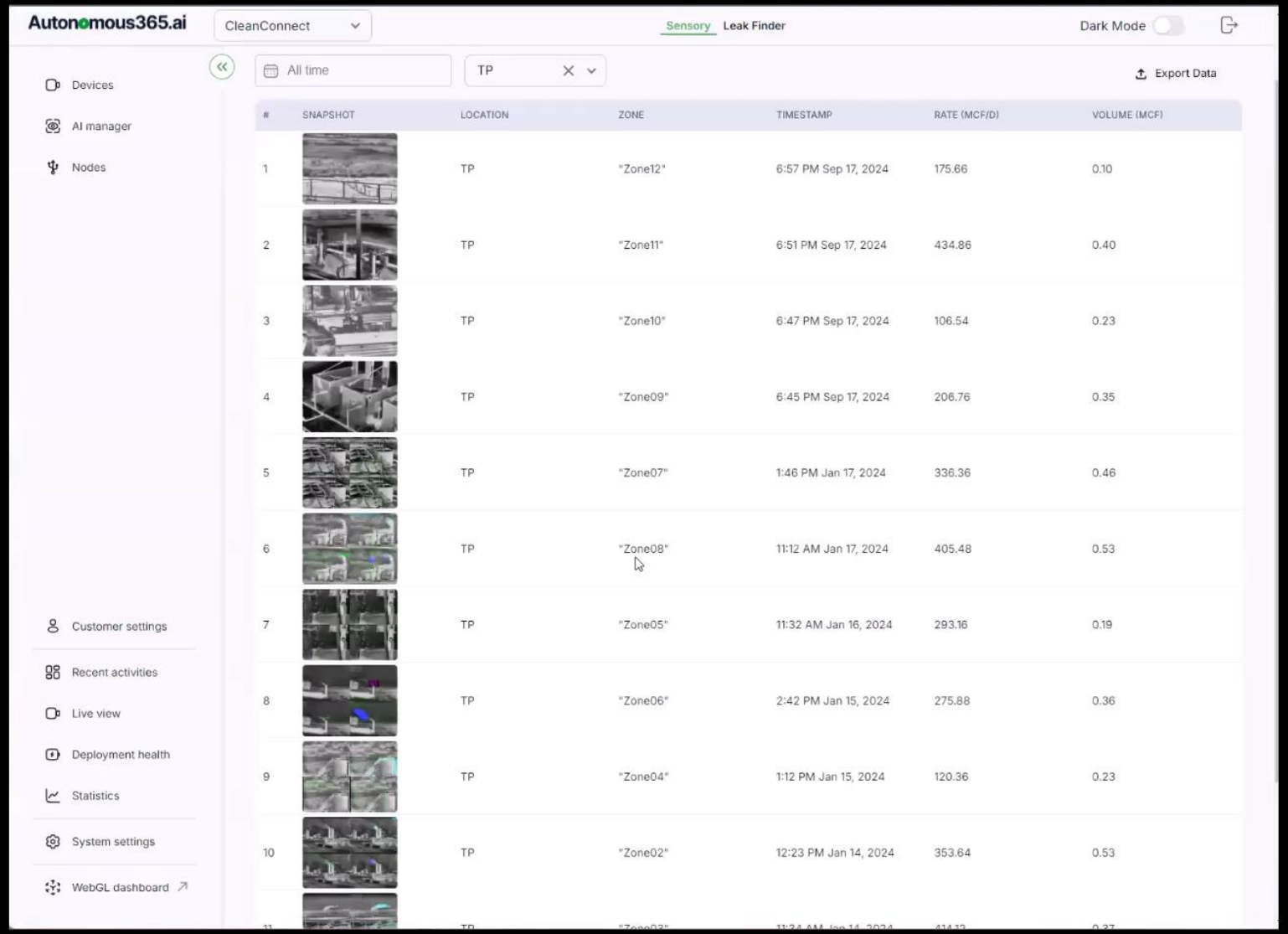
Empirical Energy Management Platform

Minerva Camera Deployment

- Cameras installed by certified installers
- Camera placed on tower – 35-45 feet above site
- Connect via power-over-ethernet (POE)
- Configuration file sent to camera from digital twin
- Ready to start monitoring in minutes

Autonomous365 Dashboard Demo

- Gas Leak
- Liquid Leak
- Fire/Smoke
- Hard hat
- Tank-level monitoring
- Method 22
- Gate Guard
- Live View



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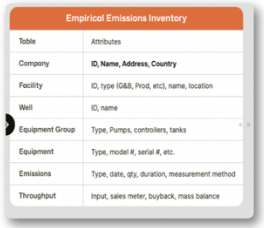

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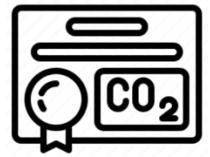

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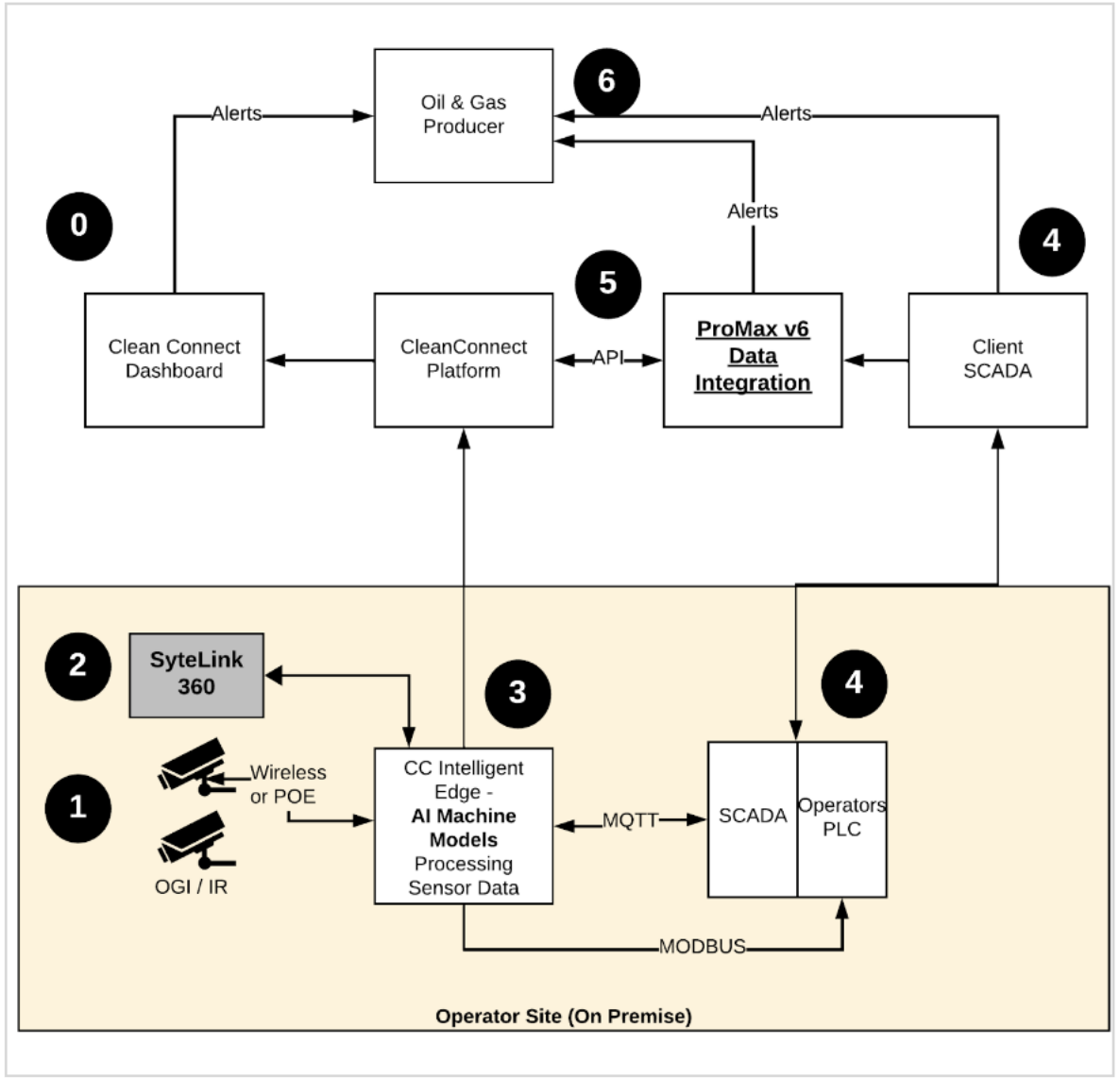
System Architecture

1. OGI cameras send raw data to edge
2. Optional: SyteLink360 sends data to edge
3. Edge device processes computer vision models
4. Integrated with SCADA via MQTT / Modbus
5. Data pushed/pulls from SCADA to Promax 6, then to Clean Connect platform
6. Alerts sent to O&G producer



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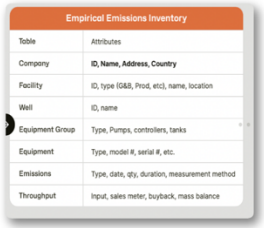

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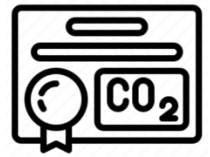

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Comparing GHG Emission Inventories

DIFFICULTY

Feature	Empirical Subpart W Waste Emission Charge	OGMP 2.0 Level 4/5	MMRV	ISCC
Prerequisite Compliance	Mandatory Reporting Rule Subpart W	Local Govt	Local Govt.	Local Govt.
Source-level Measurements	Method 1-5 (1=more accurate, 5=factors)	TBD	TBD	TBD
Site-level (Top-down) measured	n/a	Site & Source-level reconciliation required for Level 5	Site & Source-level reconciliation required for Level 5	Site & Source-level reconciliation required for Level 5
Baseline	• Upstream: 0.2% CH4 intensity • Midstream: 0.11% CH4 intensity • Down: 0.05% CH4 intensity	0.2% CH4 intensity (OGCI numbers)	0.2% CH4 intensity (OGCI numbers)	Empirically Measured Feedstock Determines CI Score
Fee (tax) for not hitting baseline	• $900/mT CH4 (2024) • $1200/mT CH4 (2025) • $1,500/mT CH4 (2026)	None	EU CBAM	n/a
Annual Emissions Inventory Audit	TBD	By OGMP	n/a	n/a
Methodology Audit		By OGMP	ISO 14067 / 14064-3	ISO 14067 / 14064-3
Data Audit / Standard	Yes. 3rd party. / TBD	Yes. OGMP/ TBD	ISO 14067 / 14064-3	ISO 14067 / 14064-3
Supply Chain Attestation / MMRV			ISO 14067	**ISO 14067 w/Mass Balance**
Data Requirements	Upload to EPA portal	Upload to OGMP portal	TBD	Tracking, Tracing, Transparency e.g. Blockchain / NFT

Excerpt from EPA Cheat Sheet

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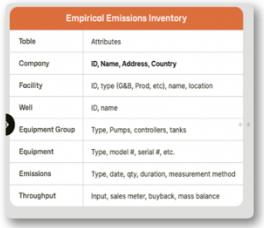

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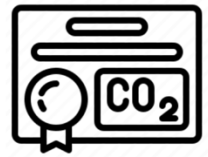

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Feedstocks

Biobased Feedstocks

Agricultural Biomass
Forest Biomass
Waste and Residues
(including agricultural, aquaculture, fisheries and forestry residues)
Ligno-cellulosic Materials
Non-food cellulosic Materials

Recycled Carbon Feedstocks

Liquid and solid waste streams of non-renewable origin or waste processing and exhaust gas of non-renewable origin

Non-biological Renewables

Energy derived from renewable sources other than biomass

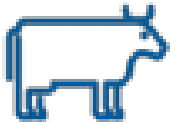
Market Applications

Food

Agricultural Biomass for the Food Production

Feed

Agricultural Biomass for the Feed Production



Industrial Applications

- Chemicals
- Packaging
- Plastics
- etc.

Fuels

- **Biofuels, Bioliquids and Biomass Fuels**

Including:

- Low iLUC-risk fuels
- High iLUC-risk fuels
- Advanced Biofuels (produced from feedstocks listed in Annex IX of the RED II)

- **Recycled Carbon Fuels**
- **Renewable liquid and gaseous Transport Fuels of non-biological Origin (RFNBOs)**

ISCC Systems

ISCC PLUS

Applicable to
Food
Feed
Industrial Applications
Energy and Fuels outside the EU (not regulated by the RED II)

ISCC EU

Applicable to
Energy inside the EU
(fuels, electricity, heating, cooling)
(regulated by the RED II)
ISCC EU confirms compliance with the Sustainability and GHG Saving Criteria of the RED II

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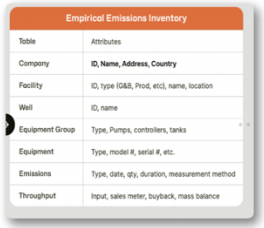

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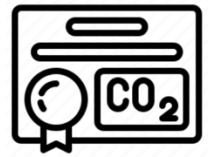

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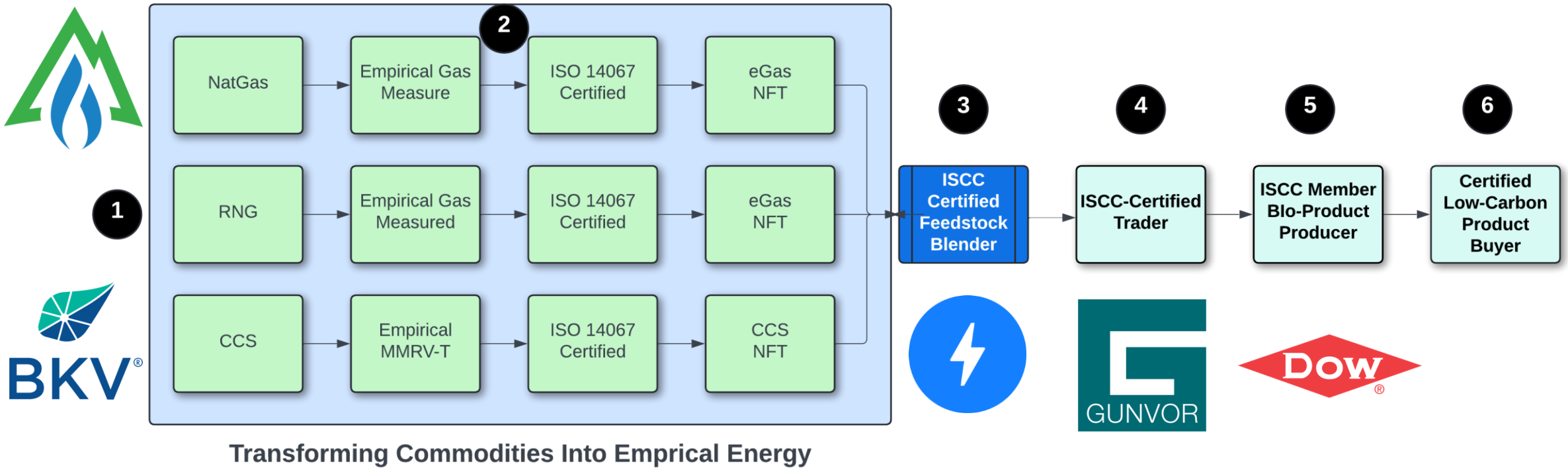
Feedstock Blending Example



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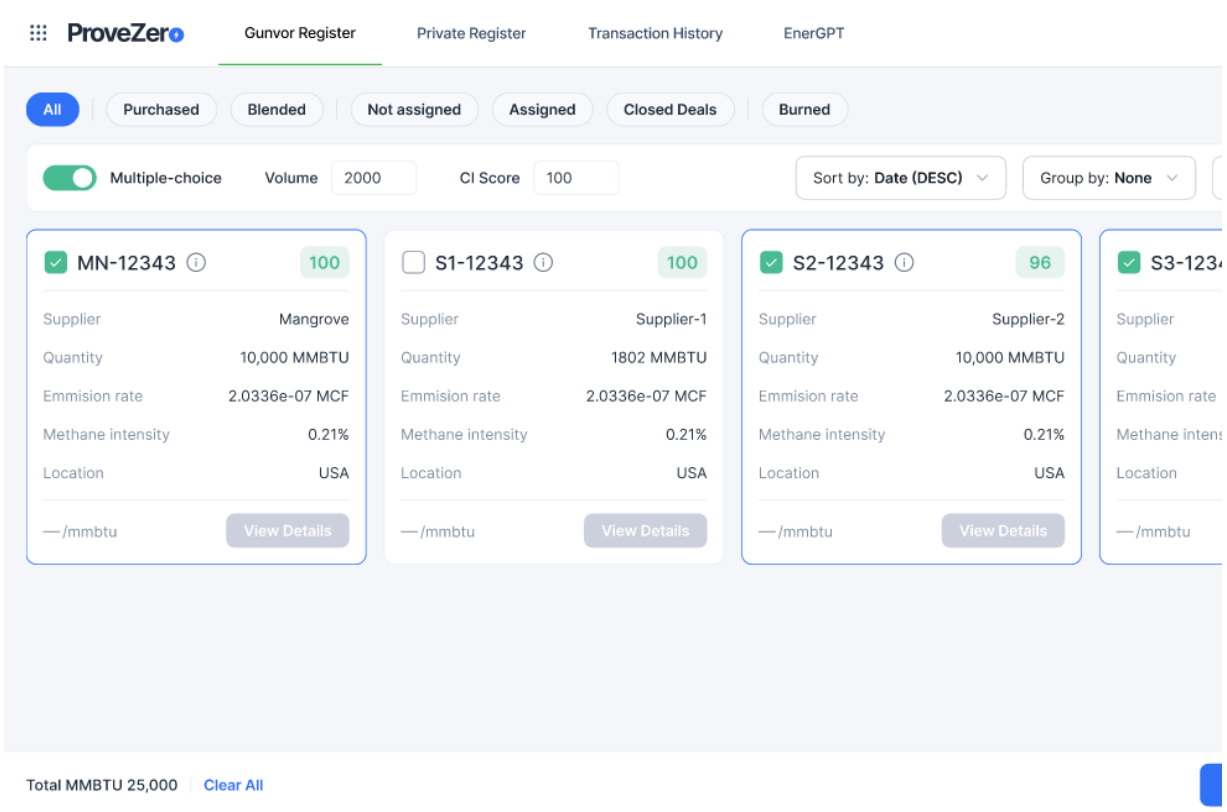
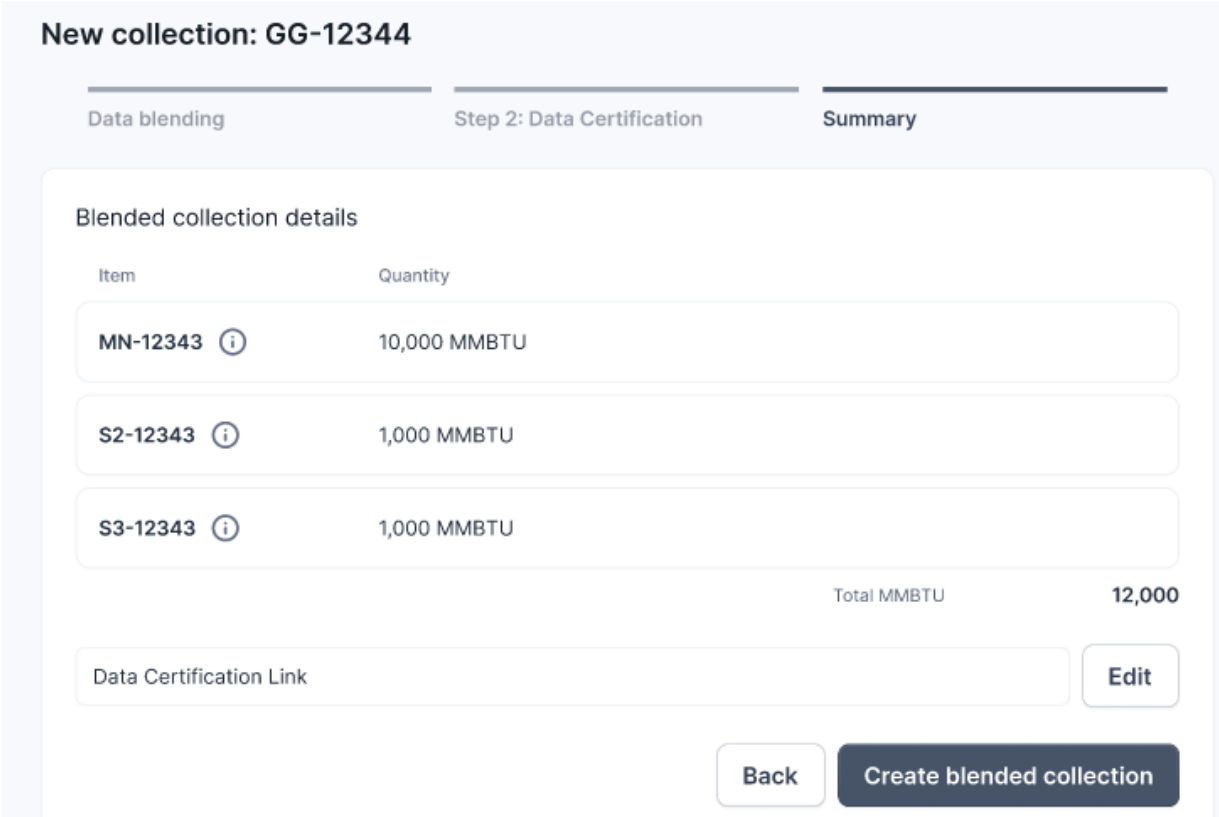
ProveZero Energy Trading Platform w/Feedstock Blending

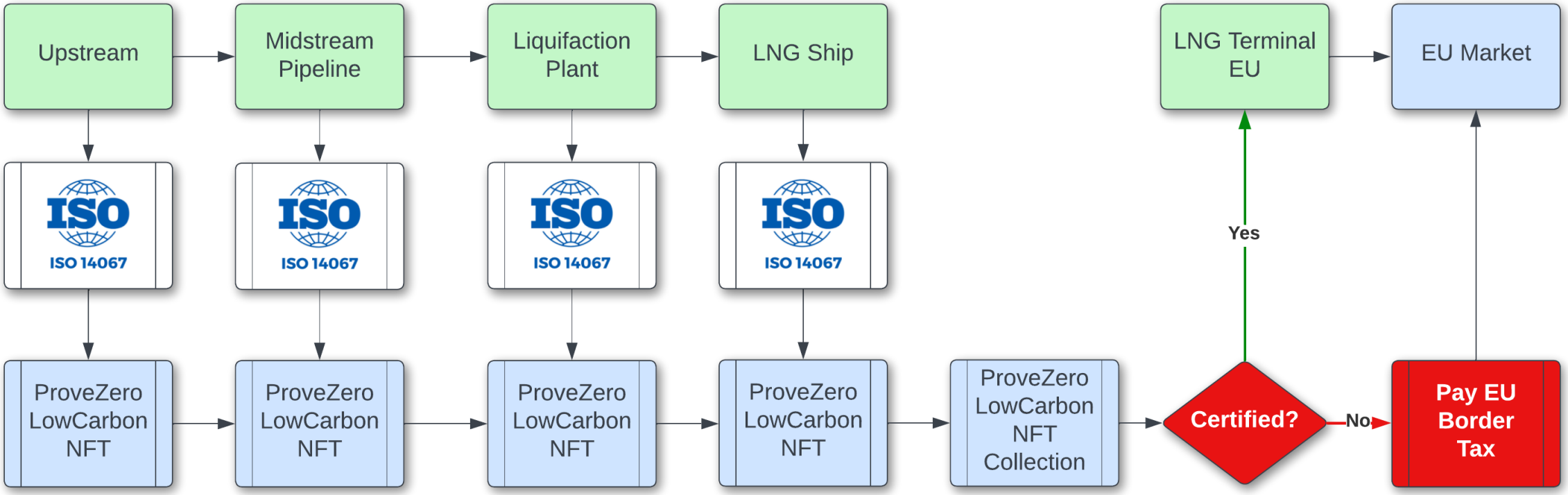




ProveZero

Use Case: LNG Trading

18-Countries Are Working on an MMRV framework for empirically measuring gas across the LNG supply chain



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Seeing is Believing

ProveZero Trading Platform Benefits to Gunvor

- Help with earning ISCC Certified trader status
- Access to certified feedstock
- Automated feedstock blending – certificate collections
- Built-in trading settlement system
- Built-in automated 3rd party verifier roles
- Integrates with CleanConnect.ai producer features/platform

Testimonial: The Empirical Energy Platform Benefits ALL PureWest's Stakeholders

Engineering

- Permits
- Site updates
- Digital Twin 2.0

Compliance

- Subpart W Reporting
- OGMP 2.0 Level 4|5
- OOOOb/c Autonomous LDAR

Operations

- Gas & liquid leak detection
- Autonomous Gate Guard
- Fire/smoke detection
- PPE Detection
- Tank level monitoring

Sustainability

- Tradeable tokenized energy
- ISO 14067 Certified
- SCS-115 Low-CI Certified
- ETH blockchain
- MMRV Trading

Marketing

- **Premium Pricing**
- **Differentiated**
- **Certified**
- **Feedstock blending**

CleanConnect.ai
Visual Automation