EVE Helps Tackle Climate Change

An example of best practice IT security at the remote distributed edge (without onsite IT staff)

Kathy Giori, Director of Product Engineering, ZEDEDA, Inc.
Agenda

› Case Study - Biodigester in Chile
  › Sustainably transforming waste to energy

› Benefits of Open Source + Industry Support
  › Remote technology management
  › Digital transformation at scale
  › Security and trust “at the edge”
Biodigestion of Cows

› INPUTS
  › plant feed 🌿 and water 🛍

› OUTPUTS
  › milk 🥛, methane 💦, manure 🧦
  › 95% burps, 5% farts
Biodigester Plant Processing

› INPUTS
  › Ag residue (grape harvests) 🍷
  › Biosolids (stabilized sludge, expired food) 🍞🍓
  › Manure 💩
  › Liquid industrial waste ♨️
  › Organic residue from fishery and meat industry 🐟🍤🐖
Biodigester Plant Cow Friendly Benefits

› OUTPUTS
  › Liquid fertilizer
  › Mulch
  › Methane gas
Climate Accounting in Molina, Chile

Molina Biodigester site

- Project type: CHP Plant
- Methodology: Anaerobic Digestion Process
- Project developer: Bio E
- Project ID: BEM

Recent Activity:
- Kayley: Added a new sensor PT3 (1d ago)
- Elizabeth: calibrated sensor TT2 (1d ago)
- Elizabeth: calibrated sensor TT1 (2d ago)
- Abigail: calibrated sensor PT2 (4d ago)

18,463 +7% GHG emissions last 30 days
237,469 GHG emissions annu. est.
80% Data confidence score
Plant Design

- Main sensors
  - Level sensors
  - Flow meters
  - Weight
  - Energy production
- Other manual data (spreadsheet)
  - Received bio deliveries
  - Sales
“Digital MRV” is a solution for carbon accounting implemented at state-of-the-art waste-to-energy facilities to support climate finance, carbon markets, and nationally determined contributions (NDCs).

<table>
<thead>
<tr>
<th>Gas Flow Sensor</th>
<th>Data</th>
<th>Data</th>
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<tbody>
<tr>
<td>Gas Composition</td>
<td>Data</td>
<td>Data</td>
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<td>Electricity Generation</td>
<td>Data</td>
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<td>Flare Temperature</td>
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<td>Flow Meter</td>
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<td>Feedstock Weight</td>
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<td>Truck Mileage</td>
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<td>Diesel</td>
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<tr>
<td>Photos and Misc.</td>
<td>Data</td>
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<td>Data</td>
</tr>
</tbody>
</table>

Server

Alvarium

Ledger

Confidence

Digital MRV Dashboard
Goal: Enable Climate Improvements to be Profitable

**Stage 1**
Develop / adapt the MRV Standards

- Climate and Sustainability Programs and Standards Organizations (UN, Governments, Voluntary)
- General MRV Standards (Measurement, Quantification, Reporting, Disclosure) e ISO 14064-2/3
- General MRV Standards (Auditing, Assurance)

**Stage 2**
Measure and secure the data

- Digital System at Site
  - Activity 1: Manual Data Entry (Spreadsheet)
  - Programmable Logic Controller
  - Industrial Router Switch
  - Network Router
  - SCADA System
  - SCADA Database

- Alvarium Data Confidence Annotations

**Stage 3**
Report and audit the evidence

- Online Standards Development System
- Specific MRV Standard for Sector, Technologies, Projects...
- Online M+R Reporting Template
- Online Verification Reporting Template
- Verification Report
- Linked
- Linked
- Linked

- Export
  - Registries
  - Markets
  - Finance
  - Reports
  - Certification

- Single Sign On Integration
- Exported Content
- Linked

**Digital MRV**

- Backend
  - IOTA Cloud Node + Alvarium Author CLI
- Frontend
  - 360 viewable 3D Digital Twin with digital sensors for UI/UX
  - Data logs (Real-time, historical)
  - QA/QC: calibration records, sensor manuals, photos
  - Integrated GHG calculations
  - Integrated Data Confidence Score

**SCADA System**
- Onsite Report
- SCADA Database

**Digital System at Site**
- Activity 2
- Digital Sensors
- Programmable Logic Controller
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**Digital Sensors**
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**IOTA Tangle Distributed Ledger**

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Use and Benefits of Open Source at the Edge
Ship Provisioned Hardware, not People

› EVE-OS image on USB stick
› USB boot to install on Dell T140
› Ship to Chile, connect Internet
Secure Edge Architecture

- Web Console
- App Marketplace
- Historian, SCADA, or any on-premise system
- Any cloud (IOTA Tangle)
- Any app (VM or container)
- Any Gateway at IoT Scale
- Hardware
- (Commercial EVE Controller)
- SaaS
- No Compromise to Security (TPM and vTPM)
- TLS
- https
Digital Transformation at Scale

- No reason to visit Chile (darn 😄)

Remote device/sw mgmt

Remote app, data, reports, and analysis
Security and Trust at the Edge

› EVE locks down the bare metal hardware and lets admins securely deploy software from anywhere

› IOTA secures and routes the application data

› Alvarium applies a confidence score so that data auditors know when they can trust the source
Solution Partners and Projects

Dell EMC PowerEdge T140 Tower Server

Open Source EVE-OS

Alvarium SDK

IOTA Tangle

Digital MRV Platform

Data confidence integrations
EVE Value: Key Takeaways

› Digital transformation at the edge brings unique requirements
  ● Remote cloud-based administration for massive scale
    ■ Device security and full control over app orchestration
  ● Support for disparate embedded hardware (any hardware)
  ● Enablement of both legacy and cloud-native applications
  ● Critical IT need: “lock down and own the bare metal”

› Evolution means handling old (VMs) and new (containers and clusters)
› Networking is harder than you think, especially with security
› Stay ahead of the competition by leveraging and engaging in the power of open source, open community, and open ecosystems
Ready to Transform Your Edge?
Demo Time