THE LINUX FOUNDATION
OPEN SOURCE SUMMIT
LATIN AMERICA

Tackling Climate Change with Open Source and Data-Driven Technology

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#ossummit

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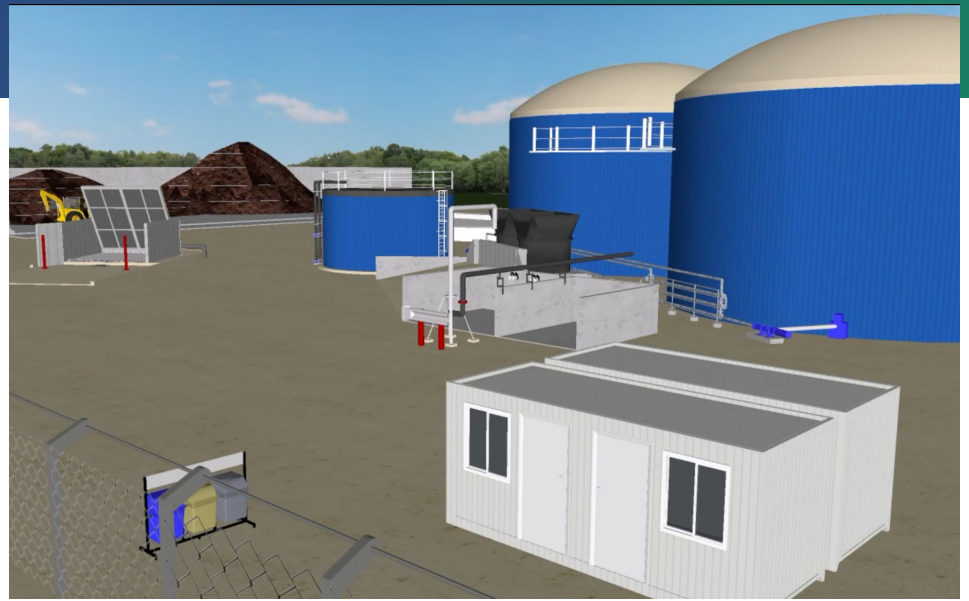
Agenda

- 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

- 95% burps, 5% farts

INPUTS
- plant feed 🌱 and water 💧

OUTPUTS
- milk, methane, manure

🍼 💨 💩

Biodigester Technology (Cow-Friendly)

INPUTS

- Ag residue (grape harvest) 🍷
- Biosolids (stabilized sludge, grocery store expirations) 🍞🍓
- Manure 💩
- Liquid industrial waste 🛢️
- Organic residue from fishery and meat industry 🐟🦐🐖

OUTPUTS

- Liquid fertilizer
- Mulch
- Methane gas

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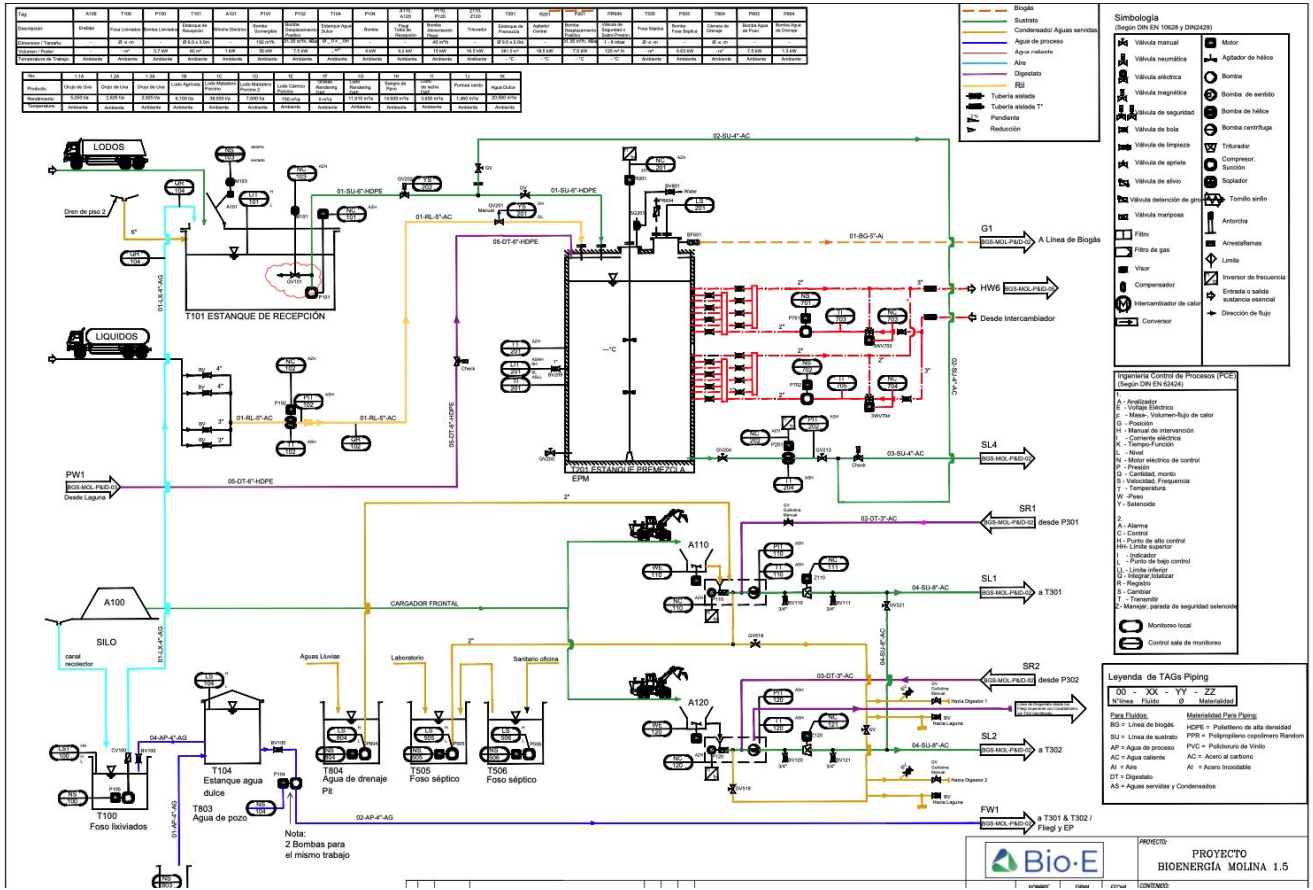
Molina Design



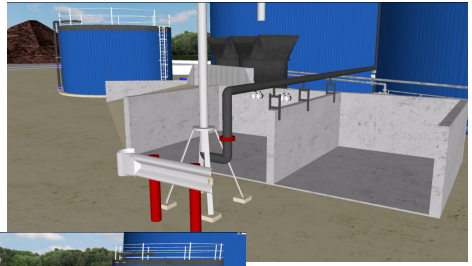
Main sensors

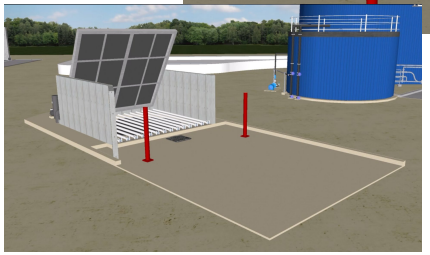
- Level sensors
- Flow meters
- Weight
- Energy production

Other manual data (spreadsheet)

- Received bio deliveries
- Sales

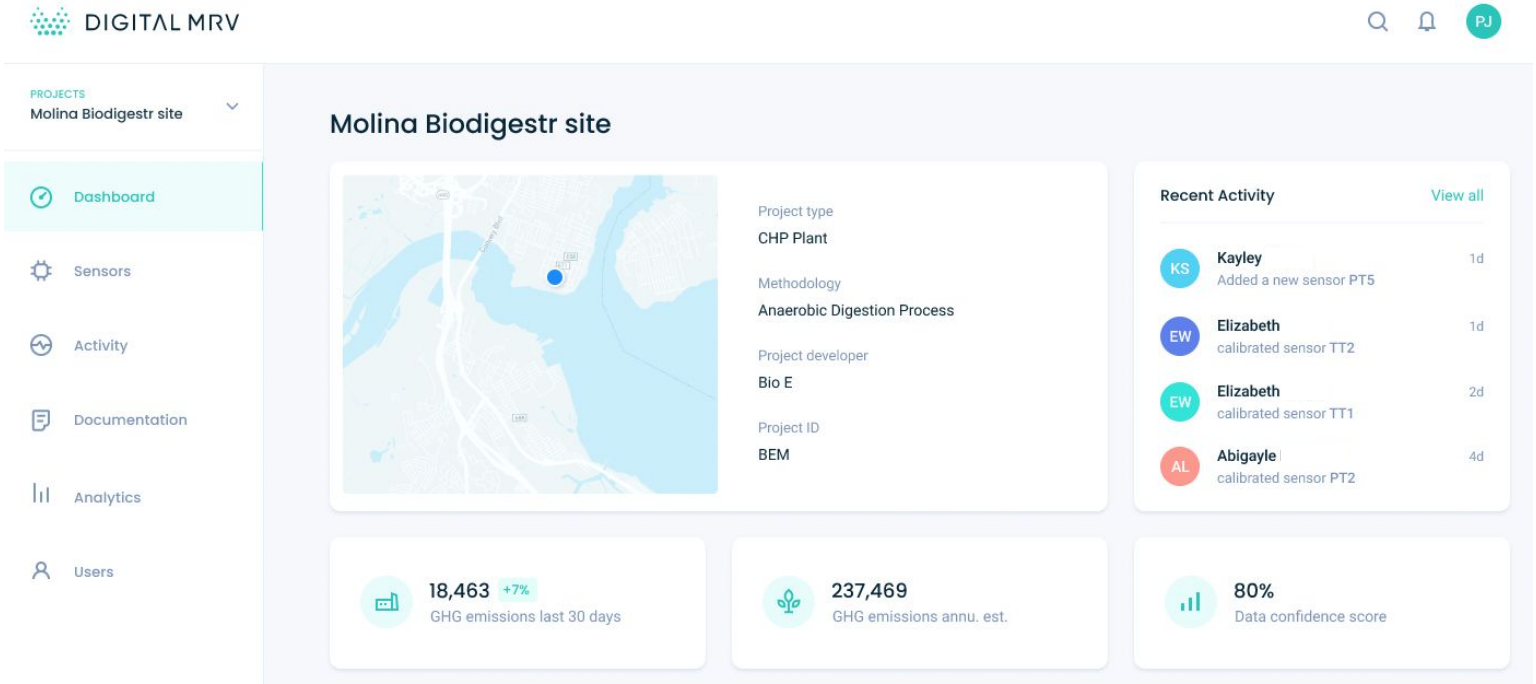
Molina Photos





Open Source Software Applied to a Biodigester Plant

- Remote Biodigester Location: Molina, Chile



Climate Accounting

"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)

Digitizing

Measurement

Obtaining the data necessary to quantify green house gas (GHG) emissions

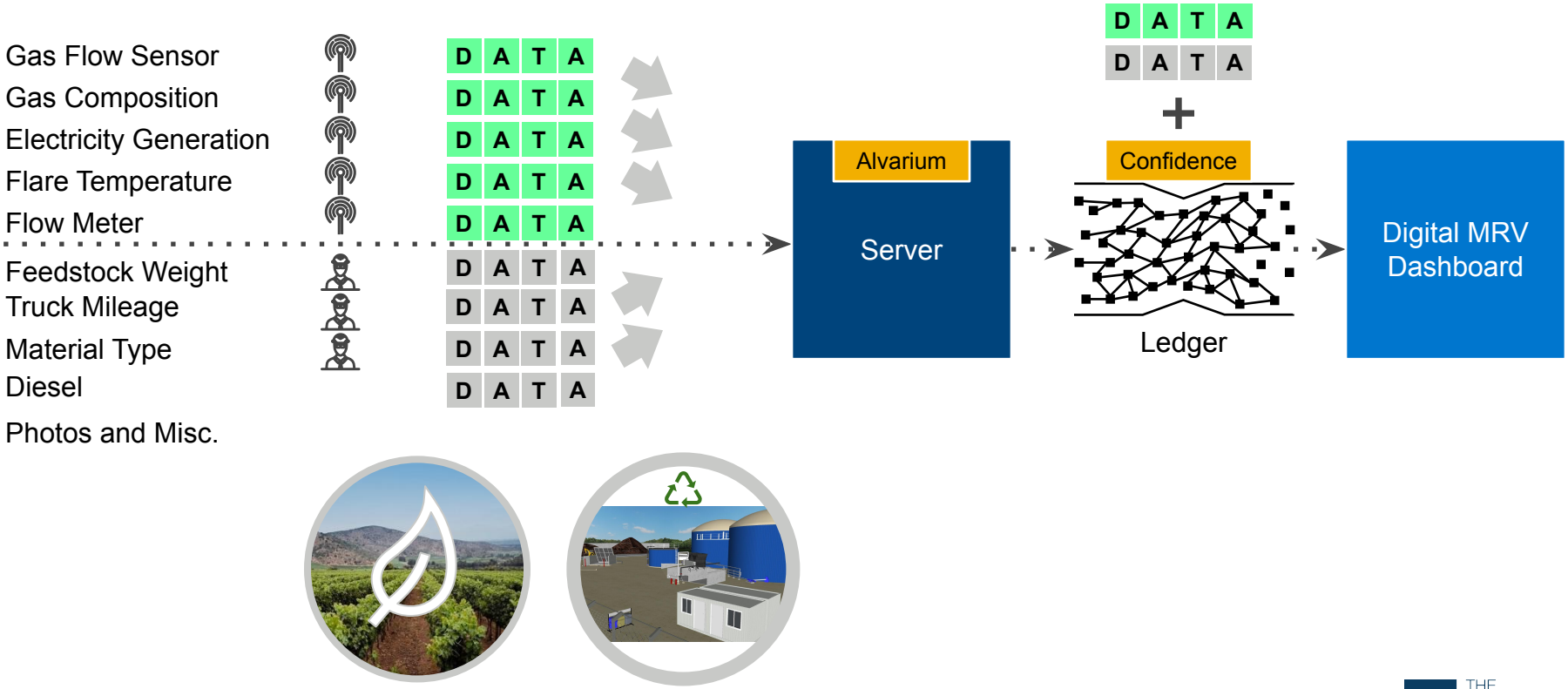
Reporting

Sharing the results of the measurements in a standardized and auditable manner

Verification

On/off-site teams - responsible for quality assurance, control
3rd party - provide assurance of "truthfulness" of GHG emissions reporting

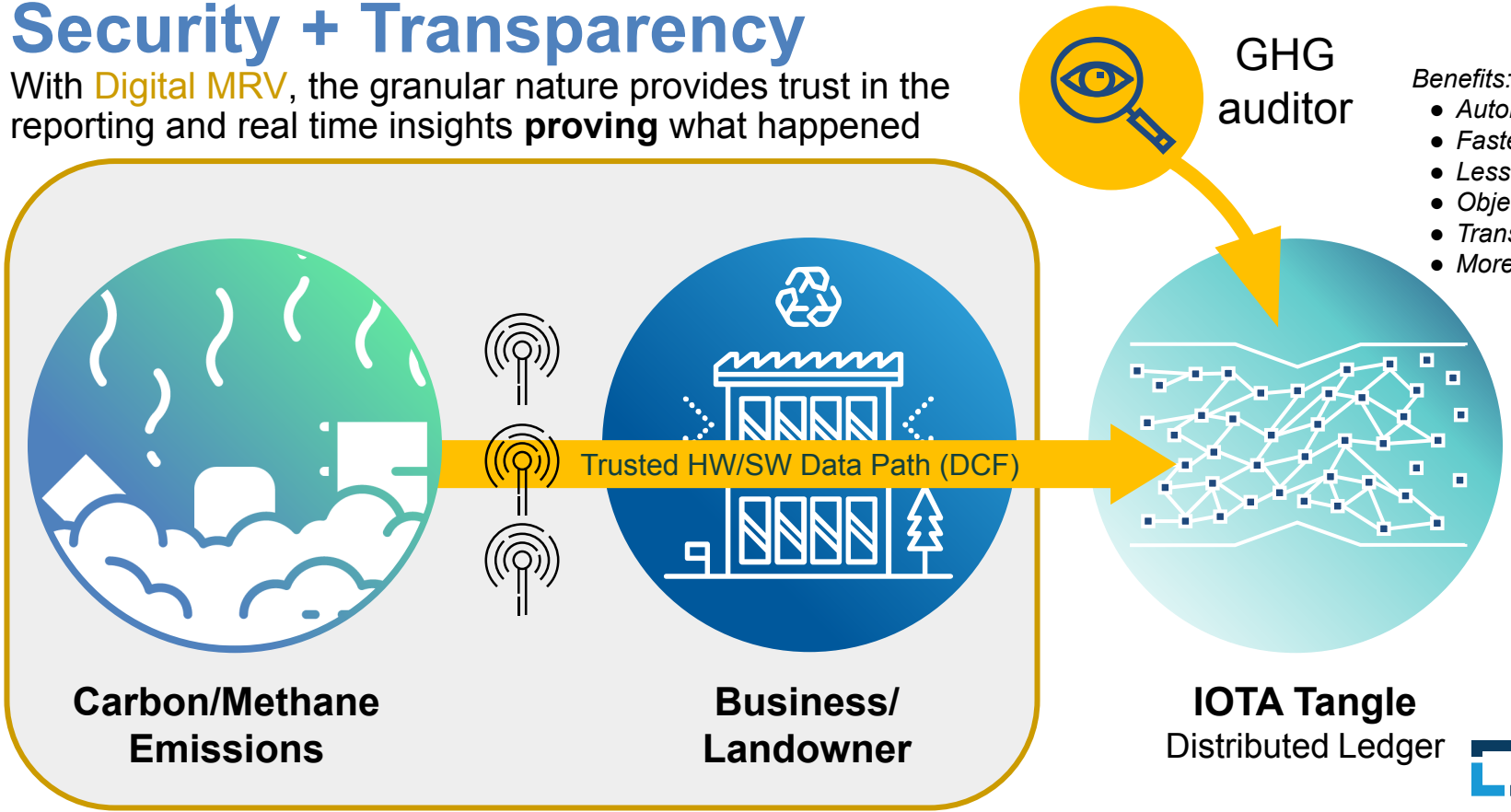
Digital MRV/DCF solution overview



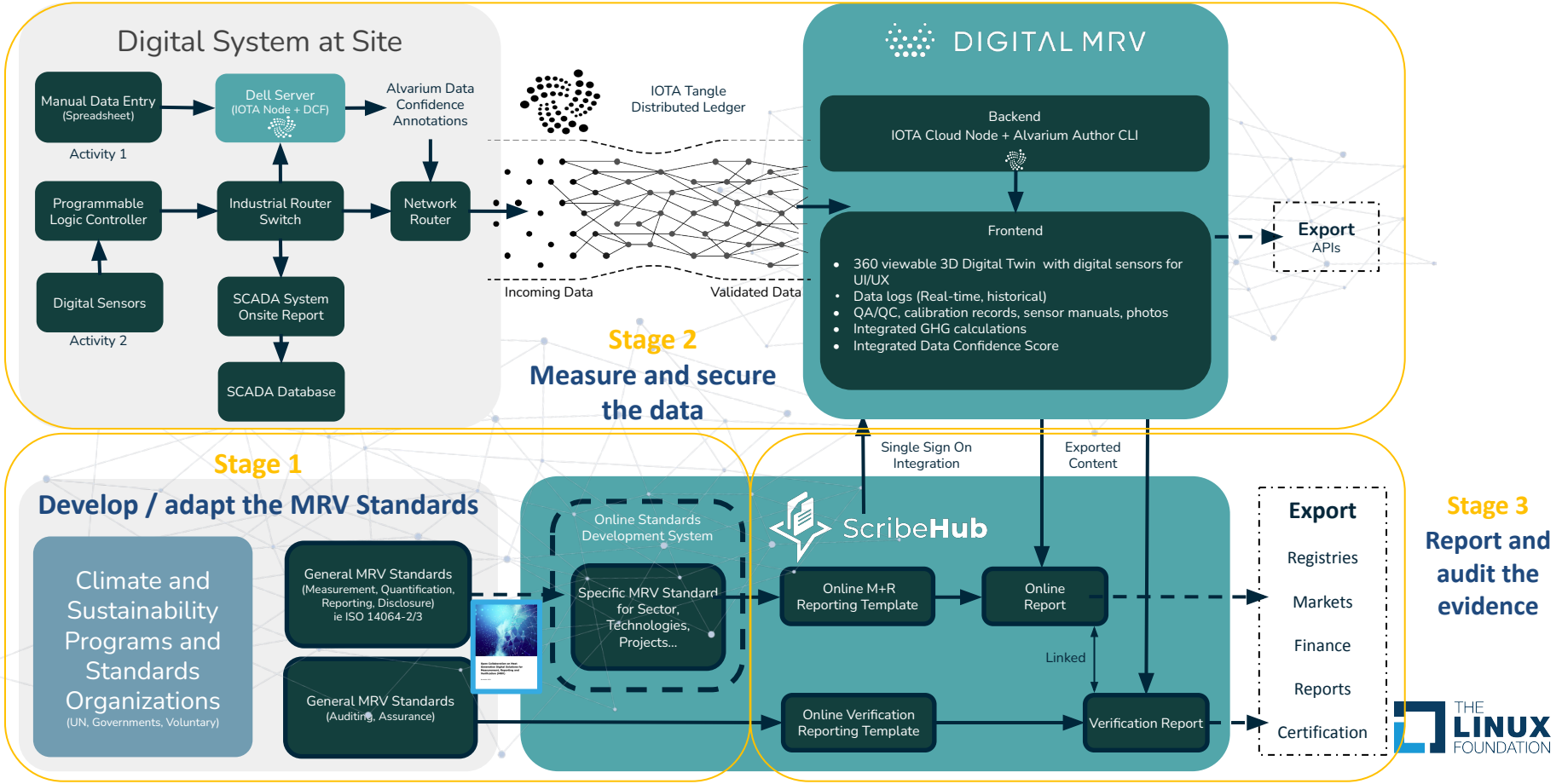
Digital Transformation at Scale

Security + Transparency

With Digital MRV, the granular nature provides trust in the reporting and real time insights **proving** what happened



Goal: Enable Climate Improvements to be Profitable



Use and Benefits of Open Source at the Edge

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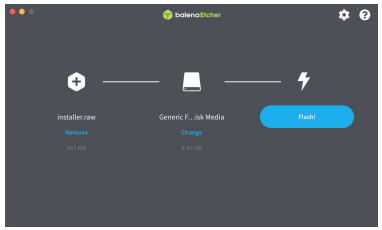
Prep for Remote Technology Management

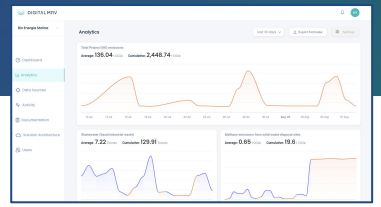
- EVE-OS image on USB stick
- USB boot to install on Dell T140
- Ship to Chile, connect Internet



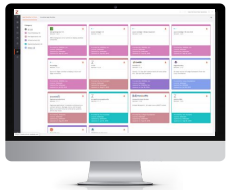
boot

ship

Secure Edge Architecture

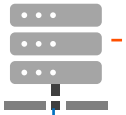


Web Console



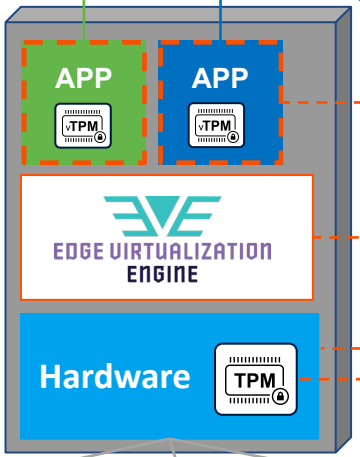
App Marketplace

https



(Commercial EVE Controller)

TLS



Any cloud (IOTA Tangle)

Historian, SCADA, or any on-premise system

Any app (VM or container)

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Any Gateway at IoT Scale

No Compromise to Security
(TPM and vTPM)

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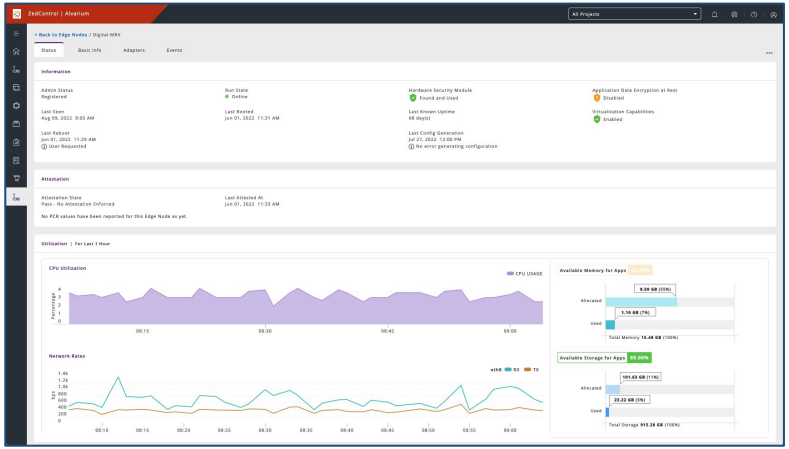
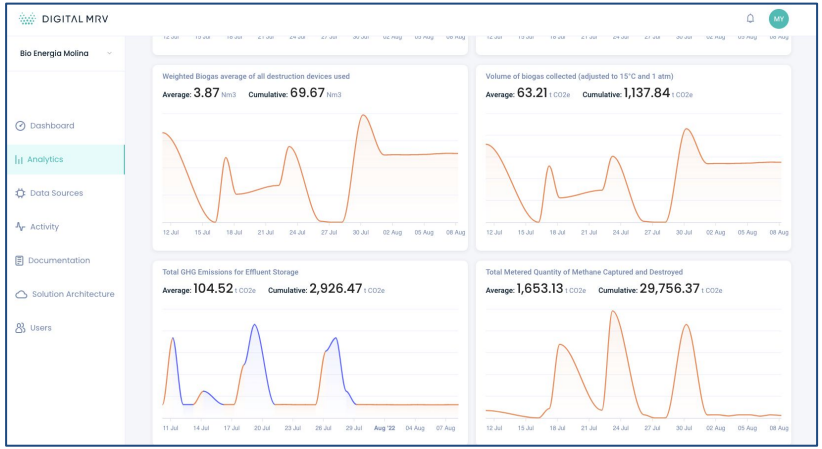
Digital Transformation at Scale

- Would love to visit Chile, but…

Remote device/sw mgmt



Remote app, data, reports, and analysis



Flexibility of Open Source: LF Edge + IOTA + Industry

- LF Edge Projects
  - Edge Virtualization Engine (EVE)
    - Abstraction layer designed to secure the edge
  - Alvarium
    - Data Confidence Fabric (quantifies data trustworthiness)
- IOTA Foundation
  - Transfer and secure data over the “Tangle” (DLT)
- Climate Check
  - Ditigal MRV data reporting, analysis, auditing
- ZEDEDA, Dell
  - Secure remote access and sw orchestration

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

Live Demo of Remote Device Access

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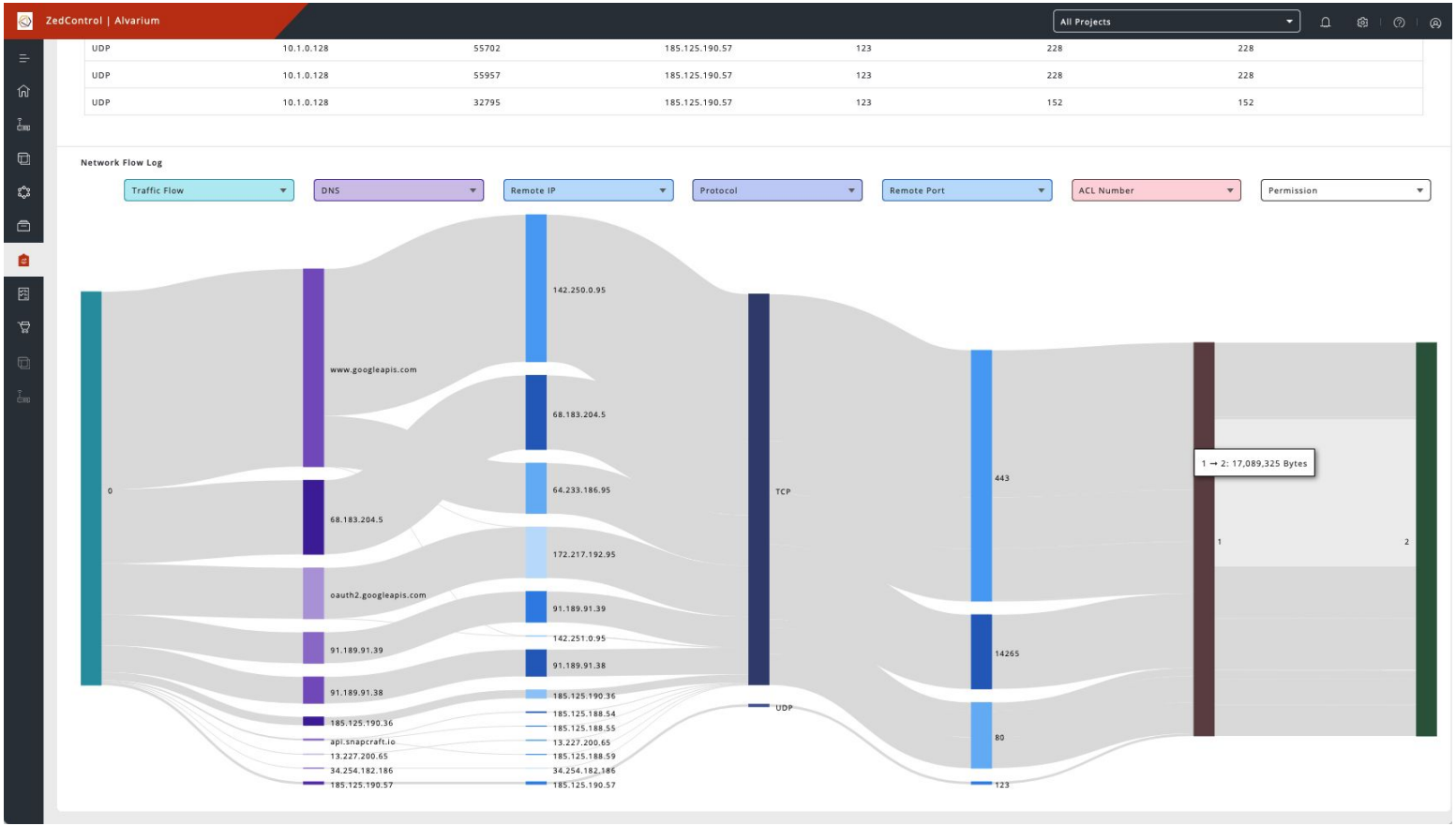
ZEDEDA: Secure Edge Orchestration at Scale



Summary

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Useful Links

- Application Software and Data Processing
  - IOTA Tangle https://www.iota.org/
  - Alvarium https://www.lfedge.org/projects/alvarium/
  - Climate Check, DigitalMRV
    - https://www.climate-check.com - https://digitalmrv.io
- Device and Industry Support
  - ZEDEDA Secure Device Mgmt and App Orchestration
    - https://zededa.com
  - EVE-OS on Dell T140 Edge Node
    - https://www.lfedge.org/projects/eve/
    - https://www.dell.com

Solution Partners and Projects

Dell EMC
PowerEdge T140
Tower Server

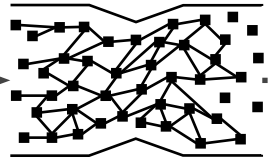
SaaS
ZEDEDA

Open Source
EVE-OS

Alvarium
SDK

IOTA

ClimateCHECK



IOTA
Tangle

Digital MRV
Platform

Data
confidence
integrations

PROJECT ALVARIUM

LF EDGE

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Thanks!

Online Q&A as time permits

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