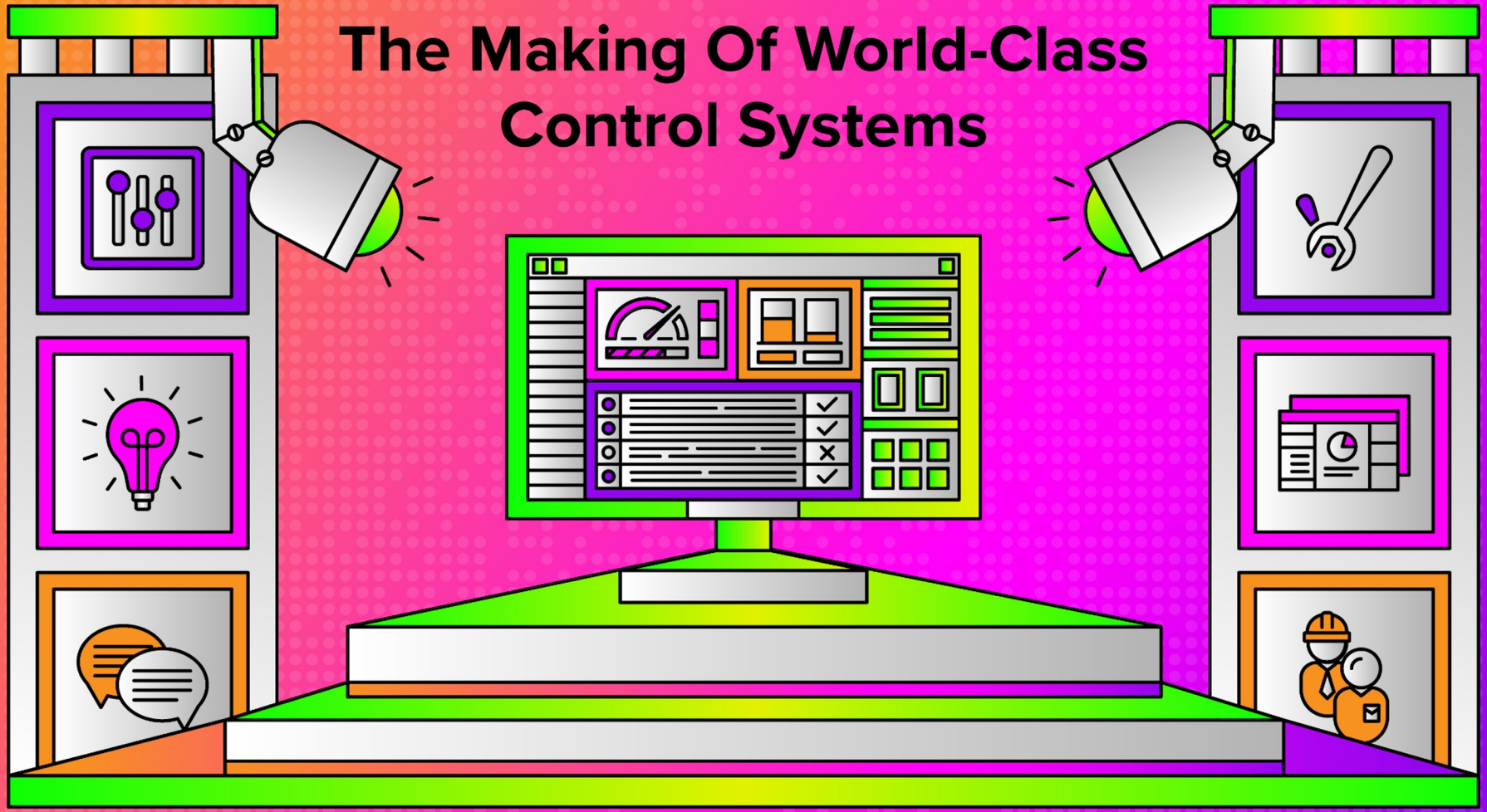
The Making Of World-Class Control Systems



Today's Moderator

Travis Cox

Chief Technology Evangelist

Inductive Automation

Guest Presenters

Travis Broussard

Lead SCADA Engineer

Edge Controls

Cédric Groc

Director of Activities

2Gi Technologie

Dominique Wille

CEO

Plantformance AG

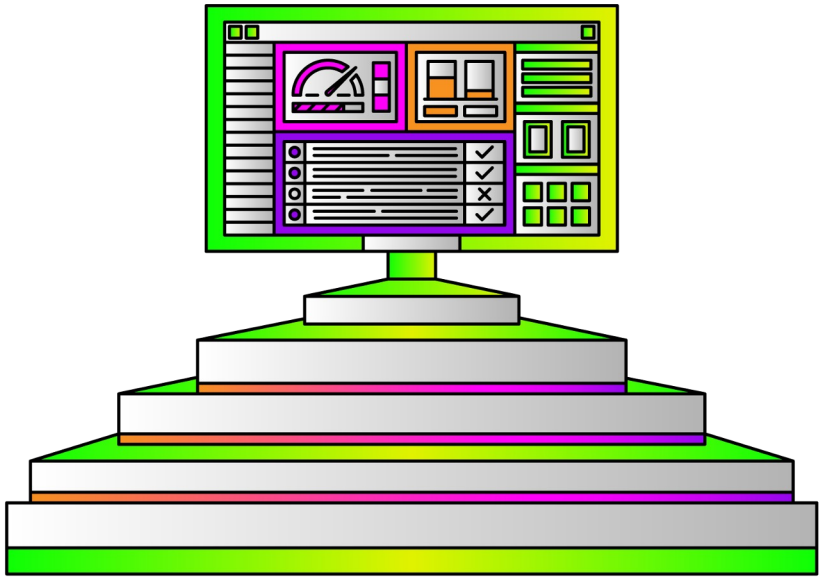
Kevin Komara

Director, Data Acquisition Services

Customized Energy Solutions

Agenda

- Edge Controls / Stonehill Environmental Partners
- 2Gi Technologie & Plantformance / Saint-Gobain Glass
- Customized Energy Solutions
- Q&A

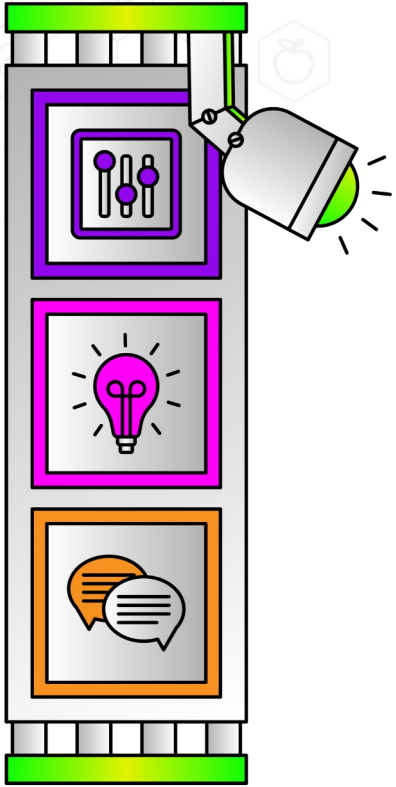


About Inductive Automation

- We make software for problem solvers
- In business for 21 years
- 61% of the Fortune 100 and 44% of the Fortune 500 use Ignition
- Highly diversified customer base across many industries
- Ignition installations in 100+ countries
- 4,000+ integrators worldwide
- Profitable and independent with no outside investors

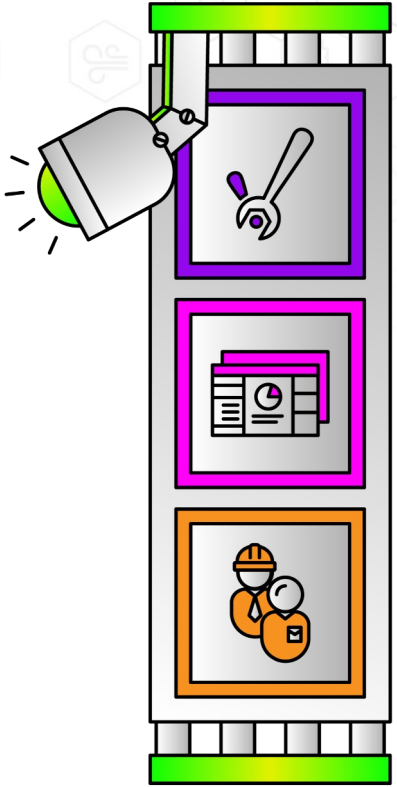

Ignition!
by inductive automation
The Unlimited Platform for SCADA and So Much More
• Connect, Design, Deploy Without Limits:
- One central hub for everything on the plant floor
- Create any kind of industrial application
- Web-deploy clients to desktops, industrial displays & mobile devices
• Unlimited licensing
• Industrial-strength security and stability
• Trusted by thousands of companies worldwide

What Makes A Control System “World-Class”?



- Significant positive impact
- Uniqueness
- Well-designed UI/UX
- Sophisticated architecture & features
- High level of effort

Today’s webinar showcases some world-class control systems that all leverage the power of Ignition.



Edge Controls / Stonehill Environmental Partners

- **Start Date:** January 2023
- **Deploy Date:** February 2024

- **Overview:** Standardized field equipment programming & SCADA configuration, creating a unified data model, enabling the rapid onboarding of new facilities with a fully mobile-responsive modern, card-based UI, while lowering overall costs.

Edge Controls / Stonehill Environmental Partners

Initial Problem

- Assets were a mix of brownfield solutions:
  - Multiple hardware brands
  - Differing programming standards
- Growing Organization
  - Evolving business objectives
  - More agility in field automation and SCADA was necessary

Edge Controls / Stonehill Environmental Partners

Solution - Design

- Understanding of company vision & pain points
- New unified data model
  - Flexible - Able to evolve with business needs
  - Scalable - Organized and understandable at any size
- Configuration Framework
  - Standardized automation programming
  - Well-defined Ignition UDTs

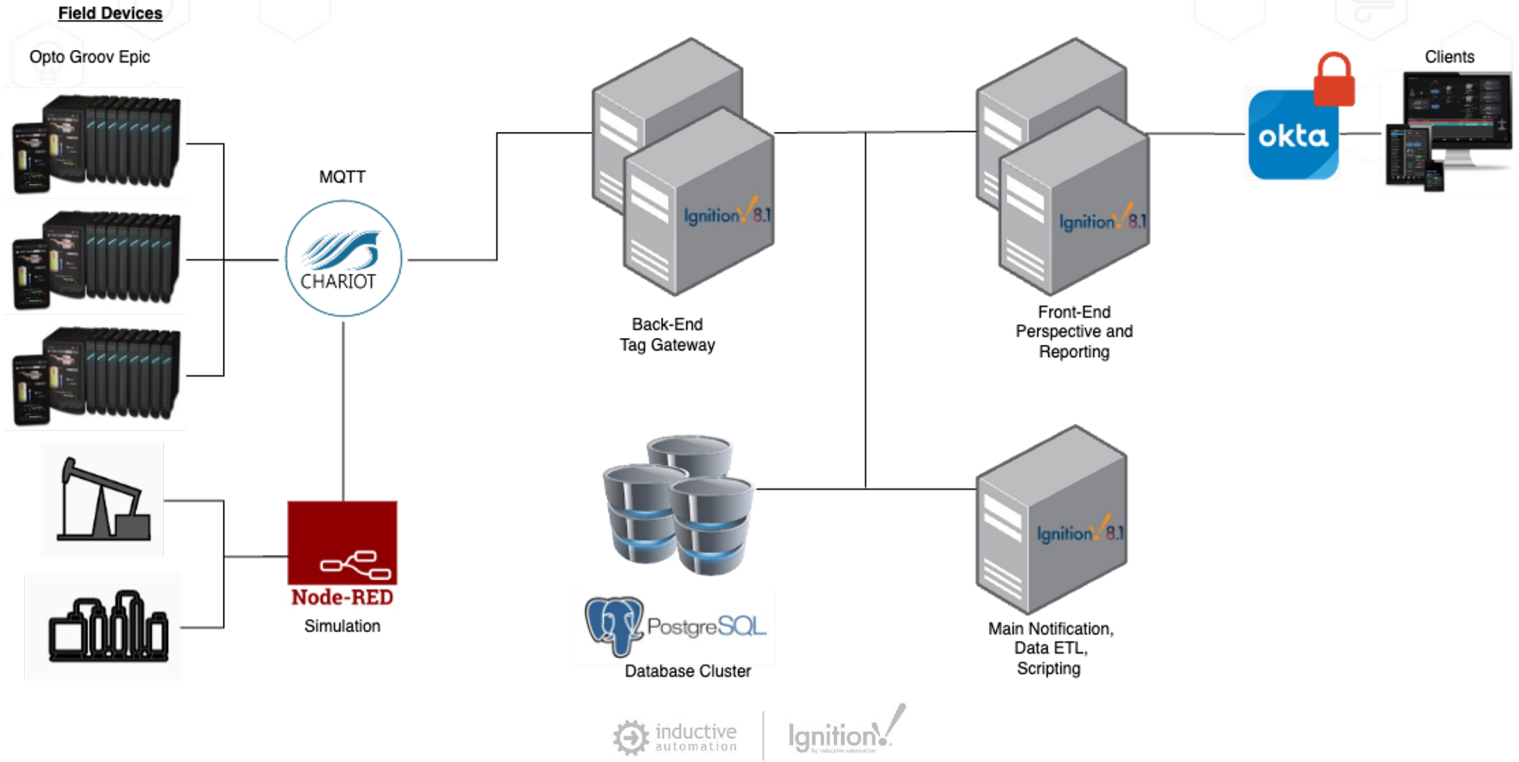
Edge Controls / Stonehill Environmental Partners

Solution - Execution

- Opto 22 Hardware
  - Durable & powerful at a great price
  - Energy monitoring units for drive analytics
- Cloud-hosted VM infrastructure
- Hub & Spoke architecture
  - Cirrus Link’s Chariot MQTT Broker

Edge Controls / Stonehill Environmental Partners

Architecture

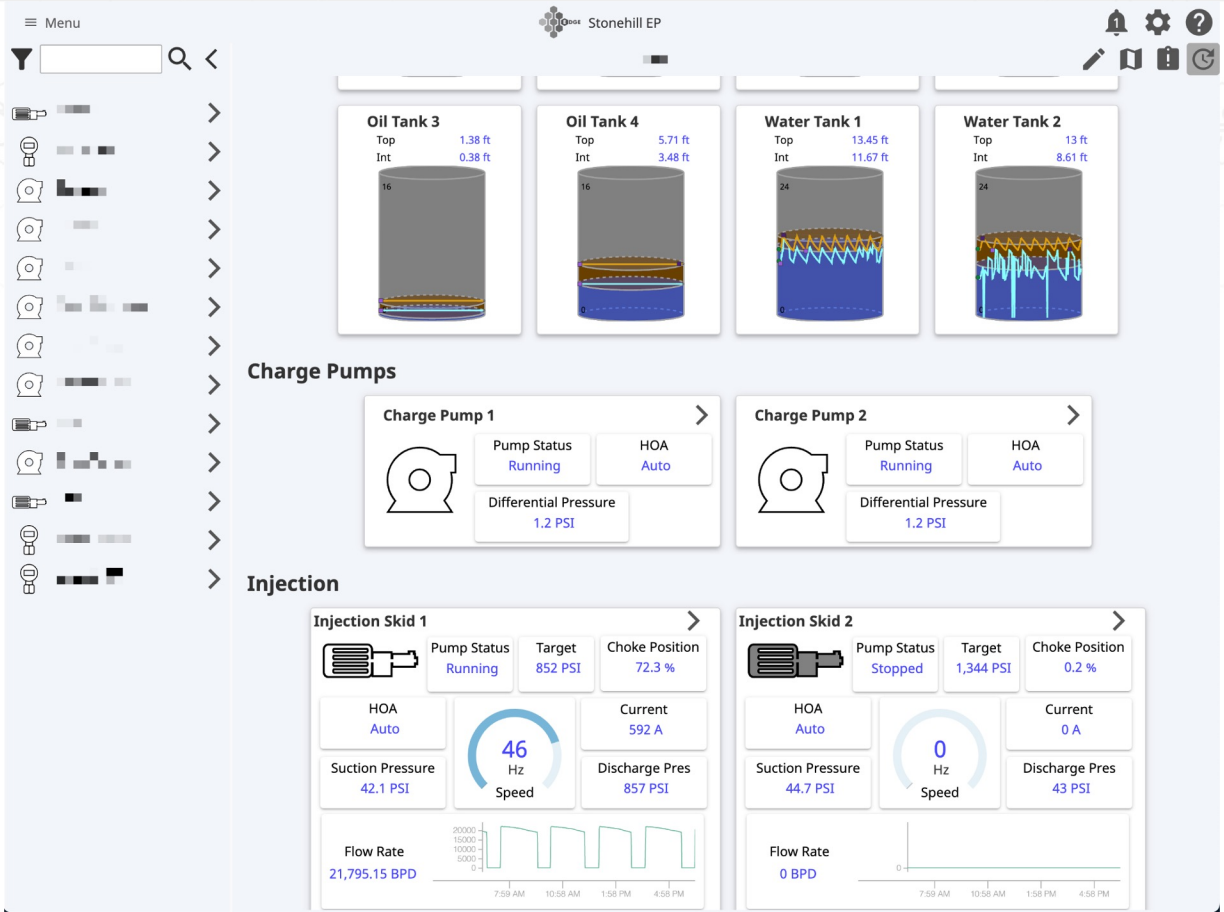


Edge Controls / Stonehill Environmental Partners

Solution

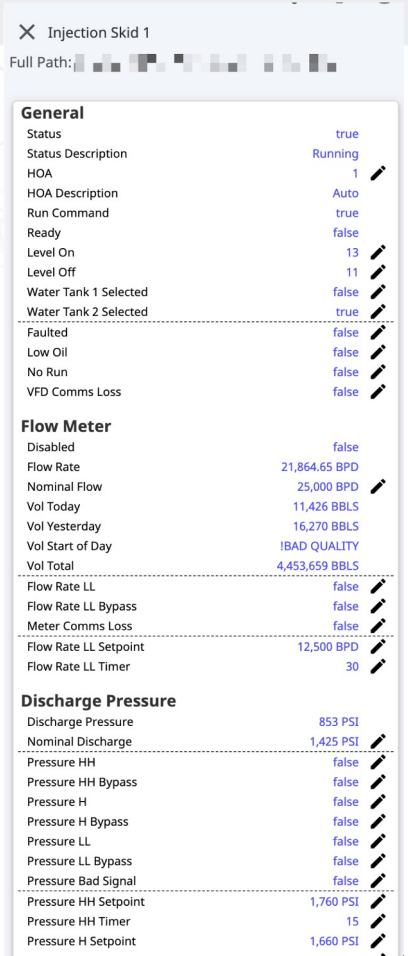
- Modular “equipment package” design
  - Rapid facility onboarding
- Ignition Perspective SCADA system
  - Modern, card-based UI
  - Mobile Responsive with a 1:1 feature set
  - External identity provider (Okta) with robust security
    - Adaptive Multi-Factor Authentication (MFA)

Edge Controls / Stonehill Environmental Partners

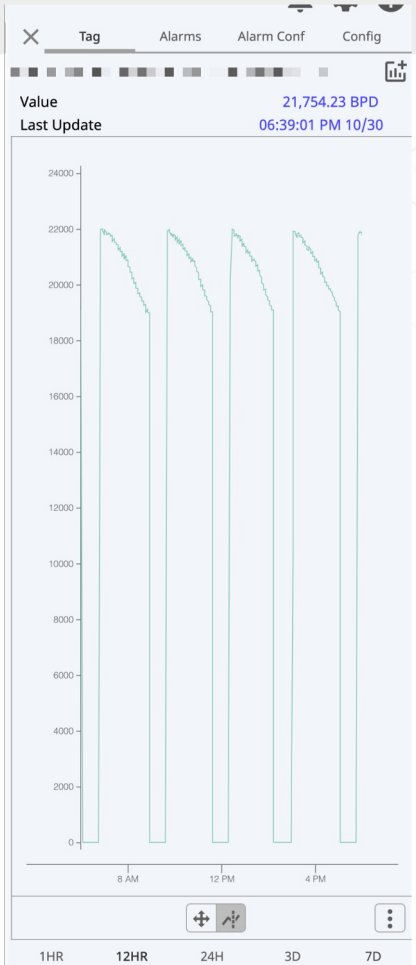


Site Details

Edge Controls / Stonehill Environmental Partners



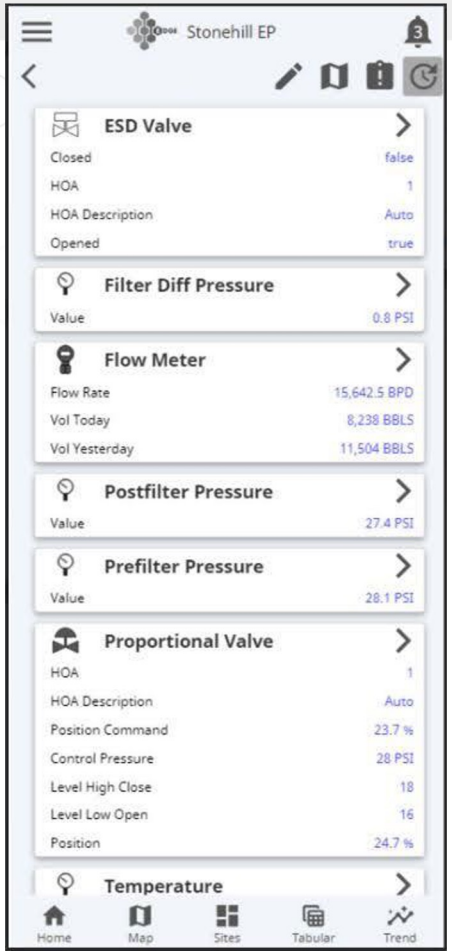
Equipment Details



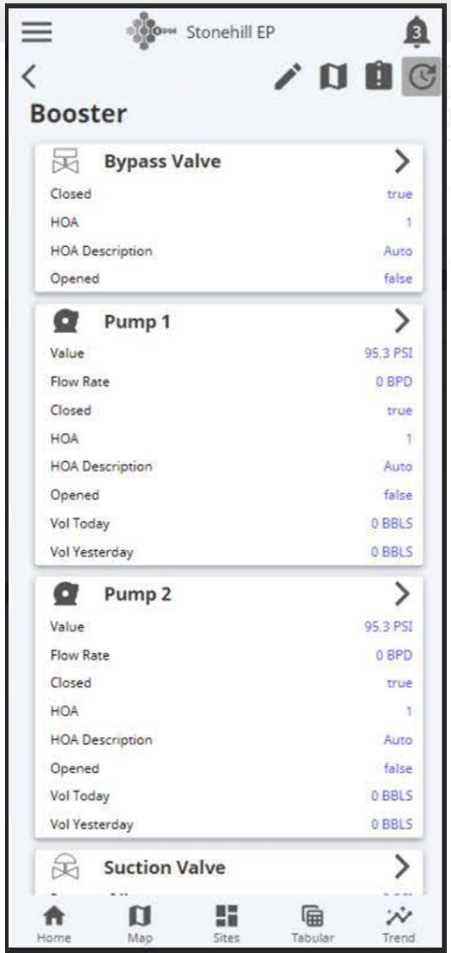
Tag Details

inductive automation | Ignition

Edge Controls / Stonehill Environmental Partners



Site Details
(mobile)



inductive automation | Ignition

Edge Controls / Stonehill Environmental Partners

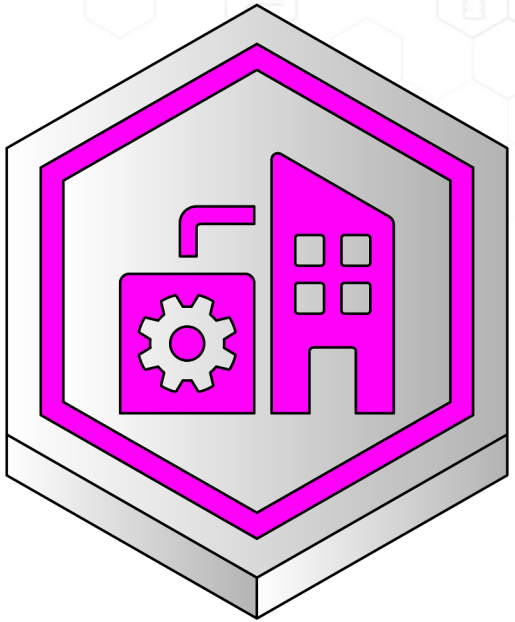
Results

- Improved communication throughout the organization
- Ability to execute in a fraction of the time
- Build entire facilities by mixing and matching constituent data packages **within an hour** that previously took days
  Example: Was able to build an entirely new saltwater disposal facility in Ignition in under 15 minutes!
- Numerous different forms of cost savings
- Newfound ease in creating analytics and reports
- Easily scalable system

2Gi Technologie & Plantformance / Saint-Gobain Glass

- **Start Date:** November 2023
- **Deploy Date:** March 2024

- **Overview:** This project consisted of Ignition applications that were deployed in several countries, with a hybrid architecture of local, real-time data and shared data in the cloud. The goal was to accelerate digitalization and consolidate data at a global level.



2Gi Technologie & Plantformance / Saint-Gobain Glass

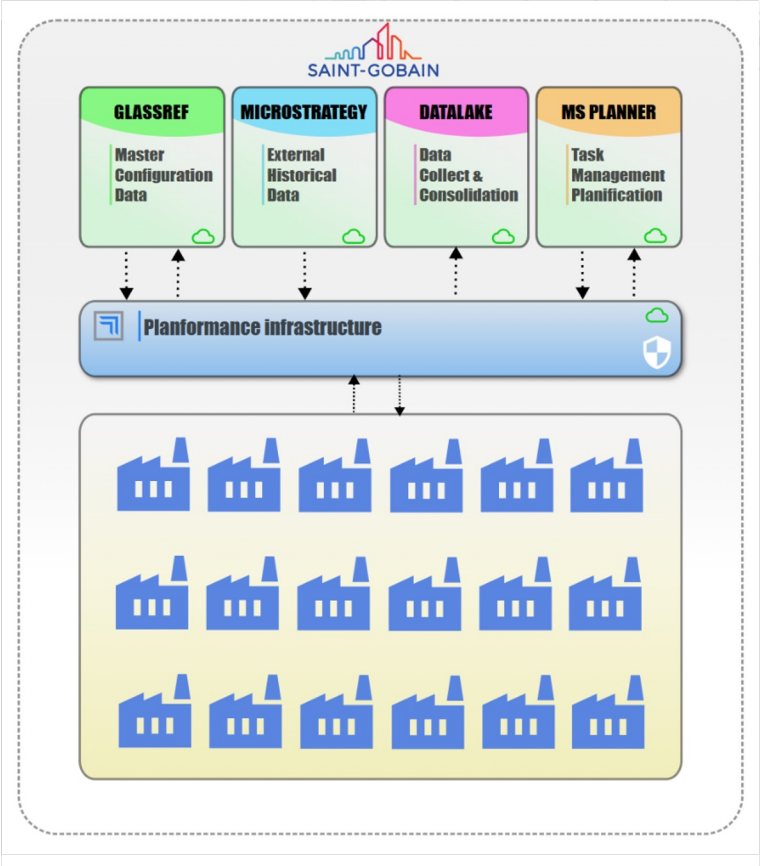
Problem

- Inconsistent digitalization across plants
- Fragmented data/siloed data storage
- Slow decision-making processes
- Lack of comprehensive visibility into global operations

2Gi Technologie & Plantformance / Saint-Gobain Glass

Solution / Overview of the layers

- Data Sources: cloud + local
- Global Data Referential (GlassRef)
- Middleware layer by Plantformance
- Scalable Software Architecture
  - Project inheritance
  - Versioning strategy for all components
  - Common practices for all projects
- Enterprise Administration Module



2Gi Technologie & Plantformance / Saint-Gobain Glass

Solution / Features

- Customizable dashboards for visual management practices
  - Improve visibility of processes and key performance indicators (KPIs)
  - Encourage team collaboration and empowerment
  - Foster a culture of continuous improvement

- Microsoft Planner connectivity to manage the tasks decided by the team

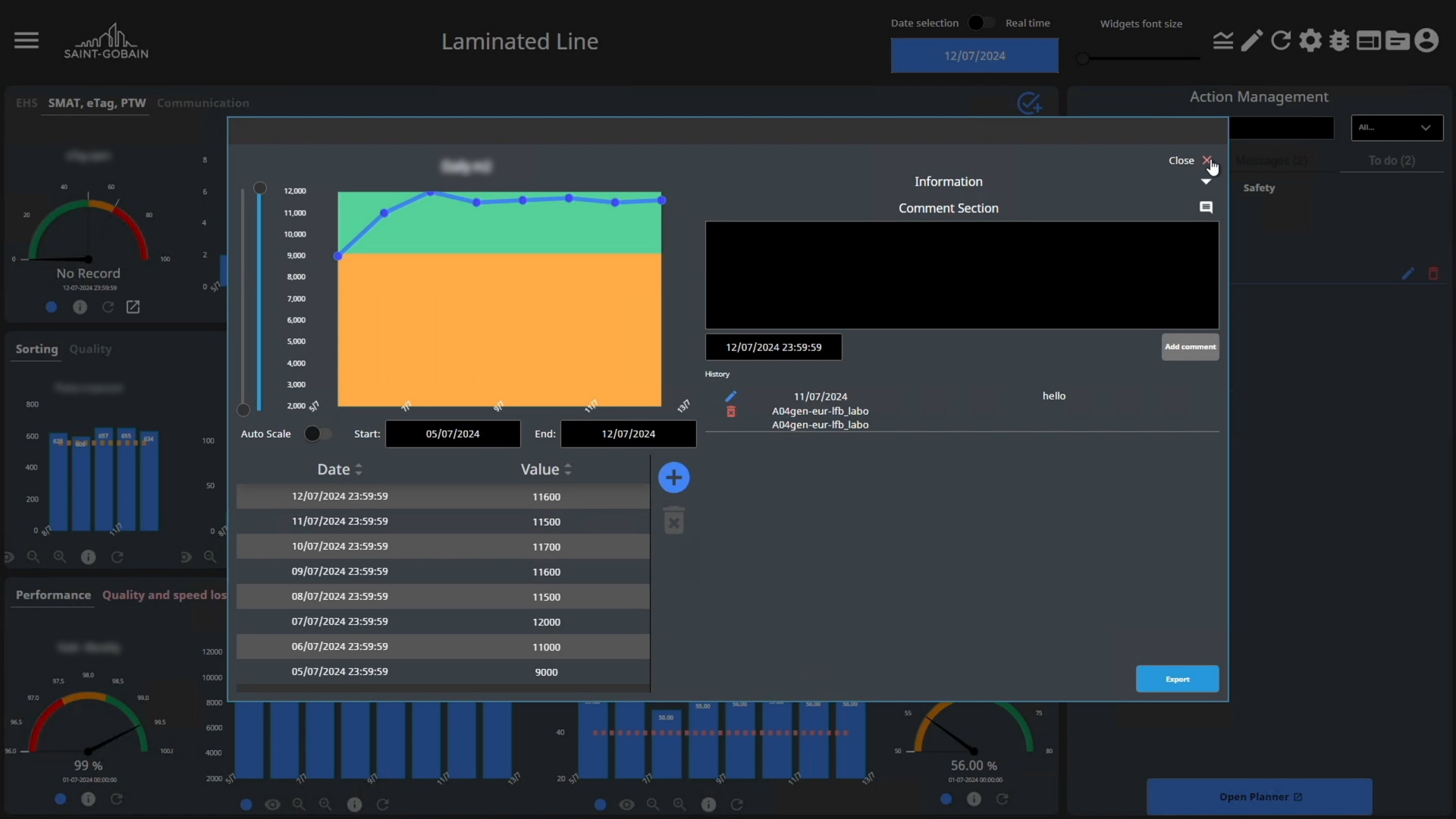
- 2nd application: Energy Management System streams data to a central data lake

inductive automation | Ignition


Laminated Line
Date selection
Real time
Widgets
Long Term
4 Piles
103659 m²


Laminated Line


SAINT-GOBAIN
Laminated Line
Date selection
Real time
12/07/2024
Widgets font size
EHS
SMAT, eTag, PTW
Communication
No Record
12-07-2024 23:59:59
Sorting
Quality
No Record
12-07-2024 23:59:59
No Record
12-07-2024 23:59:59
Performance
Quality and speed losses 3
99 %
01-07-2024 00:00:00
11500
2024-07-08
56.00 %
01-07-2024 00:00:00
Action Management
All...
Long Term (0)
Messages (2)
To do (2)
Safety
Please check this
Leclercq, Mathieu
2023-04-30
Open Planner


Laminated Line
Date selection
Real time
12/07/2024
Widgets font size
EHS
SMAT, eTag, PTW
Communication
Action Management
No Record
Sorting
Quality
Performance
Quality and speed los
99 %
56.00 %
Open Planner
Close
Information
Comment Section
12/07/2024 23:59:59
Add comment
History
11/07/2024
hello
A04gen-eur-lfb_labo
A04gen-eur-lfb_labo
Auto Scale
Start:
05/07/2024
End:
12/07/2024
Date
Value
12/07/2024 23:59:59
11600
11/07/2024 23:59:59
11500
10/07/2024 23:59:59
11700
09/07/2024 23:59:59
11600
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11500
07/07/2024 23:59:59
12000
06/07/2024 23:59:59
11000
05/07/2024 23:59:59
9000
Export

2Gi Technologie & Plantformance / Saint-Gobain Glass

Results

- Rapid deployment capability (one-hour deployment)
- Globally managed cybersecurity (by Plantformance)
- Local and global data analysis
- Faster decision-making
- Consolidated HMI
- Project was completed in record time!
  - 5 months development & first factory
  - Then deployed to over 10 plants in less than a year

2Gi Technologie & Plantformance / Saint-Gobain Glass

Project Scope

Tags: 10k+ / factory
Screens: Dynamic dashboards generated by each user
Clients: 10+ / factory
Alarms: 500-1k / factory
Devices used: PCs and tablets
Architectures used: Enterprise (with EAM), Plantformance Factory Brains, connections to cloud services via middleware (Apache Nifi)
Databases used: MySQL + PostgreSQL

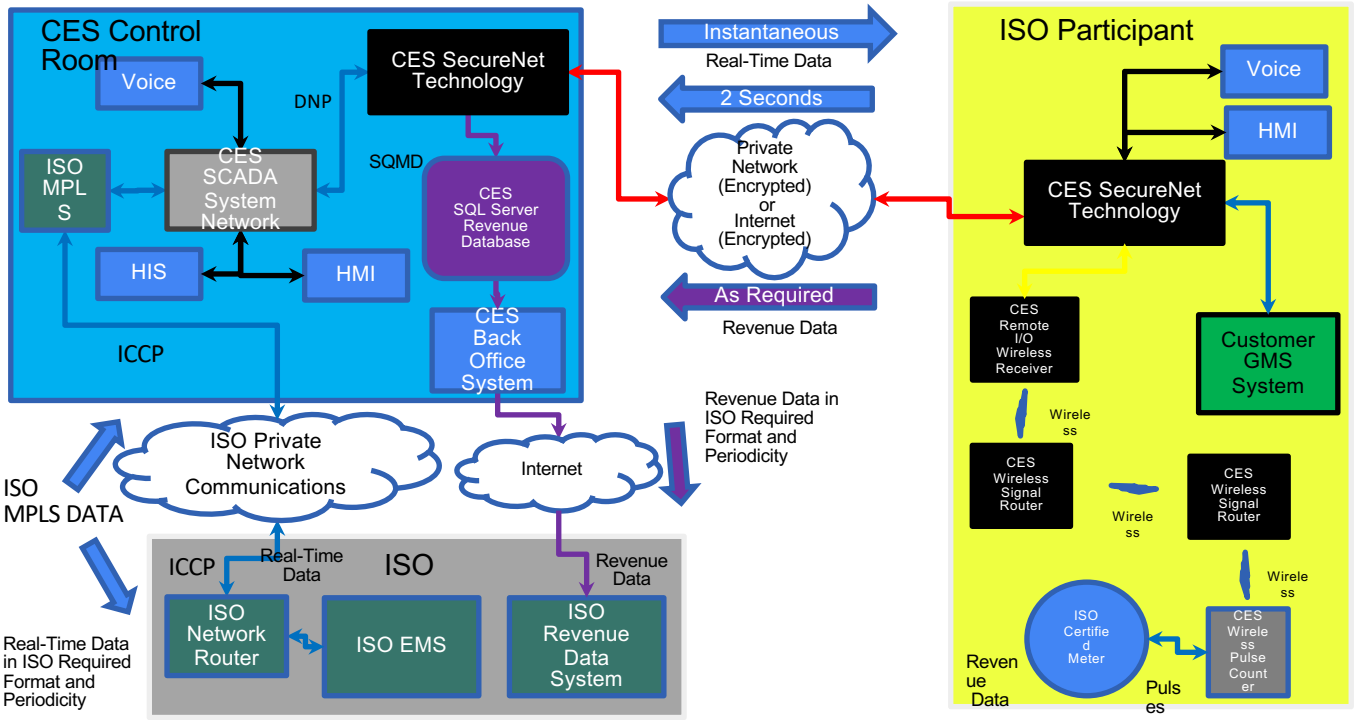
What is a SCADA System and why do we have one at CES?

SCADA

(Supervisory Control and Data Acquisition)

Kevin J. Komara P.E.
Director - Data Acquisition Services
10/29/2024

Asset Data Through CES SCADA System



Shrink-Wrapped Solutions

- Expensive
  - Large annual maintenance fees
- Rigid
  - Hard to add to seamlessly
- Constraining
  - Lots of rules
- Complicated, Complicated, Complicated
  - All our EGGS in one BIG basket

Shrink-Wrapped Solutions

Siemens

OSI

TIE Fighter™ Attack 75237 | Star Wars ...

Aveva/GE/Etc

.

Jack of all Trades – Master of NONE!
(Did I mention – COMPLICATED ?)

What do we need at CES?

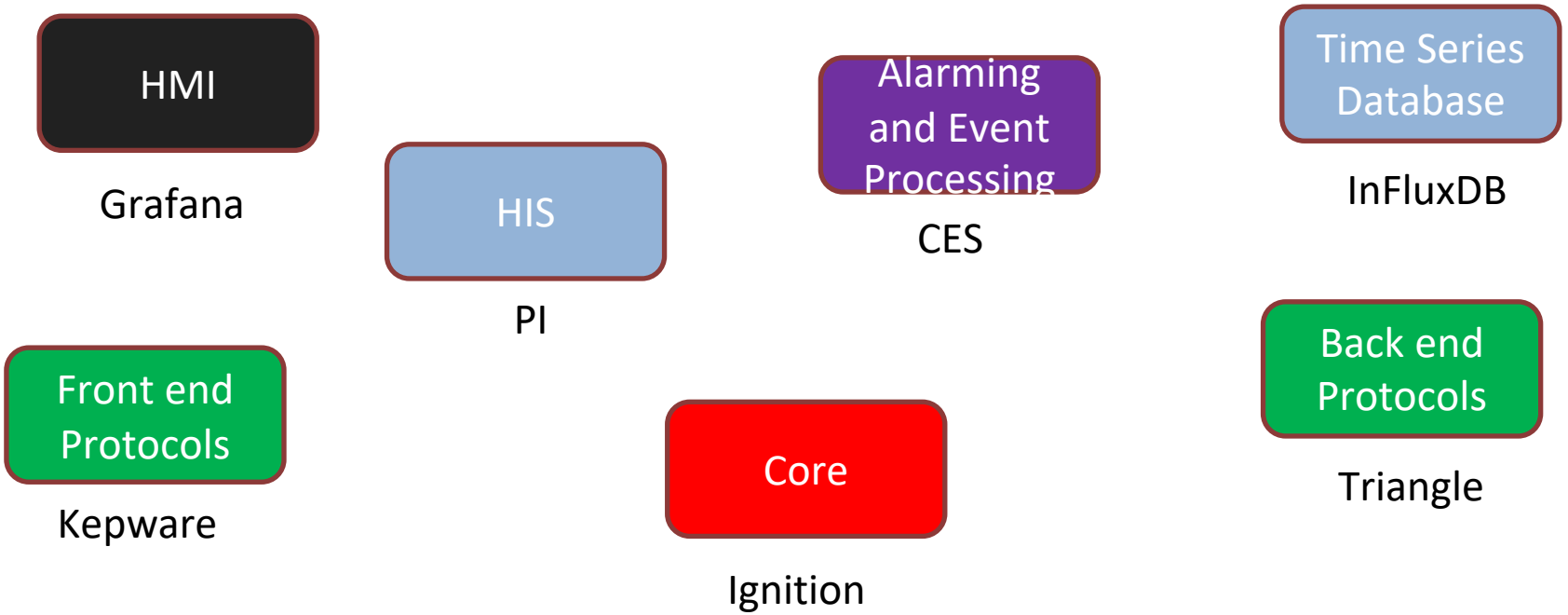
- Reliability
- Flexibility
- Expandability
- Costability (?)

Master of ALL TRADES! (How do we do that, you ask?)

Modular Solutions

Interoperability!

Modular Solutions



Able to Choose Best of Breed!

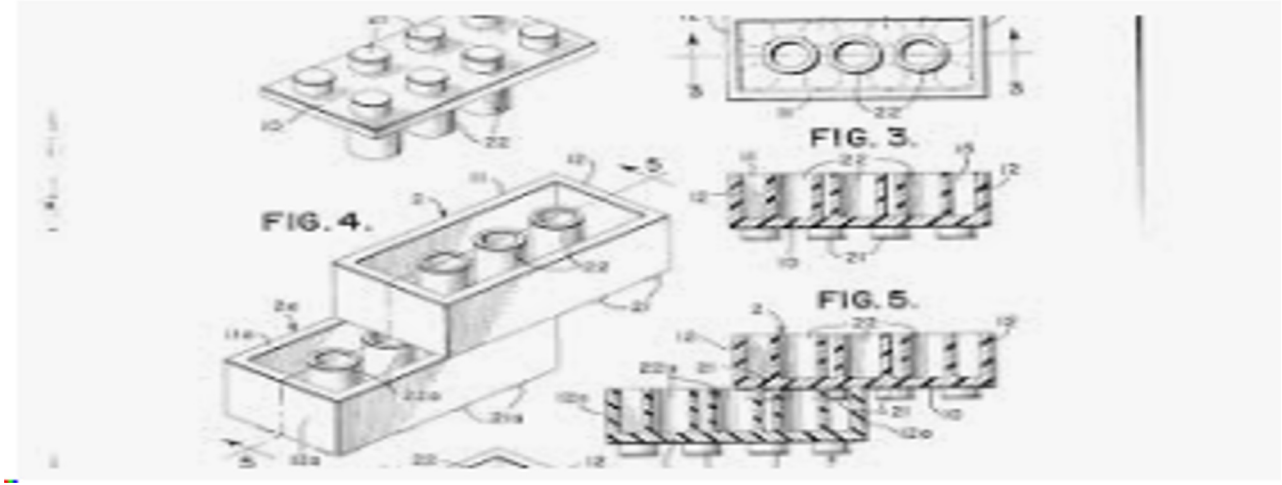
Unlimited Combinations

Unlimited Growth Potential!

Where do we START? At the FOUNDATION!

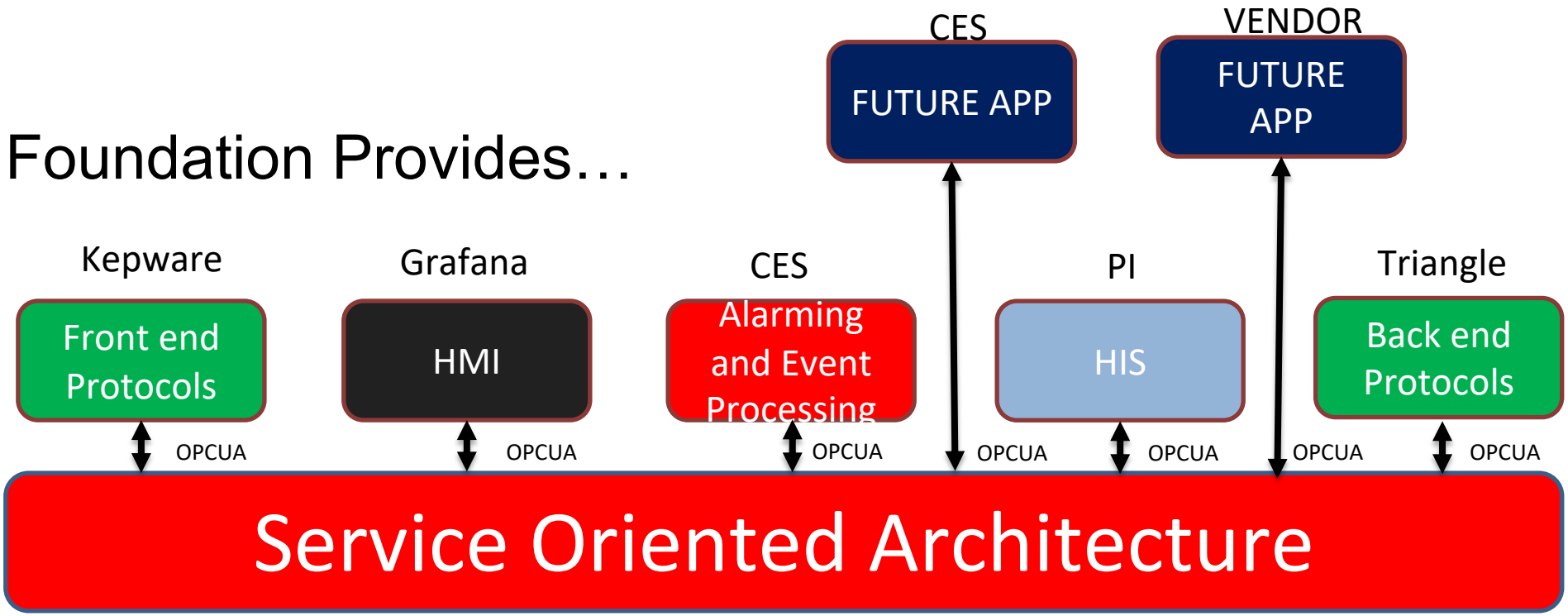
Strength in Standards!

Foundation



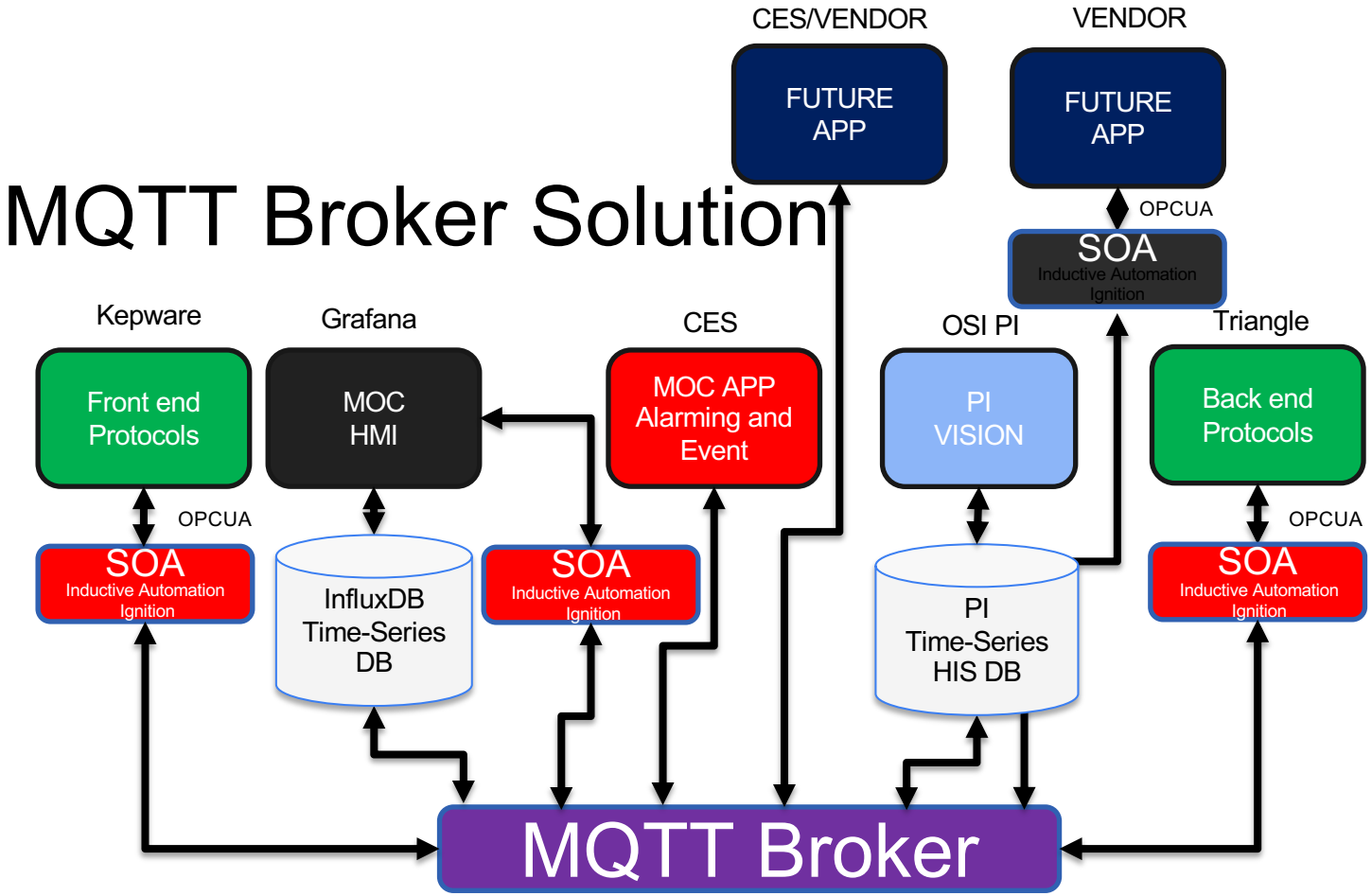
Standards and Interoperability!

Foundation Provides…



Inductive Automation Ignition

Future Proof – add new functionality!


MQTT Broker Solution
CES/VENDOR
VENDOR
FUTURE APP
FUTURE APP
OPCUA
SOA
Inductive Automation Ignition
Kepware
Grafana
CES
OSI PI
Triangle
Front end Protocols
MOC HMI
MOC APP Alarming and Event
PI VISION
Back end Protocols
OPCUA
OPCUA
SOA
Inductive Automation Ignition
InfluxDB Time-Series DB
SOA
Inductive Automation Ignition
PI Time-Series HIS DB
SOA
Inductive Automation Ignition
MQTT Broker

We can **BUILD** ANYTHING!

Customized Energy Solutions

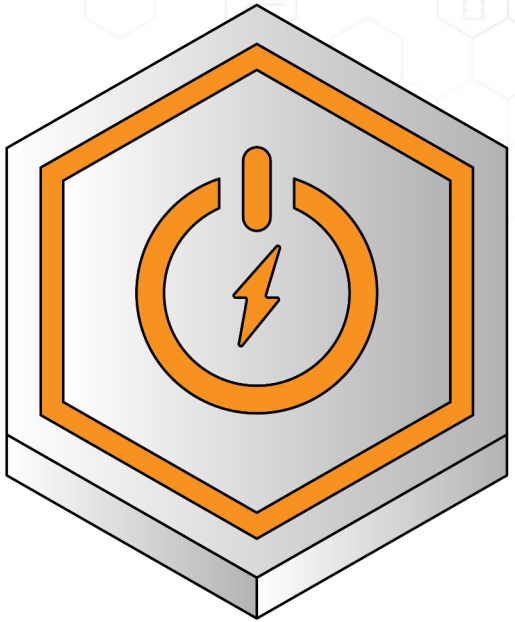
Asset Information Management System Using Ignition

Kevin J. Komara P.E.
Director - Data Acquisition Services
10/29/2024

Customized Energy Solutions (CES)

Overview

- Asset Information Management System (AIMS)
- New industry segment for Ignition: Grid Scale Energy Management
- Fully distributed service platform that integrates best-of-breed components from multiple vendors
- Unique UDTs, MQTT brokering, multi-locational control centers, publish/subscribe to data from virtually unlimited sources
- Can infinitely upgrade and expand, never need to replace



Customized Energy Solutions (CES)

Problem

- No single EMS vendor offered all the functionality, flexibility, and scalability needed.
- Around 2019, CES embarked on a “proof of concept” system implementation based on Ignition.
- The Goal: Integrate the various vendor components so seamlessly with Ignition that the end users wouldn't be able to tell that the system was actually many systems performing as one.

Customized Energy Solutions (CES)

Requirements

This system had to perform 3 basic functions:

1. Scan data from various manufacturers' RTUs in US, Canada, India, Japan, etc., in a very robust and reliable way.
2. Present the data as scaled information in various formats — and allow CES control room operators to perform date intervention as needed.
3. Disseminate information to independent system operators, utilities, energy off-takers, etc., using utility-grade high-speed data links — *and* be less expensive and easier to use than traditional EMS systems.

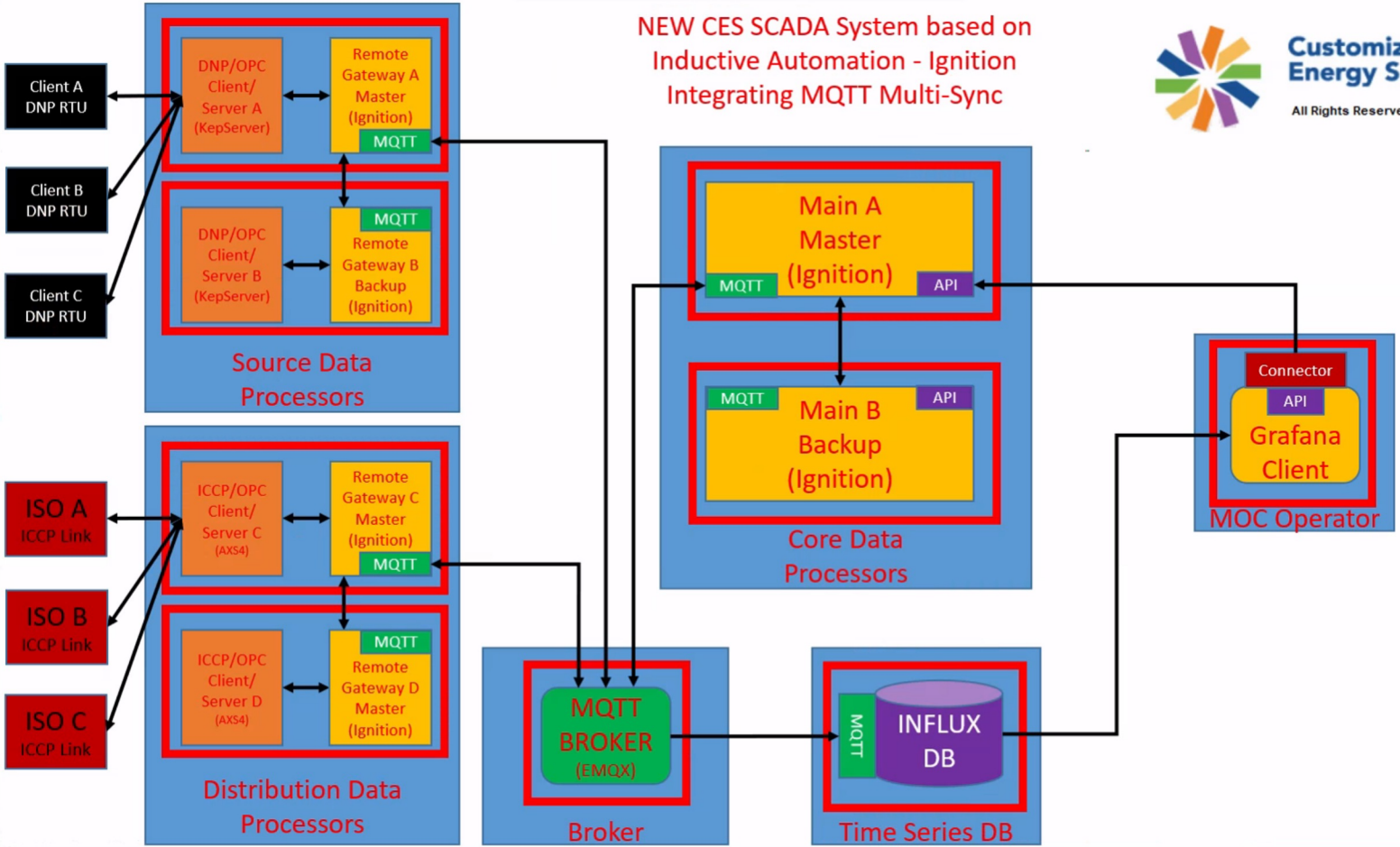
Customized Energy Solutions (CES)

Challenges

- Set up 6 servers (3 pairs) of highly available Ignition servers:
  - A pair of FEPs (Front End Processors)
  - A pair of CSPs (Core System Processors)
    - Challenge: No methods available for “data intervention.” This led CES to create our own UDTs.
  - A pair of DDPs (Data Distribution Processors)
    - Challenge: After a major power interruption and fire, CES developed a scalable Backup Control Center capability for our system that we call “Multi-Sync.”

NEW CES SCADA System based on Inductive Automation - Ignition Integrating MQTT Multi-Sync

Customized Energy Solutions



Customized Energy Solutions (CES)

Solution

- After the successful POC system/MQTT integration, the project team used the basic building blocks to lay out the entire CES System. Name changed to AIMS.
- System includes heavy usage of the Ignition Enterprise Administration Module (EAM)
- The DEV EAM Controller has 3 separate tag databases that use EAM to “push” all tag changes to all the other servers and tag databases in the system

Customized Energy Solutions (CES)

Solution

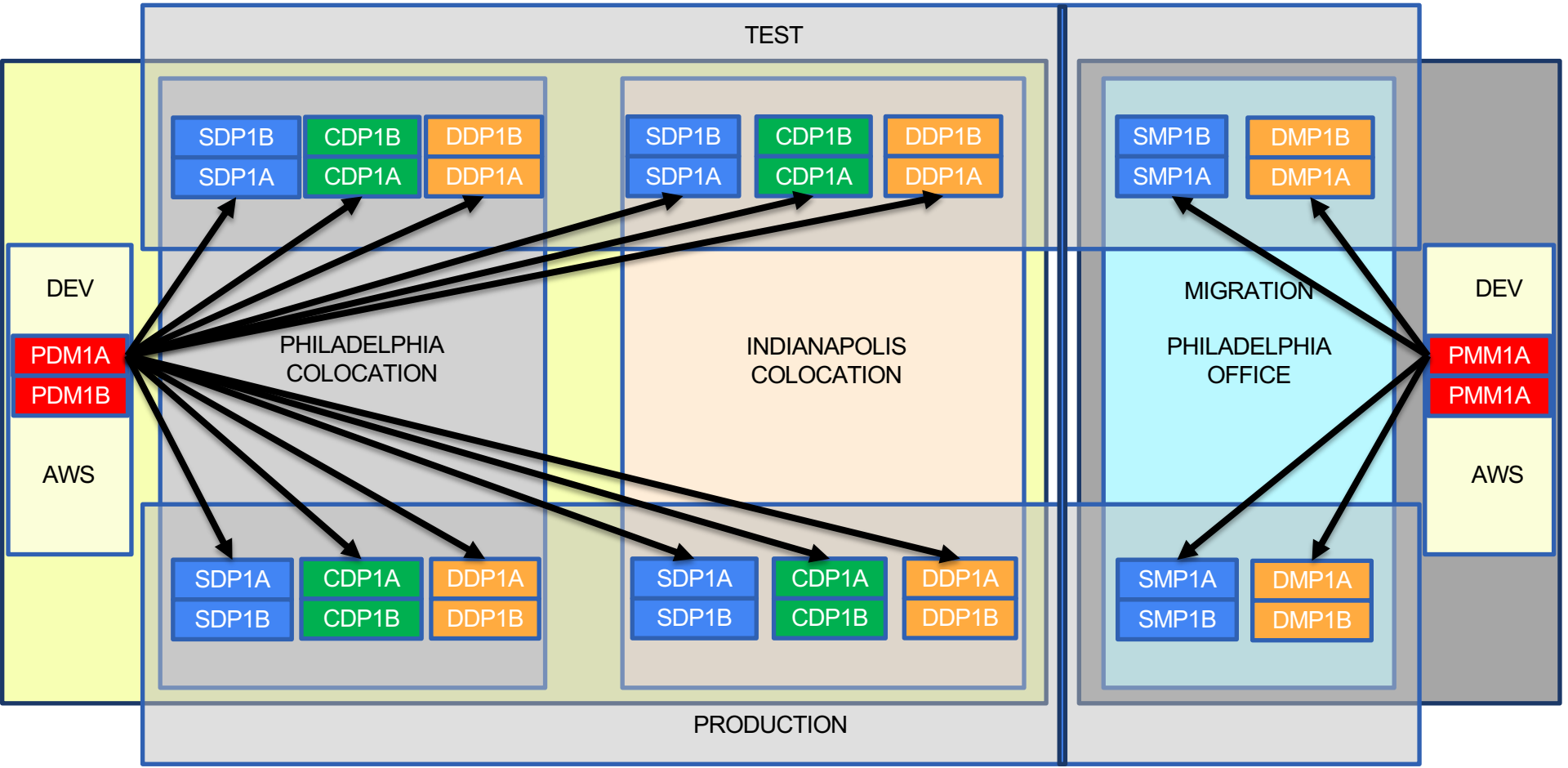
- The first Tag Database is for the provider/RTU modeling. This is now called our “Source Data Process” or SDP.
- The second Tag Database is for the actual asset modeling. This is now called our “Core Data Process” or CDP.
- The third Tag Database is for the Datalink consumer/link modeling. This is now called our “Distribution Data Process.”

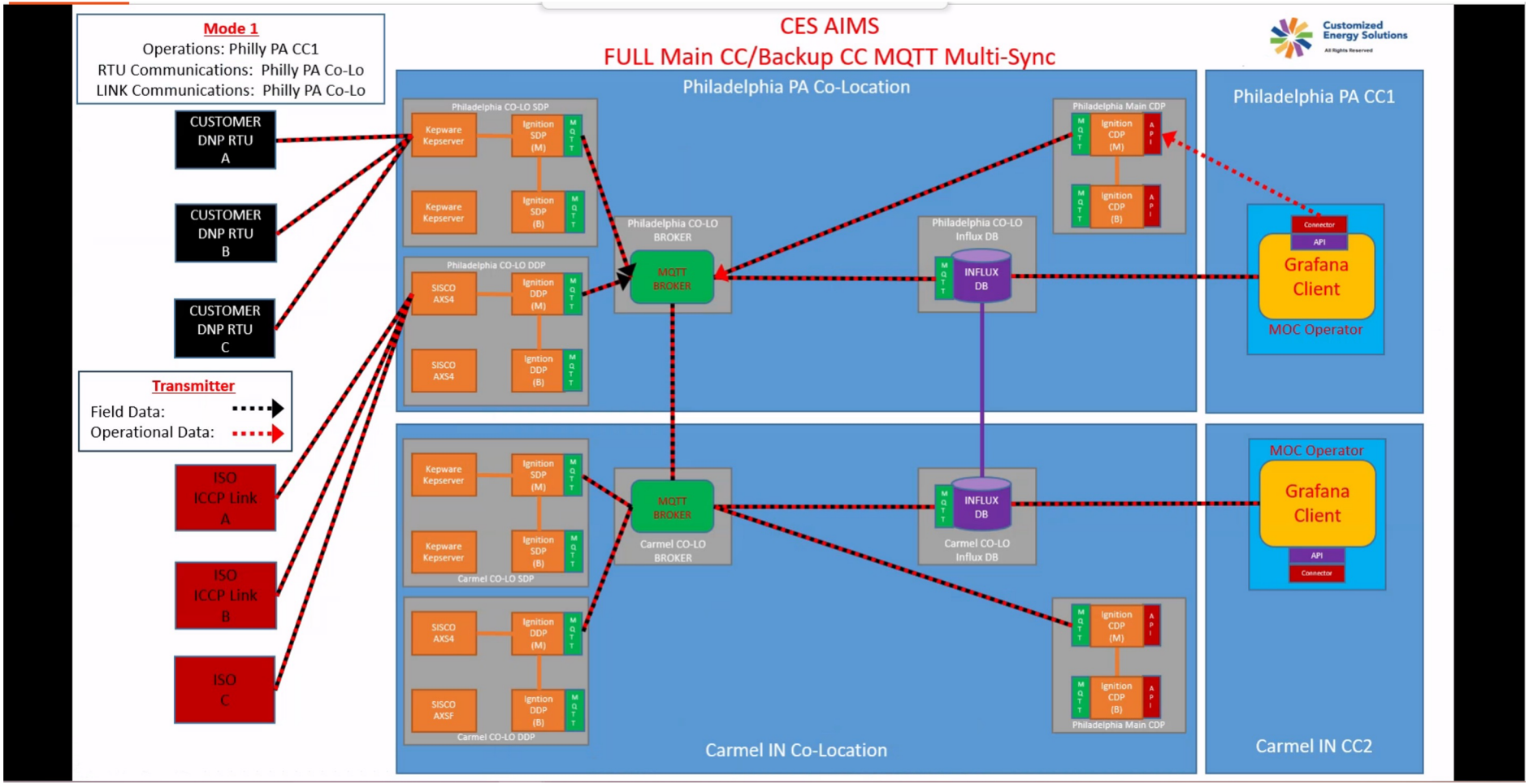
Customized Energy Solutions (CES)

Solution

- Designed and deployed a 12-server test environment. 3 pairs of servers (SDP, CDP, and DDP) in a co-location in Philadelphia, PA. Also 3 pairs of test servers (SDP, CDP, and DDP) in a co-location in Carmel, IN.
- Designed and deployed a 12-server production environment. 3 pairs of servers (SDP, CDP, and DDP) in a co-location in Philadelphia, PA. Also 3 pairs of production servers (SDP, CDP, and DDP) in a co-location in Carmel, IN.
- Developed a full migration system.

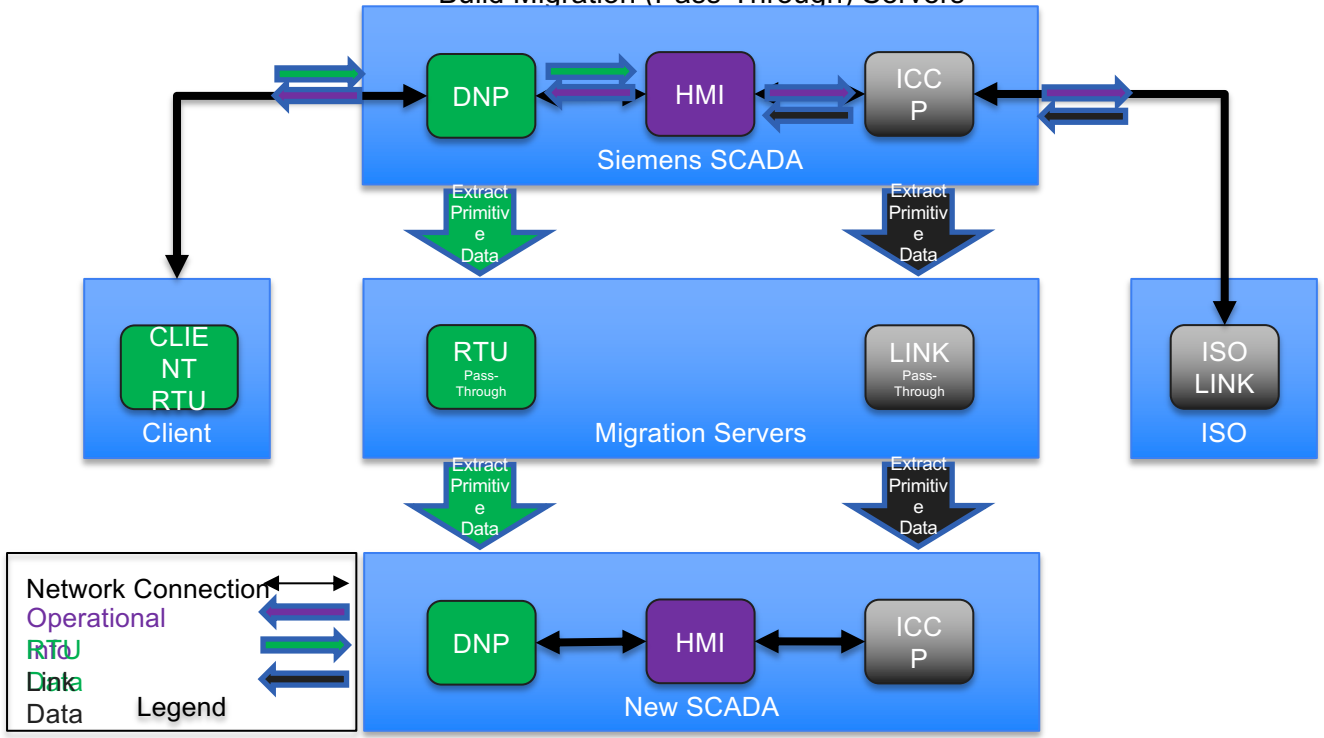
Customized Energy Solutions AIMS EAM System Architecture




Mode 1
Operations: Philly PA CC1
RTU Communications: Philly PA Co-Lo
LINK Communications: Philly PA Co-Lo
CES AIMS
FULL Main CC/Backup CC MQTT Multi-Sync
Customized Energy Solutions
All Rights Reserved
CUSTOMER DNP RTU A
CUSTOMER DNP RTU B
CUSTOMER DNP RTU C
Transmitter
Field Data:
Operational Data:
ISO ICCP Link A
ISO ICCP Link B
ISO C
Philadelphia PA Co-Location
Philadelphia CO-LO SDP
Kepware Kepserver
Kepware Kepserver
Ignition SDP (M)
Ignition SDP (B)
Philadelphia CO-LO DDP
SISCO AXS4
SISCO AXS4
Ignition DDP (M)
Ignition DDP (B)
Philadelphia CO-LO BROKER
MQTT BROKER
Philadelphia CO-LO Influx DB
INFLUX DB
Philadelphia Main CDP
Ignition CDP (M)
Ignition CDP (B)
Philadelphia PA CC1
Connector
API
Grafana Client
MOC Operator
Carmel CO-LO SDP
Carmel CO-LO DDP
SISCO AXSF
Carmel CO-LO BROKER
Carmel CO-LO Influx DB
Carmel IN Co-Location
Carmel IN CC2

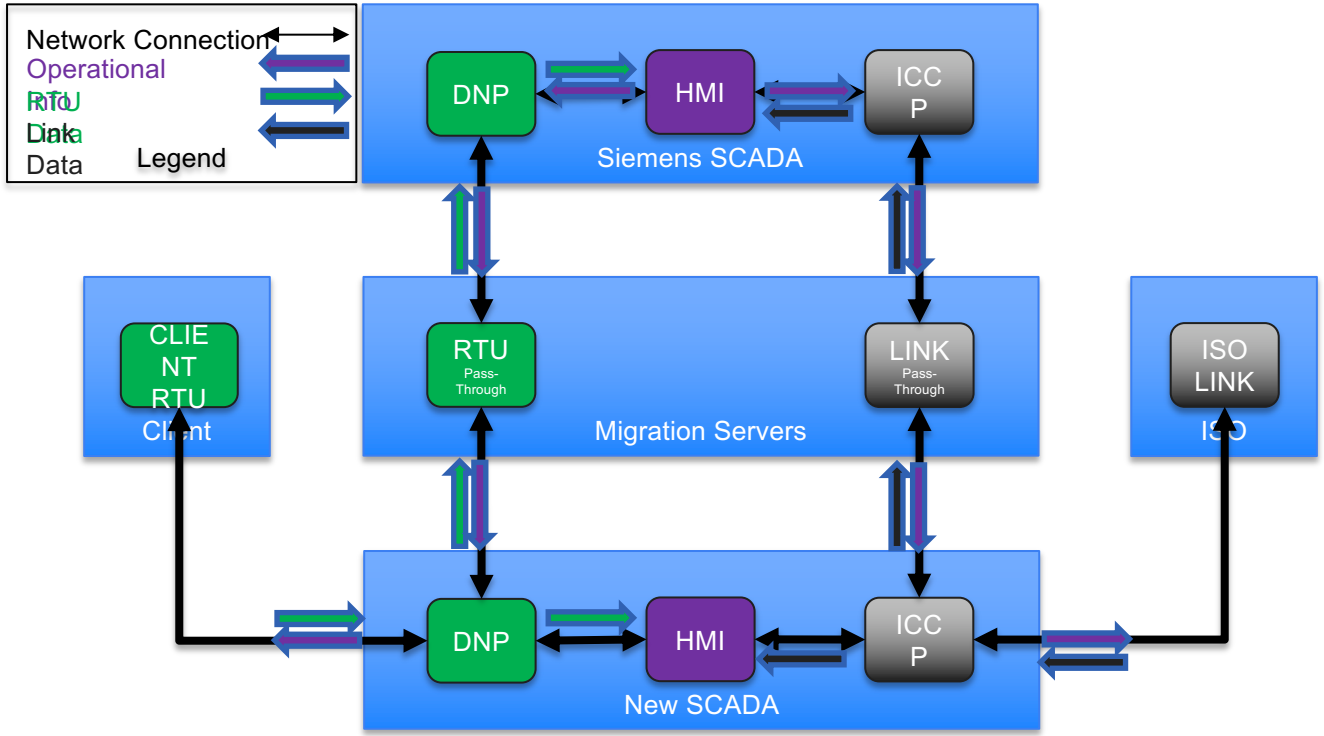
Phase 2 & 3

Build Migration (Pass-Through) Servers



Phase 4,5 & 6 (Parallel Operations)

Implement Migration Pass-Through Servers - Siemens SCADA in Operational Control



Customized Energy Solutions (CES)

Result

- Major sale of the AIMS system to one of our own customers
- None of the current components of the AIMS system require a subscription license or a single instance of Oracle.
- The initial cost of the AIMS system was 25% less than the offered Siemens system, and ¼ of the cost of OSI.
- TCO: CES will never have to replace our entire system ever again, which makes this Ignition-based system an even better value.

Search or jump to... ctrl+k

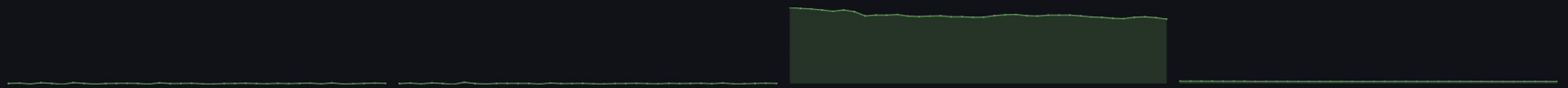
Home › Dashboards › Individual Sites › Madison BP

Add | Last 6 hours | 10s

GROUP 10m

Real Time Data

Setpoint	168 kW	↑ ∞%
Generation MW	89.2 kW	↑ 17,700%
SoC	53.1%	↓ -15.1%
MWh	1.67 MWh	↓ -15%



Madison Business Park

Name	Min	Max	Last *
DispatchMW	-662.8 kW	743.3 kW	168.3 kW
SOC (right y-axis)	53.1%	62.6%	53.1%
MW	-640.6 kW	1.1 MW	89.2 kW

KV and KVAR

Name	Min	Max	Last *
KV	12 kV	13 kV	13 kV
KVar (right y-axis)	-75 kVAr	-7 kVAr	-11 kVAr

Search or jump to... ctrl+k

Home › Dashboards › Individual Sites › Rochester

Add | Last 3 hours | 10s

Digital Status

Reg Status: Off

Avail Status: Off

Units Running: 3

Batt SETPT Min

-88.9

Total Site Info

Name	Min	Max	Last *
Transformer MW	0.36	2.81	2.81

Pad SOC

Batt1 SOC: 86.5% ↑ 153%

Batt2 SOC: 4.9% ↓ -19.1%

Batt3 SOC: 5.0% ↓ -14.9%

Pad 1

BATT 1 MW: 0 MW ↓ -100%

PAD 1 MW: 0 MW ↓ -100%

Pad 2

BATT 2 MW: 0.00 MW

PAD 2 MW: 1.41 MW

Pad 3

BATT 3 MW: 0.0 MW

PAD 3 MW: 1.4 MW

ATRR Dispatch

Name	Min	Max	Last *
MW	0.3	2.8	2.8

Pad 1

DC1	DC2	DC3
Idle	Idle	Idle
# Racks Online	# Racks Online: 4	# Racks Online: 4

Pad 2

DC1	DC2	DC3
Ready	Ready	Ready
# Racks Online: 4	# Racks Online: 4	# Racks Online: 4

Pad 3

DC1	DC2	DC3
Ready	Ready	Ready
# Racks Online: 4	# Racks Online: 4	# Racks Online: 4

Real Time Data

RTU Setpoint	Setpoint	Transformer MW	Plant MW
-1.3 MW	-1.2 MW	-1.5 MW	-1.5 MW
↓ -393%	↓ -9,290%	↑ 2,270%	↑ 1,340%

PUD FEED

PUD FEED	PUD FEED 1	PUD FEED 2
6.9 MW	5.1 MW	1.9 MW

Digital Status

Reg Status	Reg Avail	PUD Tie Breaker
Off	Off	0

Voltage

Name	Min	Max	Last *
KV	13.7 kV	14.3 kV	13.7 kV

Ocean State

Name	Last *	Max	Min
Dispatch MW	-1.2 MW	1.6 MW	-1.3 MW
SOC (right y-axis)	60.1%	62.2%	59.0%
OCEANSTATE.mean	-1.5 MW	2.1 MW	-1.5 MW

Feeder MW

Name	Last *	Max	Min
FEED 1 MW	6.6 MW	6.6 MW	700.0 kW
FEED 2 MW	1.9 MW	2.0 MW	1.2 MW

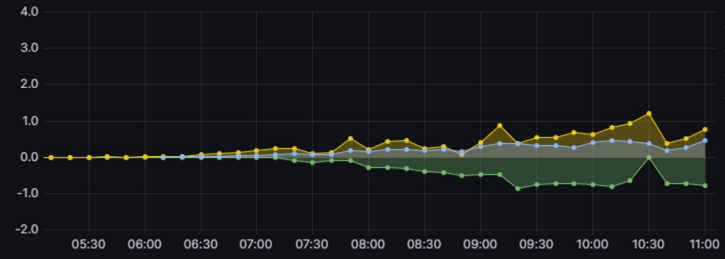
Racks Online

GROUP 10m | SiteName Auburn

Site Summary

Name	Min	Max	Last *
BESS MW	-0.87	0.00	-0.78
SOC (right y-axis)	5.55	35.77	35.77
Total Site MW	0.00	0.00	0.00

Output Summary



Name	Last *
BESS MW	-0.8
Coupled Pad MW	0.8
Solar MW	0.5

System Settings

Mode	2
Heila SETP	5
Avail Inverter	4

Regulation Status

Off

SOC

35.8%

Pad 1

Batt KW	Inv 1	Inv 2	Inv 3	Pad Total	SoC
-59.9	20.3	30.6	30.6	91.7	43%

Pad 2

Batt KW	Inv 1	Inv 2	Inv 3	Pad Total	SoC
-79.9	19.0	19.0	19.0	57.2	44.5%

Pad 3

Batt KW	Inv 1	Inv 2	Inv 3	Pad Total	SoC
-8007	19.2	19.2	19.2	57.4	28.6%

Pad 4

Batt KW	Inv 1	Inv 2	Inv 3	Pad Total	SoC
-7997	12.4	12.4	12.4	35.8	39.0%

Pad 5

Inv 1	Inv 2	Inv 3	Pad Total	SoC
31.4	31.3	31.3	94.4	43.9%

Pad 6

Batt KW	Inv 1	Inv 2	Inv 3	Pad Total	SoC
-80.0	18.8	18.8	18.8	55.9	29.3%

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