

IGNITION COMMUNITY CONFERENCE 2024®

**BREAK  THROUGH**  
TO YOUR NEXT BIG IDEA!

# Break through Power & Energy Barriers with Ignition



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 **MADE IN THE USA**

**50**  
*Anniversary!*

**OPTO 22**

# Break Through Power & Energy Barriers with Ignition

- What's the power of tracking your organization's energy use? Understanding your energy data **reduces your operational costs** and helps you **assess equipment health** and **meet regulatory or ESG guidelines**.
- It's hard to manage what you can't measure. In this session, you'll see how to quickly **incorporate energy monitoring into your Ignition projects** using free Ignition Exchange resources. Plus, you'll hear from a State of Indiana representative who **created the Energy INsights program** that helps Indiana-based manufacturers address energy use while taking steps toward digitally transforming their business operations.

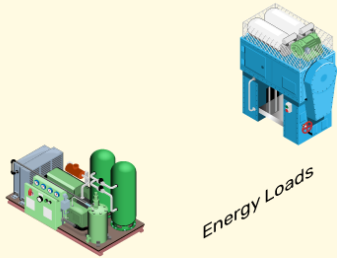
# Why Monitor Energy?





- Reduce operational costs
  - **Lower** utility demand charges
  - **Eliminate** low power factor penalties
  - **Reduce** overall consumption
- Improve equipment reliability & longevity
  - **Understand** how equipment is operating in real-time
  - **Predict** potential equipment failures
  - **Identify** poor power quality
- Meet ESG guidelines or regulatory compliance goals



# Architecture Build-Out

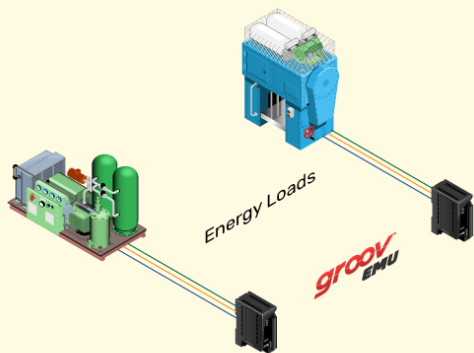
# Architecture Build-Out




-  Firewall
-  OPC UA Messages
-  MQTT/SpB Messages
-  Authenticated/Encrypted Connections




# Architecture Build-Out



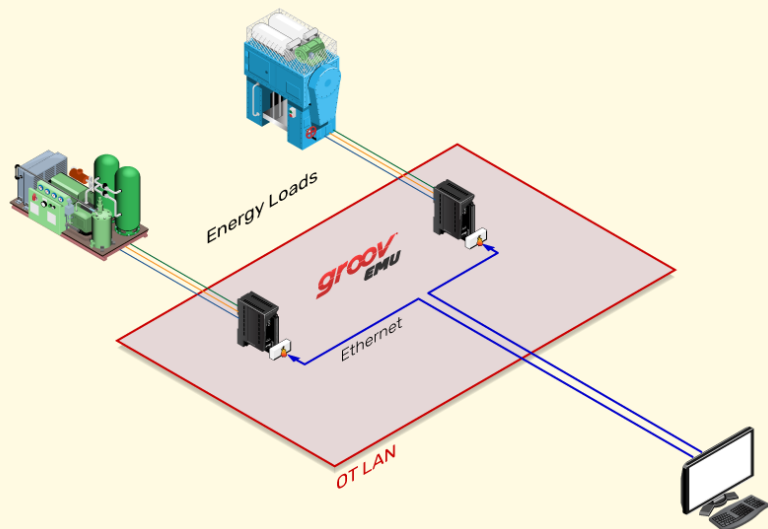
 Firewall

 OPC UA Messages

 MQTT/SpB Messages

 Authenticated/Encrypted Connections

# Architecture Build-Out



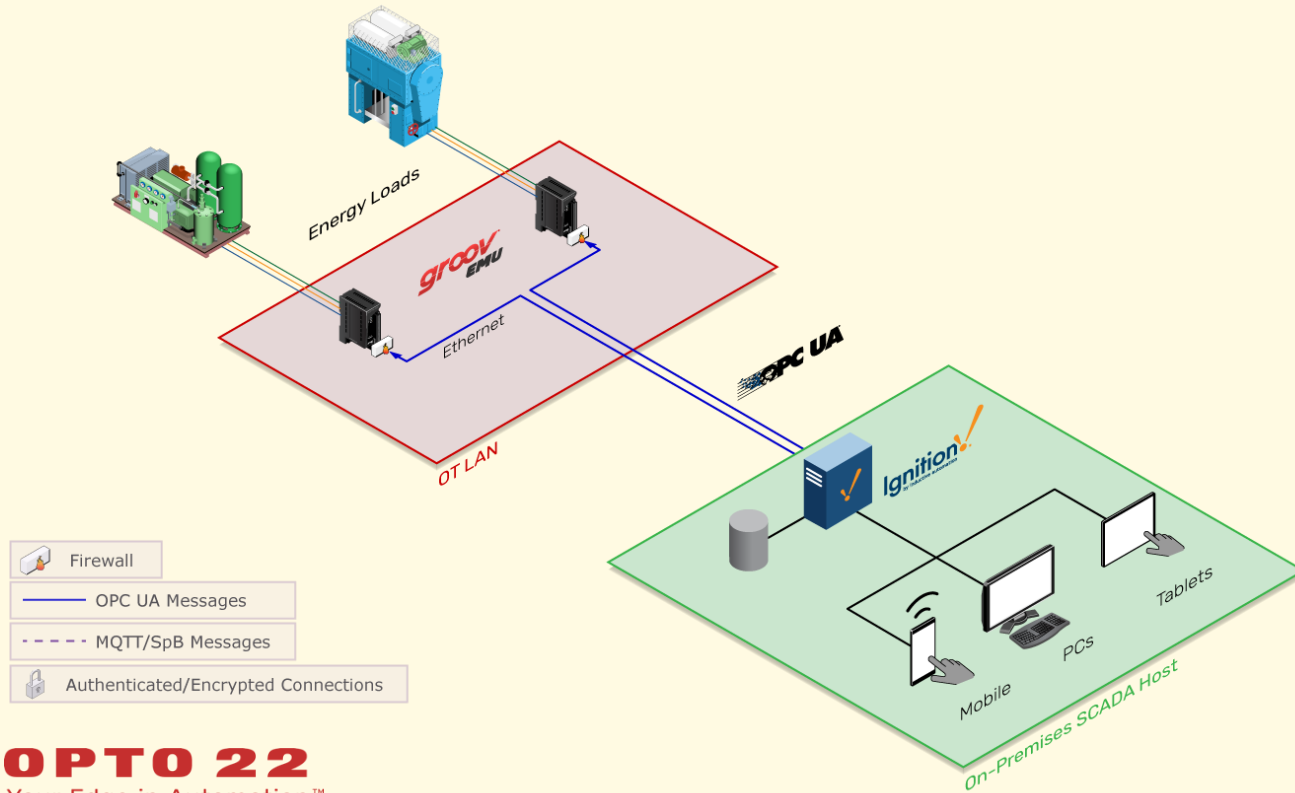
Firewall

OPC UA Messages

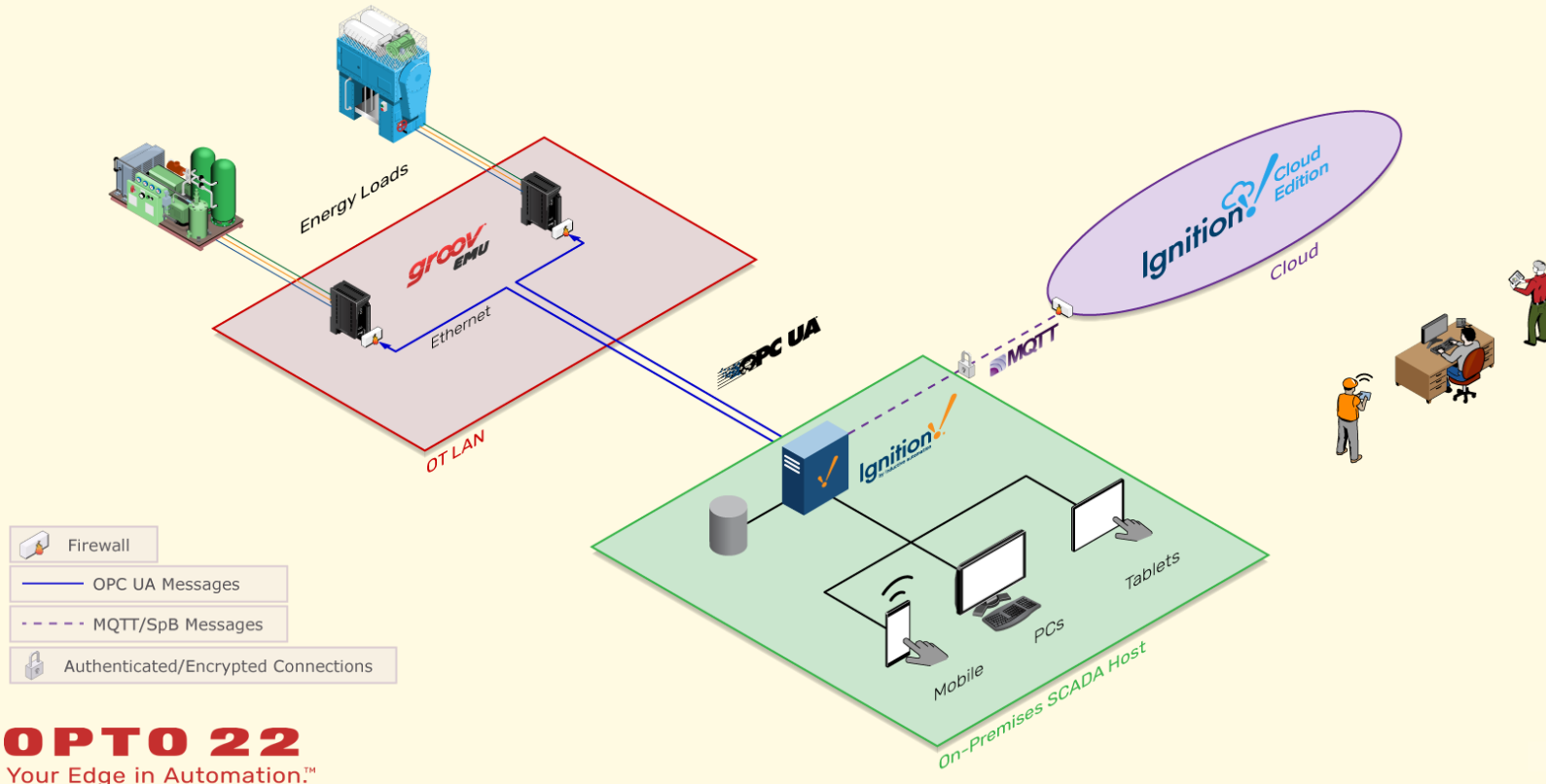
MQTT/SpB Messages

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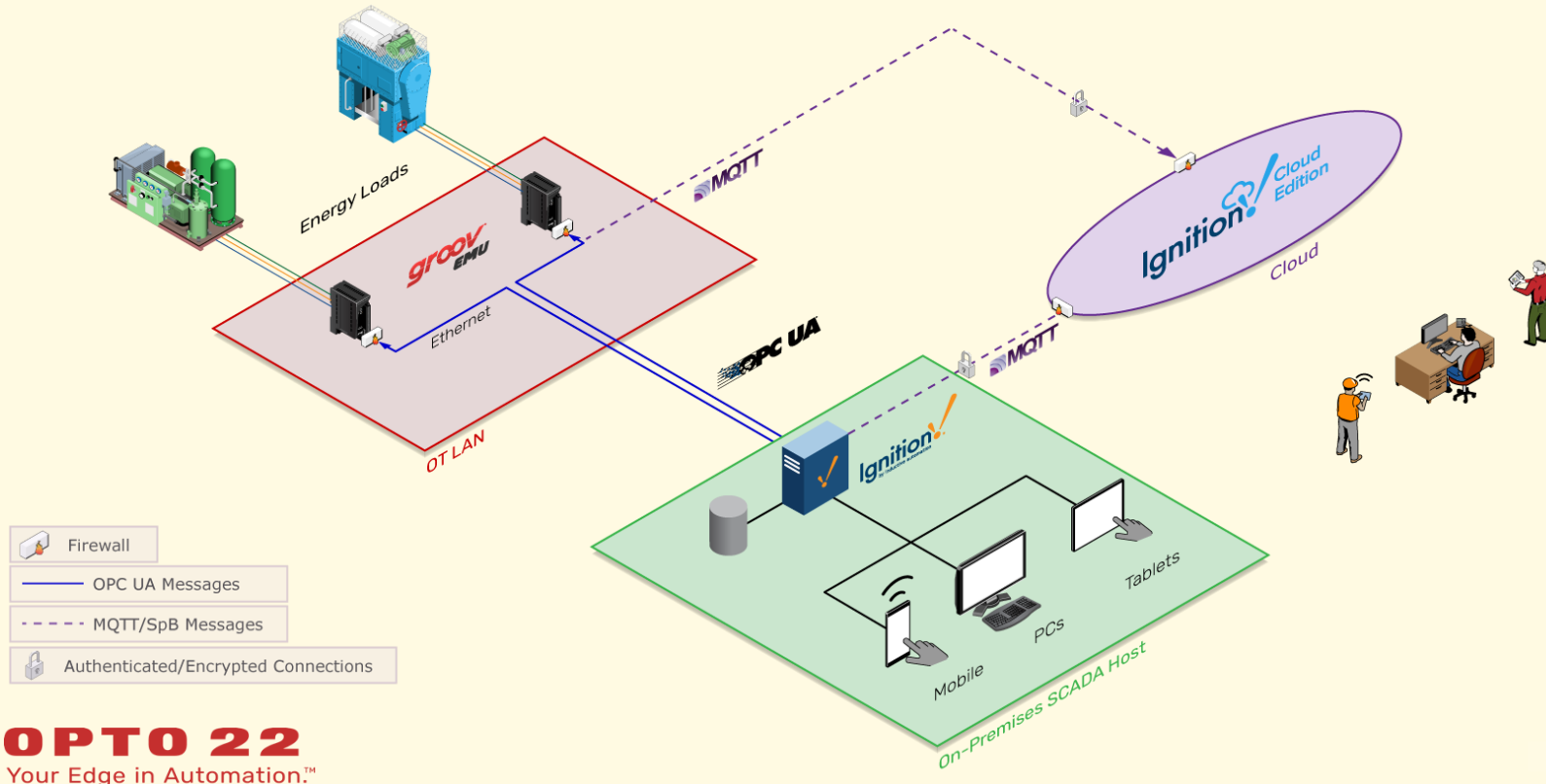
# Architecture Build-Out



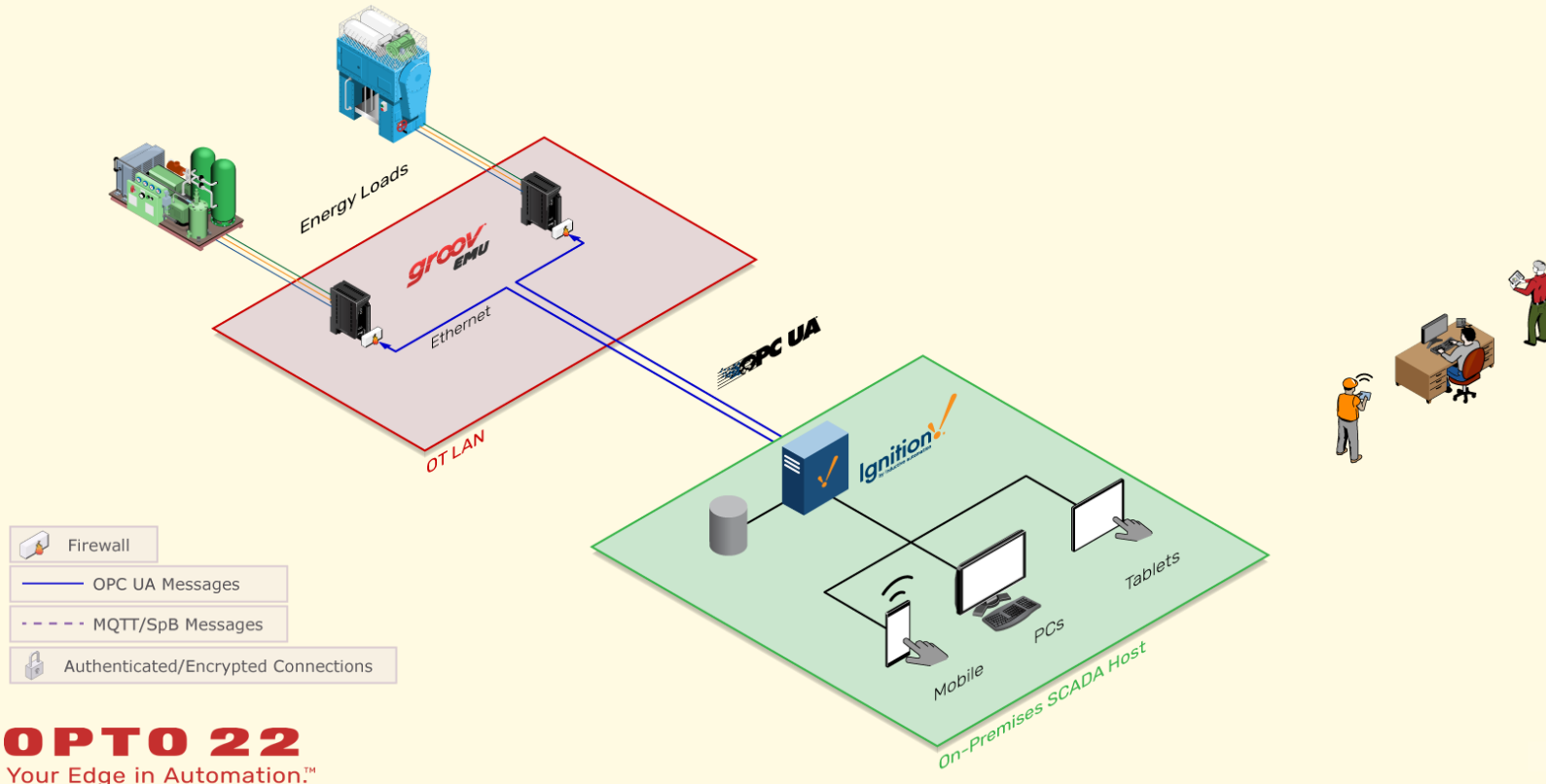
# Architecture Build-Out



# Architecture Build-Out



# Architecture Build-Out



# How to get started

# Steps to follow

1. **Identify** energy load to measure
2. **Instrument** load with current transformers
3. **Connect** CTs and voltage to *groov* RIO EMU
4. **Configure** *groov* RIO EMU
5. **Create** OPC UA client in Ignition
6. **Import** UDTs and Perspective templates
7. **Instantiate** UDT to model the load as an asset
8. **Drag & drop** UDT into Perspective views

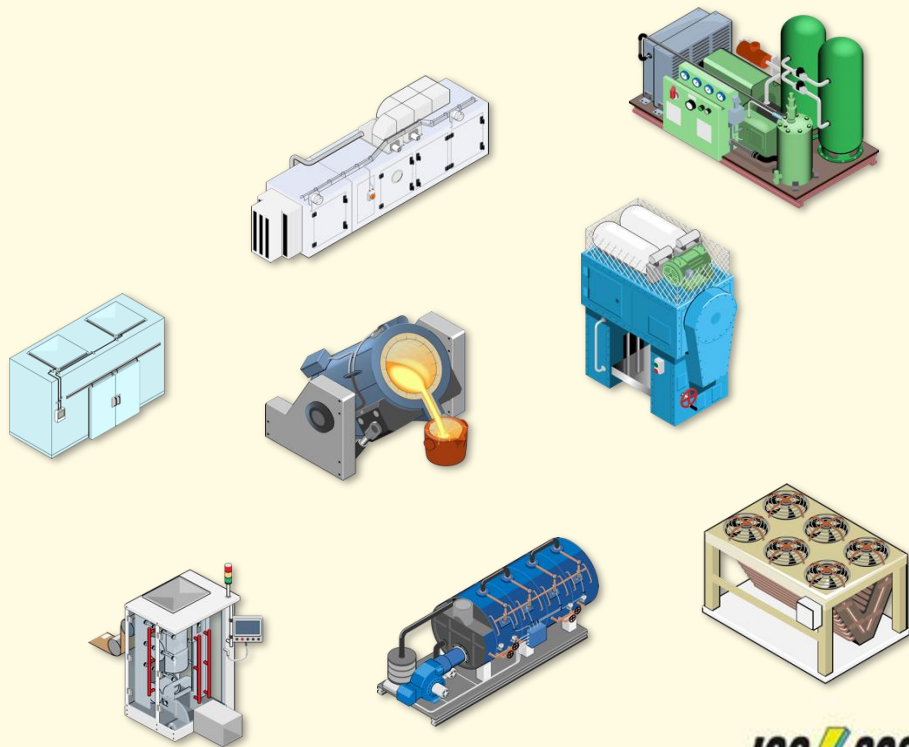




# Steps to follow – Identify load

## 1. Identify energy load to measure

- Typically, choose a larger energy load
  - Compressors
  - HVAC systems
  - Presses
  - Process heating
  - Industrial refrigeration
  - Large motors or drives
- Choose loads based on consumption and/or peak power draw (demand)
  - Consumption is energy over time
  - Demand is power at a given time



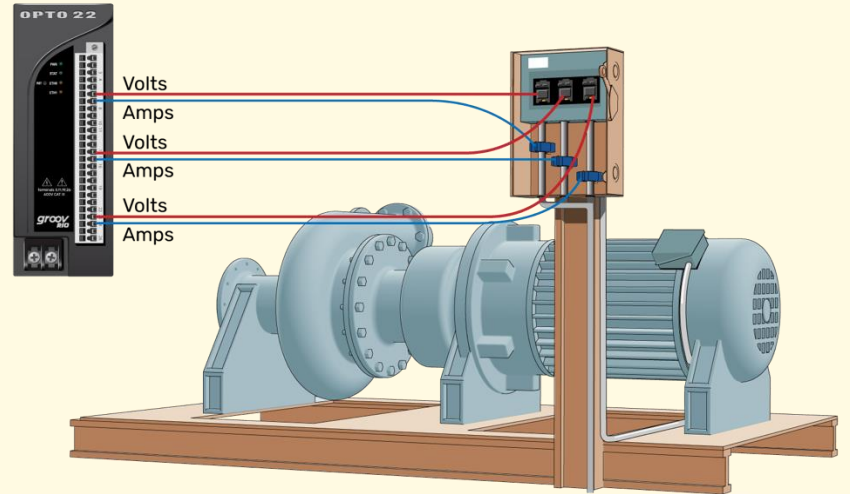
# Steps to follow – Instrument load

1. Identify energy load to measure
2. Instrument load with current transformers
  - Choose CT for the maximum current load on a phase
  - Clamp-on CTs are easiest for existing loads
  - 333 mV AC secondary is the safest choice
  - Many vendors and options to choose from



# Steps to follow – Connect CTs

1. Identify energy load to measure
2. Instrument load with current transformers
3. Connect CTs and voltage to *groov* RIO EMU
  - Single-phase or 3-phase loads
  - Directly connect voltages to 600 VAC
  - Power EMU with PoE or 10-32 VDC
  - What's an EMU?



# About the *groov*RIO EMU (Energy Monitoring Unit)



MQTT

OPC UA

Modbus

OPENVPN

CODESYS

Node-RED



- *groov* RIO EMU includes:
  - 64 **power & energy** real-time data values
  - Up to **3-phase, 600 V Category III** loads
  - **Delta** or **Wye** load types supported
  - **PoE** or line-powered
  - **Cybersecure** with firewalls, certs, accounts
  - Browser-based configuration
  - **USB** for data storage or Wi-Fi
  - **MQTT** Sparkplug B, **OPC UA**, and **Modbus**
  - Compatible with standard **current transformer** sensors

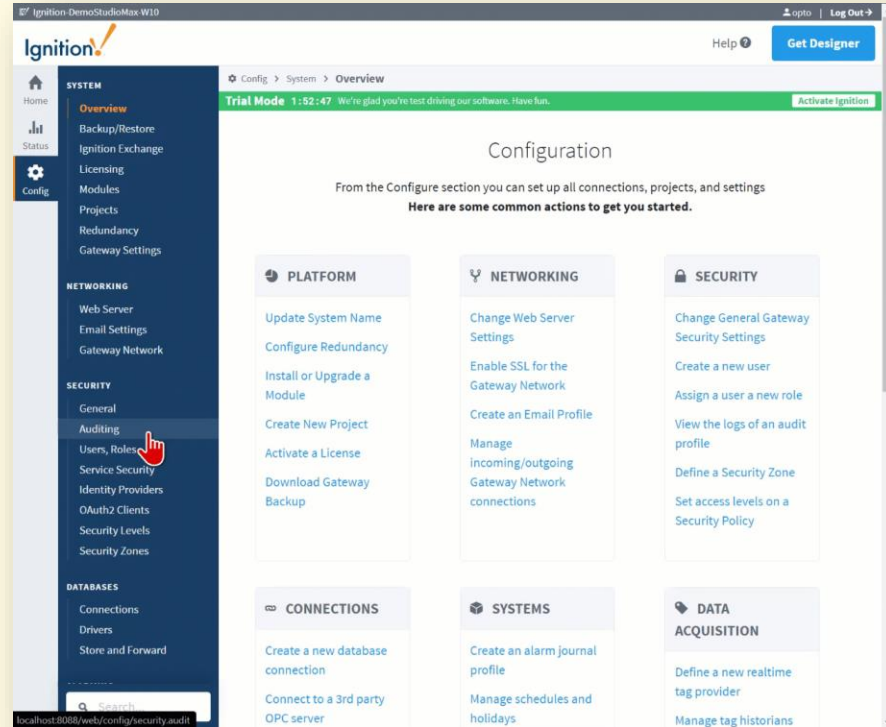
# Steps to follow – Configure EMU

1. Identify energy load to measure
2. Instrument load with current transformers
3. Connect CTs and voltage to *groov* RIO EMU
4. Configure *groov* RIO EMU
  - Connect to the network, open your web browser
  - Create an admin account, set time, hostname, and certs
  - Configure load type, current & voltage values
  - Configure on-board OPC UA server



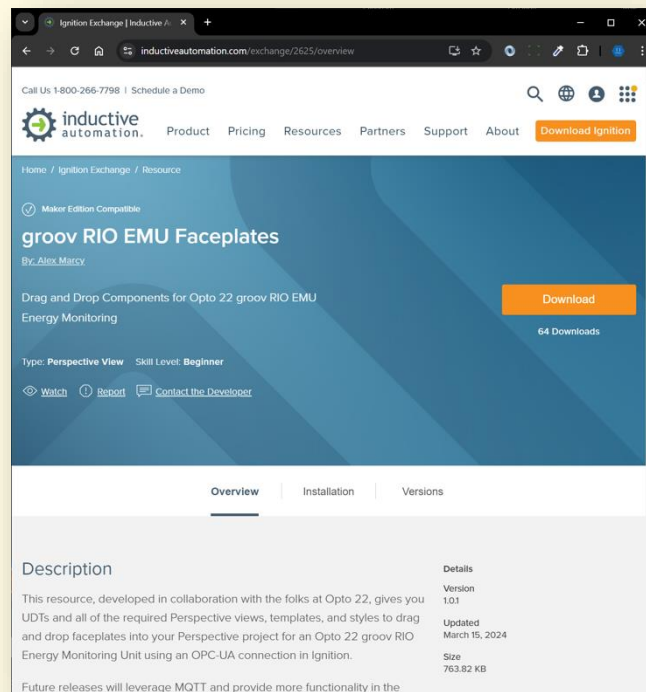
# Steps to follow – Configure Ignition

1. Identify energy load to measure
2. Instrument load with current transformers
3. Connect CTs and voltage to *groov* RIO EMU
4. Configure *groov* RIO EMU
5. Create OPC UA client in Ignition
  - Create a new OPC UA Client Connection
  - Discover EMU's OPC UA Server
  - Name your new OPC Client connection



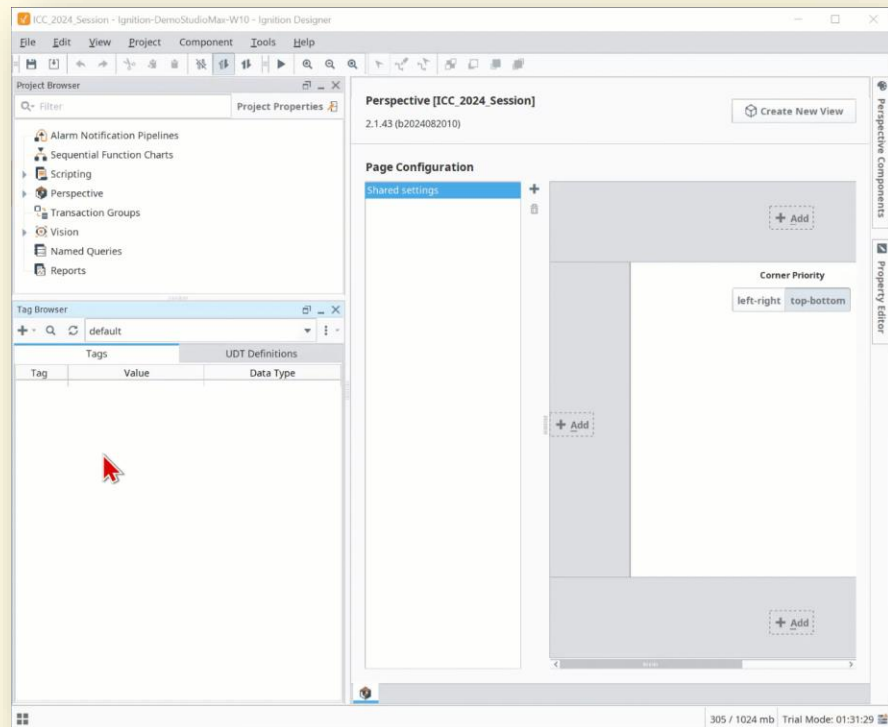
# Steps to follow – Import Resources

1. Identify energy load to measure
2. Instrument load with current transformers
3. Connect CTs and voltage to *groov* RIO EMU
4. Configure *groov* RIO EMU
5. Create OPC UA client in Ignition
6. Import UDTs and Perspective templates
  - Download free Exchange Resources



# Steps to follow – Import Resources

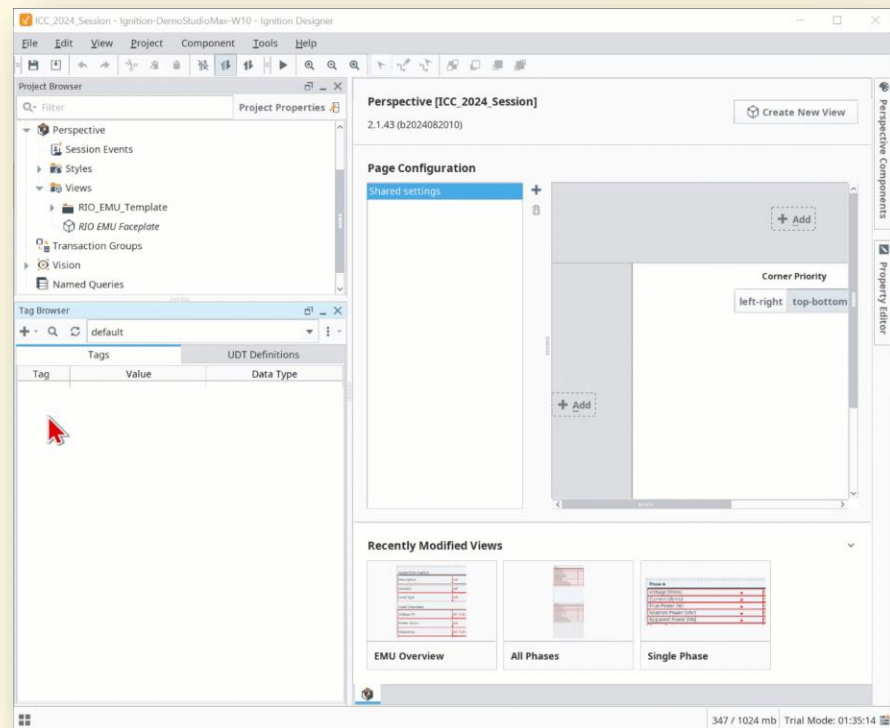
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  - Import into Ignition





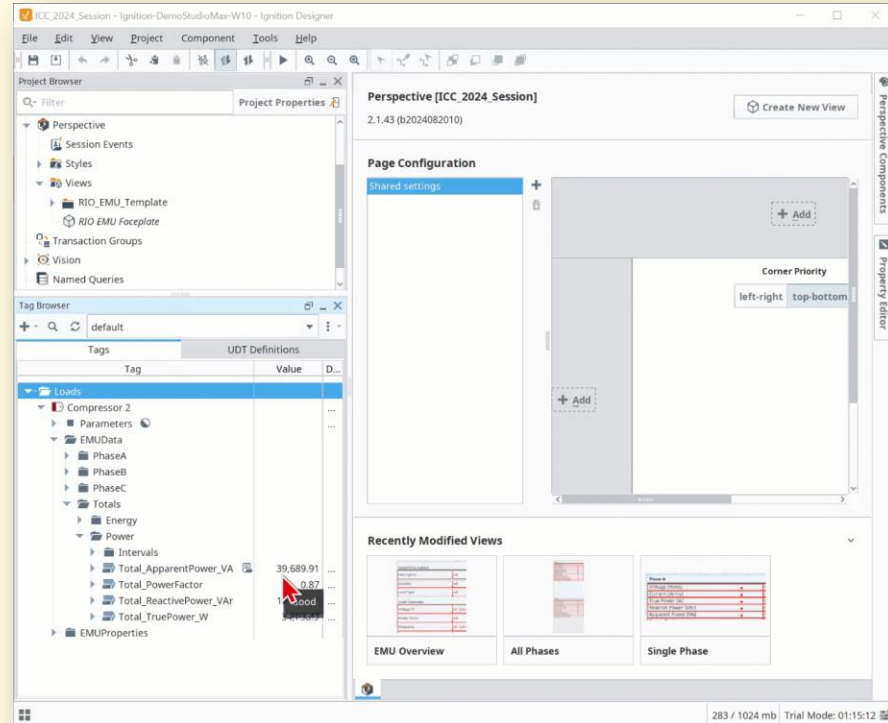
# Steps to follow – Instantiate UDTs

1. Identify energy load to measure
2. Instrument load with current transformers
3. Connect CTs and voltage to *groov* RIO EMU
4. Configure *groov* RIO EMU
5. Create OPC UA client in Ignition
6. Import UDTs and Perspective templates
7. Instantiate UDT, model load as an asset
  - Create a new instance of UDT and fill in the parameters

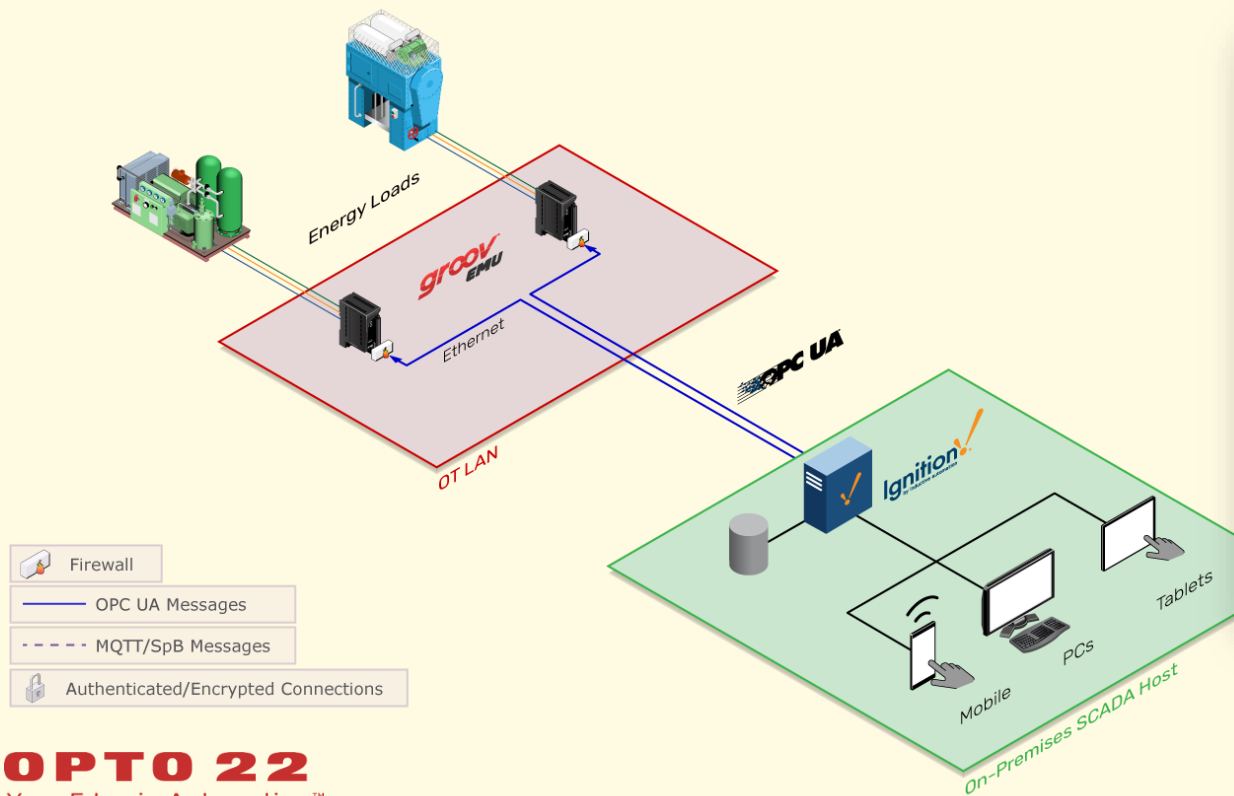


# Steps to follow – Drag & Drop UDT

1. Identify energy load to measure
2. Instrument load with current transformers
3. Connect CTs and voltage to *groov* RIO EMU
4. Configure *groov* RIO EMU
5. Create OPC UA client in Ignition
6. Import UDTs and Perspective templates
7. Instantiate UDT, model load as an asset
8. Drag & drop UDT into Perspective views



# Completed Energy Monitoring Application



Ignition

light-cool Sign In Alarms

HOME CHARTS ALARMS

Welcome to Perspective!

The skeleton project is intended to help you get started with Perspective. The project is designed to be mobile-responsive and fully utilizes styles. Feel free to modify as desired.

Overview	Totals	Phases	Overview	Totals	Phases
Load Name: Wave Solder Machine Line 1		Load Name: Wave Solder Machine Line 2			
<b>Asset Information</b>					
Description	Solder machine for through-hole mfg				
Location	Upstairs manufacturing				
Load Type	0-300 Vrms Wye				
<b>Phase A</b>					
Voltage (Vrms)	123.28				
Current (Arms)	0.27				
True Power (W)	26.79				
Reactive Power (VAr)	20.66				
Apparent Power (VA)	33.9				
Power Factor	0.8				
Frequency (Hz)	60				
Net True Energy (kWh)	216.68				
Net Reactive Energy (kVArH)	200.56				
Net Apparent Energy (kVAh)	357.03				
<b>Load Overview</b>					
<b>Phase B</b>					
Voltage (V)	0.8 / 108.2 / 105.5				
Current (Arms)	0.05				
True Power (W)	-1.37				
Reactive Power (VAr)	6.13				
Apparent Power (VA)	6.2				
Power Factor	-0.22				
Frequency (Hz)	59.94				
Net True Energy (kWh)	207.6				
Net Reactive Energy (kVArH)	195.8				
Net Apparent Energy (kVAh)	346.18				
<b>Phase C</b>					
Voltage (Vrms)	123.28				
Current (Arms)	0.24				
True Power (W)	25.5				
Reactive Power (VAr)	30.05				
Apparent Power (VA)	30.33				
Power Factor	0.14				
Frequency (Hz)	59.94				
Net True Energy (kWh)	195.65				
Net Reactive Energy (kVArH)	193.47				
Net Apparent Energy (kVAh)	335.64				
<b>Interval Data 15 Min.</b>					
Energy (kWh)	0.02				
Demand (VA)	49.36				

# The Energy INsights Program

# What is Energy Insights?

A state-funded program to provide Indiana small-medium manufacturers hardware, software, services, and education to deploy a smart manufacturing pilot project

## Program Sponsor

**INDIANA  
FOR  
THE BOLD**

Economic Development Corp.

## Program Manager

**ESN**<sup>®</sup>  
ENERGY SYSTEMS NETWORK

## Integrator Partners

**axiom**  
MANUFACTURING SYSTEMS

**Lhp**

**Brugh**  
INDUSTRIAL ENGINEERING

**Blue Ridge**  
INC.  
Transforming Manufacturing Beyond Limits

**TensorIoT**

**MARTIN**

**NINE/TWELVE**

## Program Partners

**OPTO 22**  
Your Edge in Automation.™

**inductive  
automation.**

**TOOLINGU | sme**

**CESMII**

**EMC<sup>2</sup>**

# Why Energy Insights?

Energy INsights provides Indiana's small to medium manufacturers a **starting point** for building a smart manufacturing infrastructure

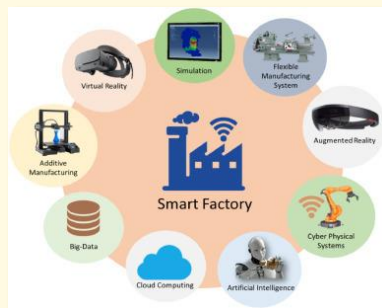
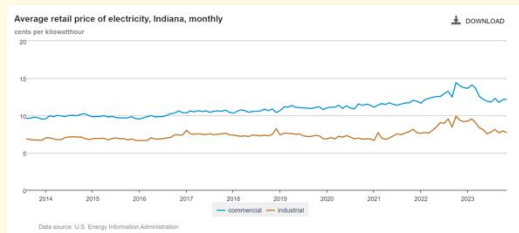
Rising Energy Costs



Global Competition



Falling Costs of IIOT



# Energy Insights Program

## What we will give:



A Hardware & Software Starter kit



Comprehensive services to build out a pilot



Four Educational & Interactive Workshops

## What you get:



Installed system delivering real insights



Empowered to chart your I4.0 Journey



Understanding energy data and savings opportunities

# Visualizing energy data can help save money

## Electric Bill Savings



### Demand Charge Reduction

Time-shift high-demand activities

Find “natural storage”

Improve energy efficiency of key peak loads



### Energy Efficiency

Quantify savings from behaviors setpoints

See and act upon degraded performance

Justify investment in more efficient equipment



### Other Energy Savings

Understand costs and benefits of DR, TOU, etc.

Reduce charges from poor Power Factor

Understand value of solar, storage, or capacitor banks



### Other uses of Energy Data

Monitor times when equipment is on or off

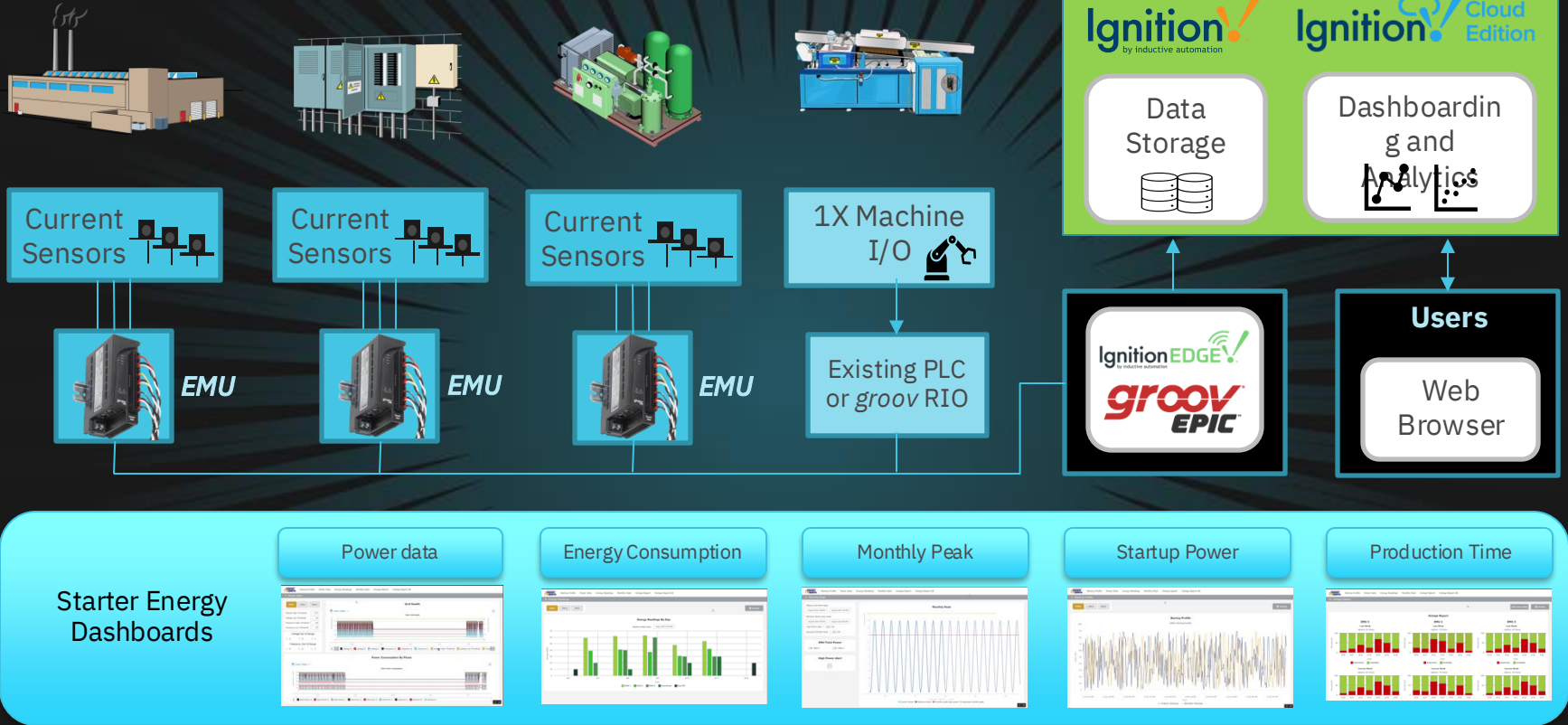
Predictive maintenance of key equipment.

Monitor supply voltage for outages and over-voltage.

**Together, Energy INsights expects to help you reduce your electric bill by 5-15%**

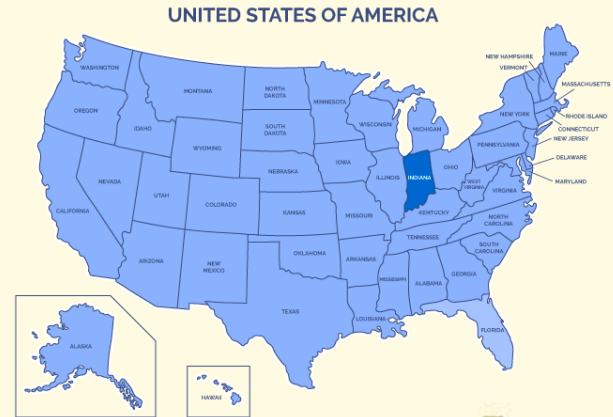


# Energy INsights Starter Kit Architecture



# Key factors that make us unique

- Digitization is the future, but manufacturers need help getting started.
- Each manufacturer is unique:
  - They are starting in a unique place and will end in a unique place.
  - Some may become DIYers, others may contract out custom solutions, and others may stick with plug-and-play solutions.
  - Their processes are unique.
- Training should take a back seat to trying.
- Energy affects everyone and is not competitive. It's a great place to get started.
- We don't assume that AI is your first stop on the digital journey. We let experienced integrators help manufacturers craft and execute their pilot projects.



***THANK YOU***

**OPTO 22**  
Your Edge in Automation.™

**ICC  2024**