ODVA 2014

Industry Conference and 16th Annual Meeting

Update on the ODVA Energy Initiative

Marketing Track

www.odva.org

Agenda

The case for ODVA energy actions

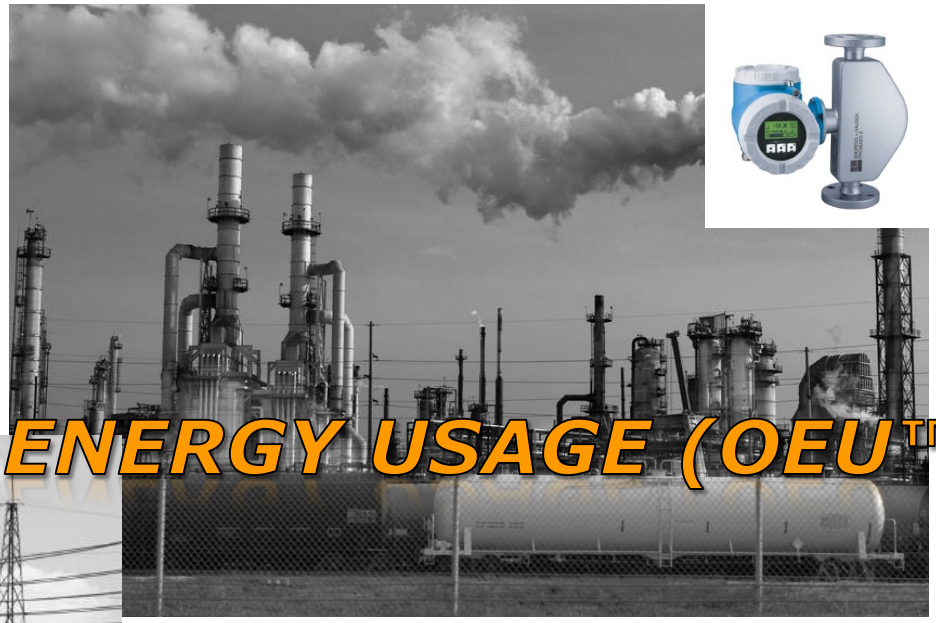
What ODVA is doing about it

What you can do

Where do we go from here?

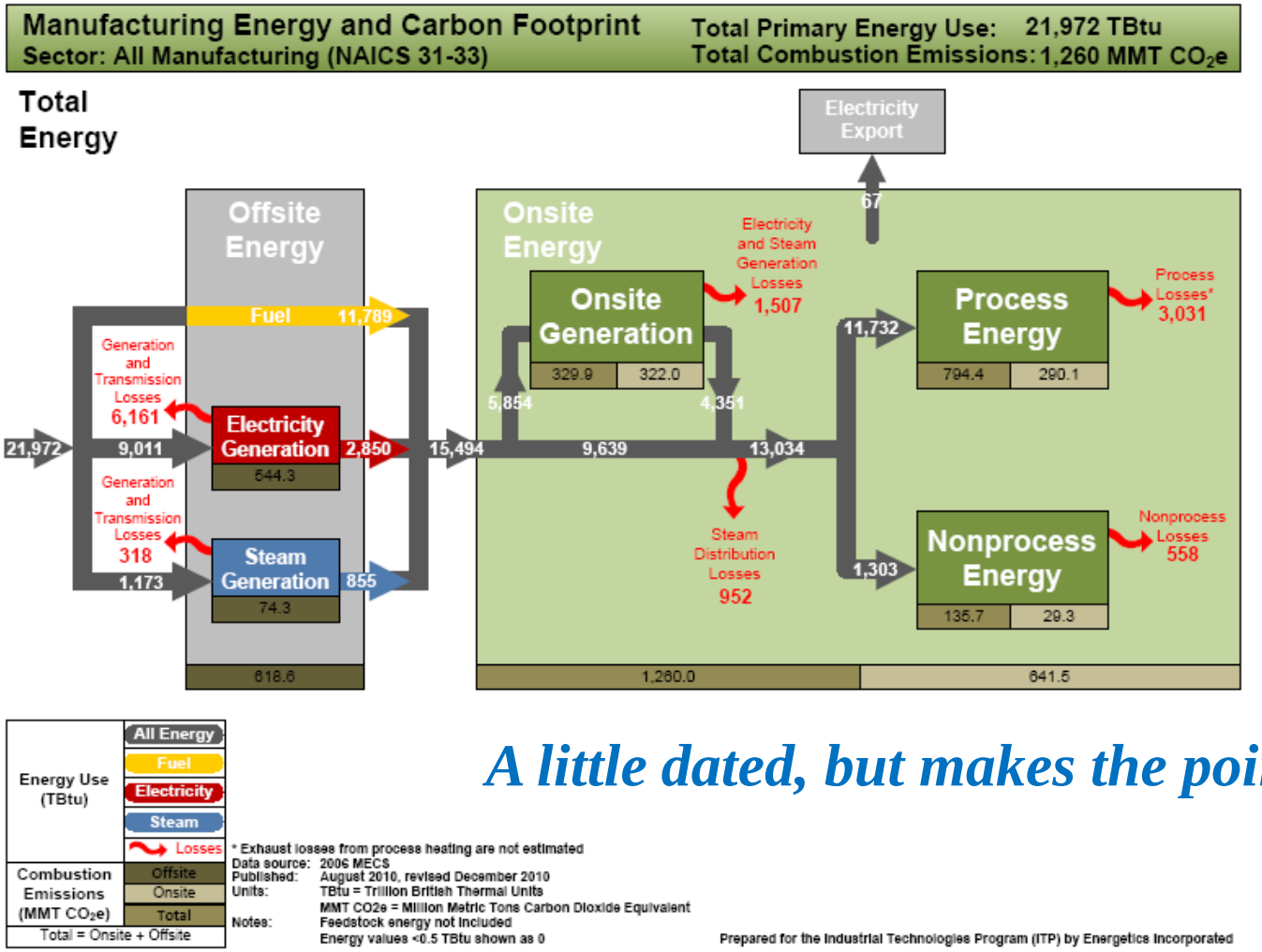
The Case for ODVA Energy Actions

IT'S ABOUT…



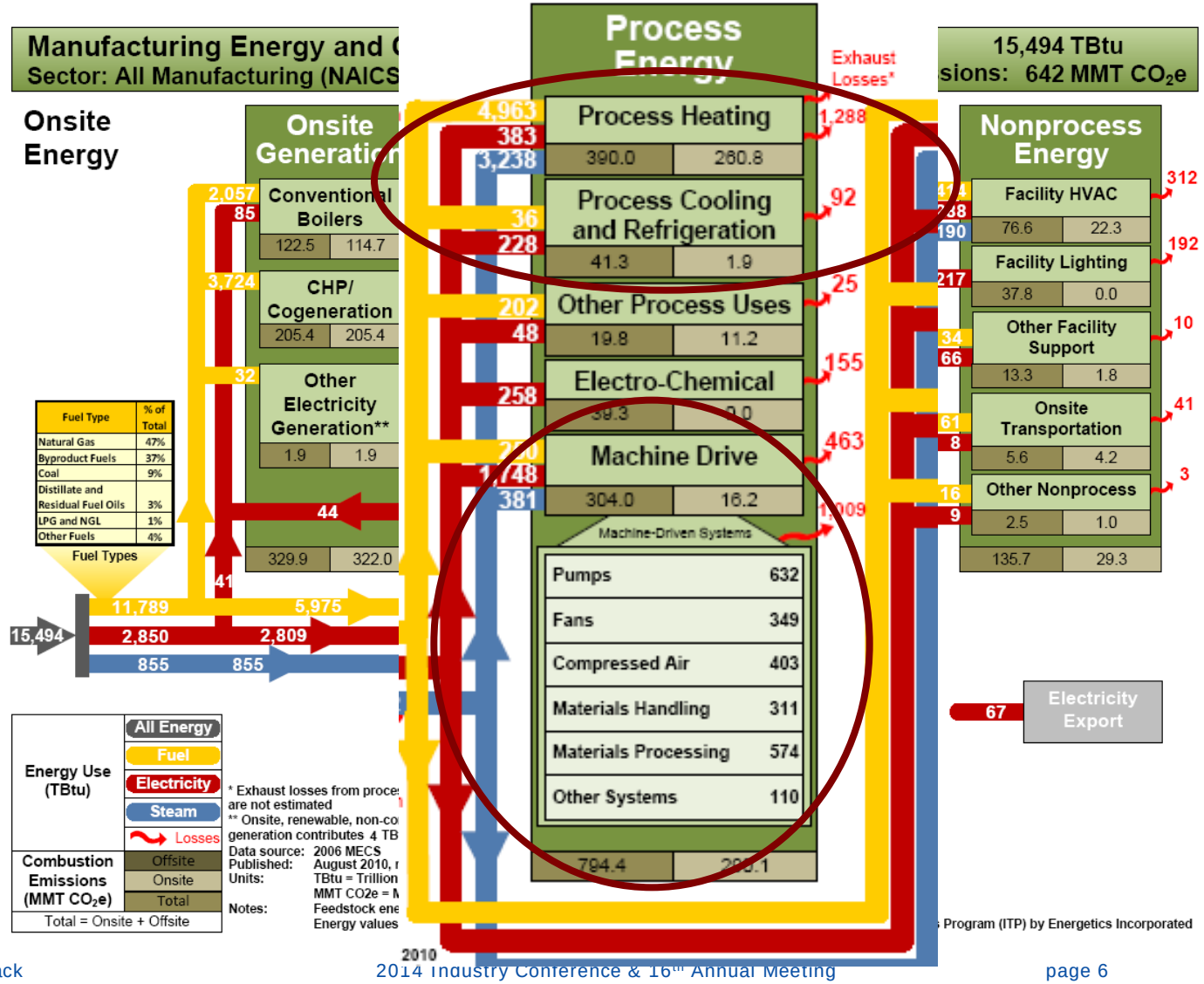
OPTIMIZATION OF ENERGY USAGE (OEU™)

Manufacturing Energy Usage



A little dated, but makes the point.

Energy Flows in Manufacturing



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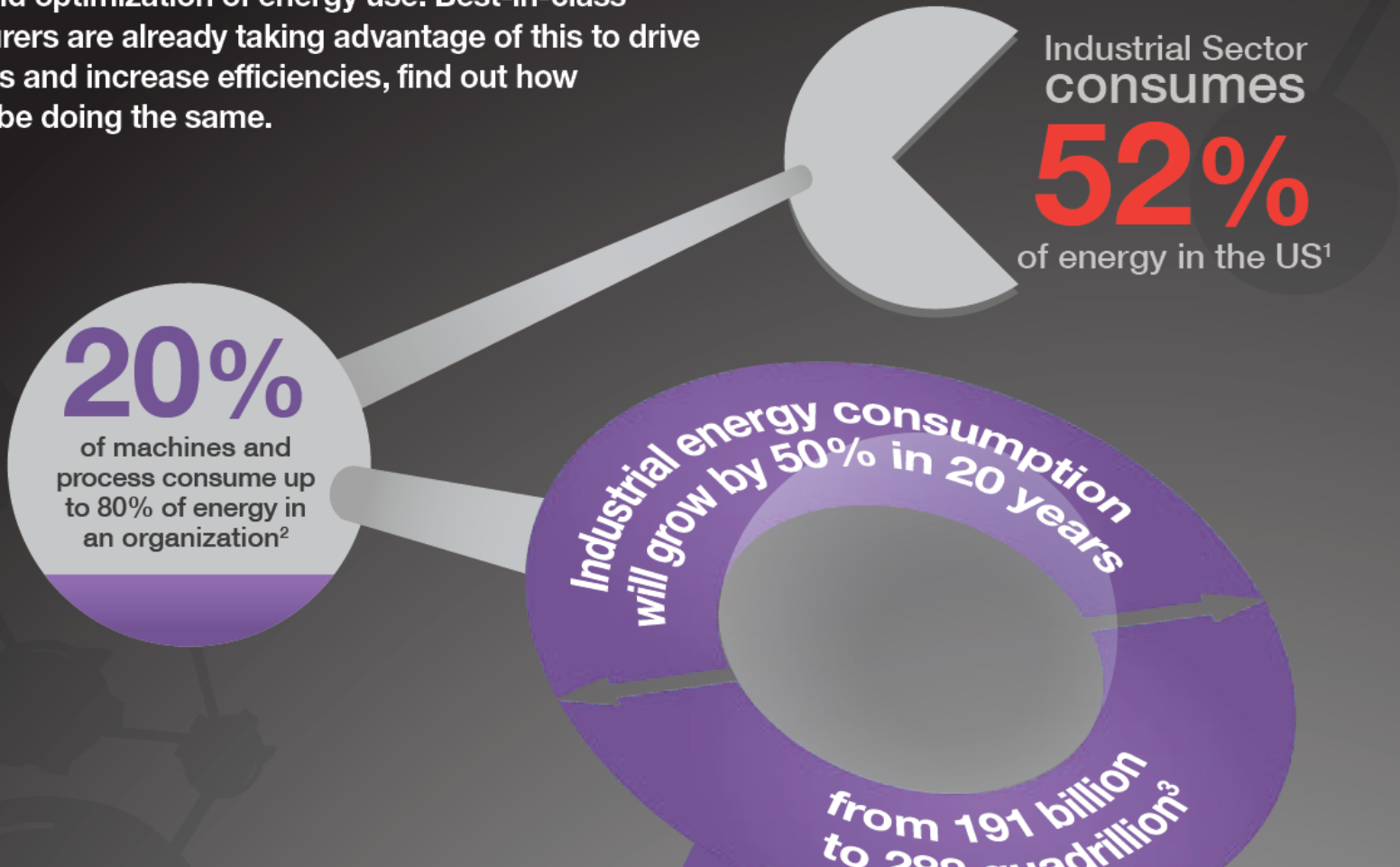
Some more statistics

Energy management is critical for the industrial sector, with energy consumption set to rise by 50% in 20 years. An IP-based industrial information infrastructure is necessary to access real-time energy consumption data, allowing quick analysis and optimization of energy use. Best-in-class manufacturers are already taking advantage of this to drive down costs and increase efficiencies, find out how you could be doing the same.



What ODVA is doing about it

ODVA Energy SIG Objectives

Develop CIP specification enhancements to integrate energy utilization and management technologies

Specification enhancement phases:

1. Standard energy reporting tools and methods
2. (a) Commanding equipment to conservation states
   (b) Controlling peak demand
3. Standardized interface to the Smart Grid

Phase 1 was published in November, 2011

- Included in CIP Networks Library, Volume 1, Edition 3.11

Phase 2a was published in November, 2012

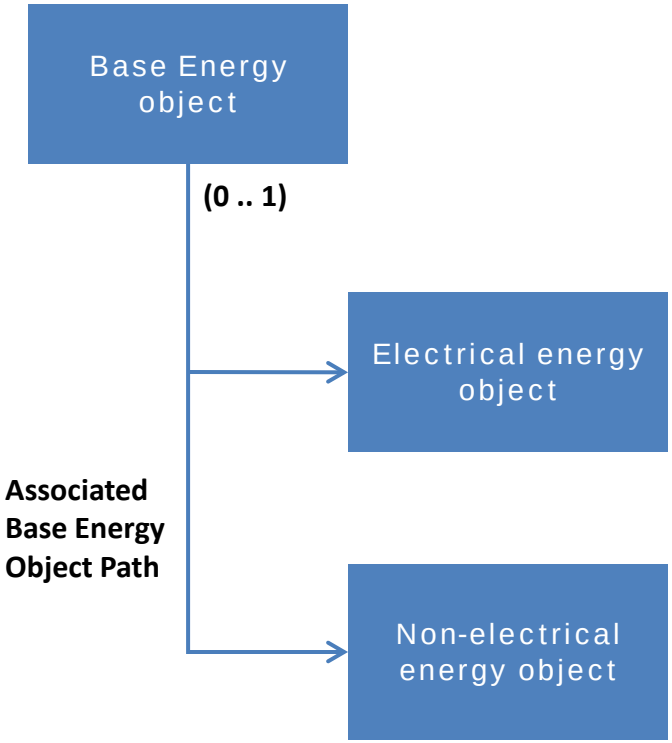
- Included in CIP Networks Library, Volume 1, Edition 3.13

Presently working on phase 2b, energy management

Base Energy Object

Energy Supervisor

- Reports energy and/or power
- Standardized reporting units (kWh/kW)
  - 1 kWh = 3600 Joules
- Capabilities
- Accuracy
- Paths
  - To Subordinate Object
  - To Aggregated Objects



Electrical Energy Object

Subordinate to Base Energy Object

- Associated Base Energy Object Path EPATH
- Standardized reporting of electrical attributes
  - Energy, Power, Voltage, Current, Power Factor, etc.

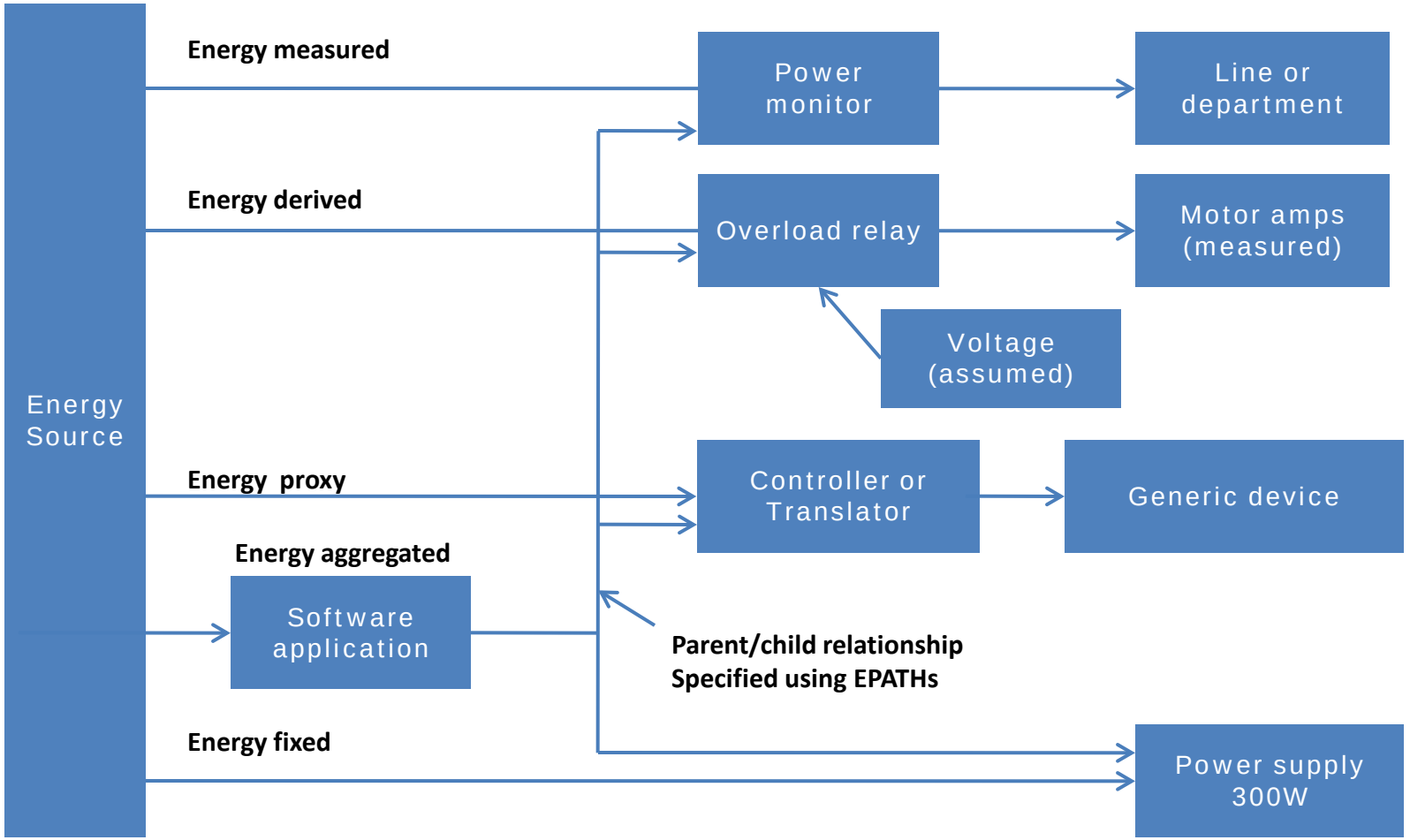
Attribute ID	Need in Implementation	Access Rule	Name	Description of Attribute
1	Optional	Get	Real Energy Consumed Odometer	The total real energy consumed.
2	Optional	Get	Real Energy Generated Odometer	The total real energy generated.
3	Conditional	Get	Real Energy Net Odometer	The running total of Real Energy Consumed minus Real Energy Generated
4	Optional	Get	Reactive Energy Consumed Odometer	The total reactive power consumed.
5	Optional	Get	Reactive Energy Generated Odometer	The total reactive power generated.
6	Optional	Get	Reactive Energy Net Odometer	The running total of Reactive Energy Consumed minus Reactive Energy Generated
7	Optional	Get	Apparent Energy Odometer	The total apparent energy consumed.
8	Optional	Get	Kiloampere-Hours Odometer	Accumulated current hours.
9	Optional	Get	Line Frequency	Hz 0.0…999.9x10^{21}
10	Optional	Get	L1 Current	Amps (A) 0.0...999.9x10^{21}

Non-Electrical Energy Object

Inclusive of all energy related resources

- Not only electricity!
- Native reporting units
  - Natural Gas in Therms, Chilled Water in Mbtu, etc.
  - Units from ENGUNIT data type (Appendix D)
  - Or text string
- Standardized reporting units
  - Conversion factor to kWh
  - Permits aggregation of diverse energy resources
  - Multiplier/divisor unit conversion factors

Energy Capabilities Examples



Show me!

Demo goals

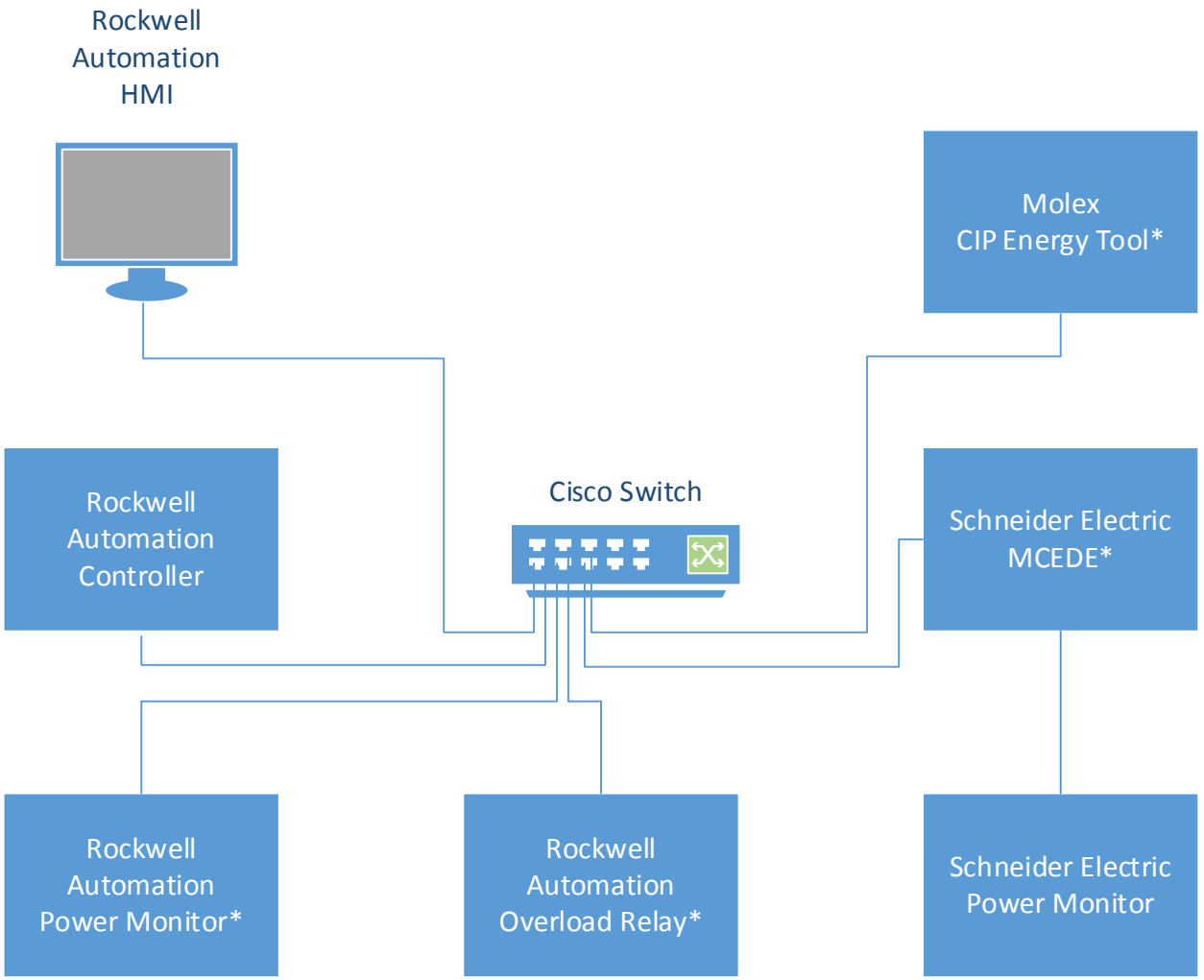
Simple demo

Combine products from different vendors

Display data read from their CIP energy objects:

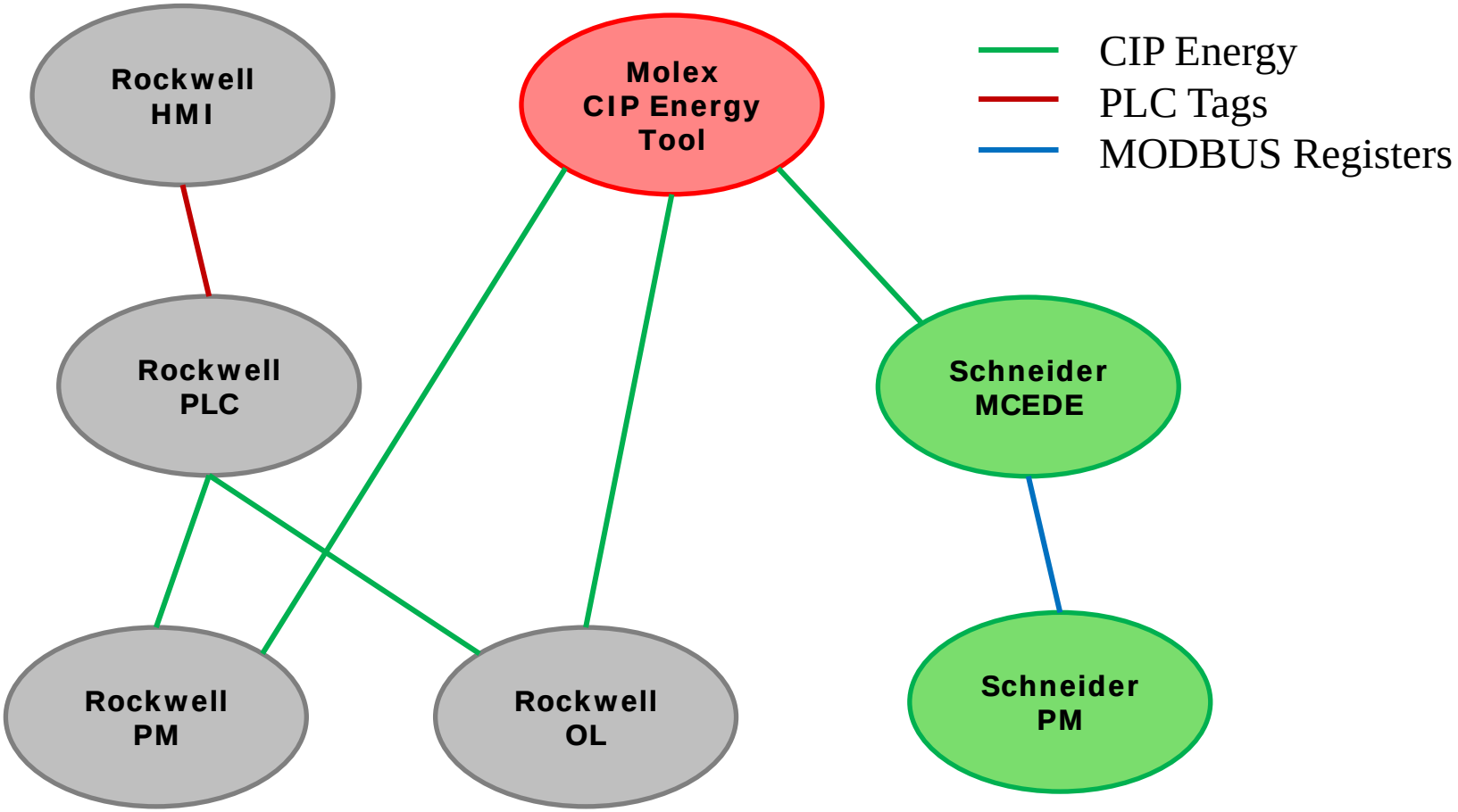
- Base Energy Object
- Electrical Energy Object

Demo Architecture



** Native CIP Energy Objects Implemented*

Demo Data Flow



Power Management

Power Management

Energy saving opportunities when equipment is idle

- Breaks
- Lunch
- Shift change
- Setup change

Management activities to save energy include:

- **Pause** (low power consumption) **state**
- **Sleep state**

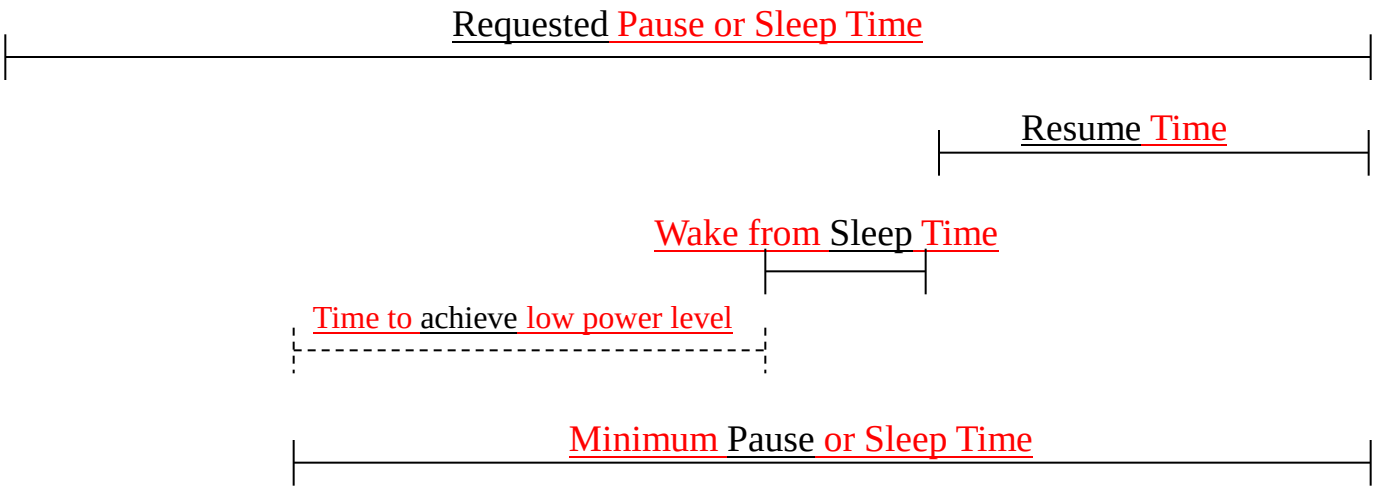
The specification defines:

- Power Management Object
- Ethernet specific sleep mechanism

Timing Relationships

Power Management object includes several time elements

- Requested Pause or Sleep
- Resume
- Wake from Sleep
- Minimum Pause or Sleep Time



Energy Management

Energy Management

Energy saving opportunities when equipment is running

Device can contain one or more Energy Management Object instances

Uses curtailment levels to manage energy usage

- Estimated savings (% of normal load)
- Capabilities and status
- Description
- Associated vendor-specific data for transition

Reduced production

What you can do

Vendor engagement

- Assess how your products can participate in the energy dialog
  - Does your product consume energy and talk CIP? DUH!
  - Does your product control an energy load?
  - Can your product measure, derive, or know its energy load?
  - Can your product display, report, or otherwise visualize energy data?
  - What DOES your product know about energy in a system?

Plan to add CIP Energy™ to your products!

User engagement

- Is your organization ready to optimize its energy usage?
  - Do you have an energy management plan?
- Are your systems capable of:
  - Collecting energy data?
  - Making sense of energy's impact on products and vice versa?
  - Making decisions that automatically reduce energy when it's not needed?
- Are your suppliers energy-enabling their devices?

Help us build out the CIP Energy ecosystem!

Where do we go from here?

Principal Member Update

Schneider Electric – Martyn Jones

Cisco Systems – Dave Cronberger

Rockwell Automation

Optimization of Energy Usage in Schneider Electric's PlantStruxure & MachineStruxure architectures

Peter Hogg & Martyn Jones

ODVA Annual Meeting & Technical Conference
Phoenix, AZ 12 March 2014

Schneider Electric

The Market

- Standard Interfaces
  - We know exactly what data is available from each of the devices and in what form

- Market Drivers
  - Dec 2015 (EU Deadline: installed EnMS or system audits)
    The obligation for large enterprises to carry out an energy audit at least every four years, with a first energy audit at the latest by 5 December 2015. Incentives for SMEs to undergo energy audits to help them identify the potential for reduced energy consumption.
  - Customers need to be delivering energy data for analysis now to be linked to these EM projects

Our Response

1. Bring ODVA data compliance to existing data

- Bring ODVA data compliance means we can start to work with customers now and have them ready for a more standard future

- Making customers value ODVA compliance will add it to standards and drive prescription

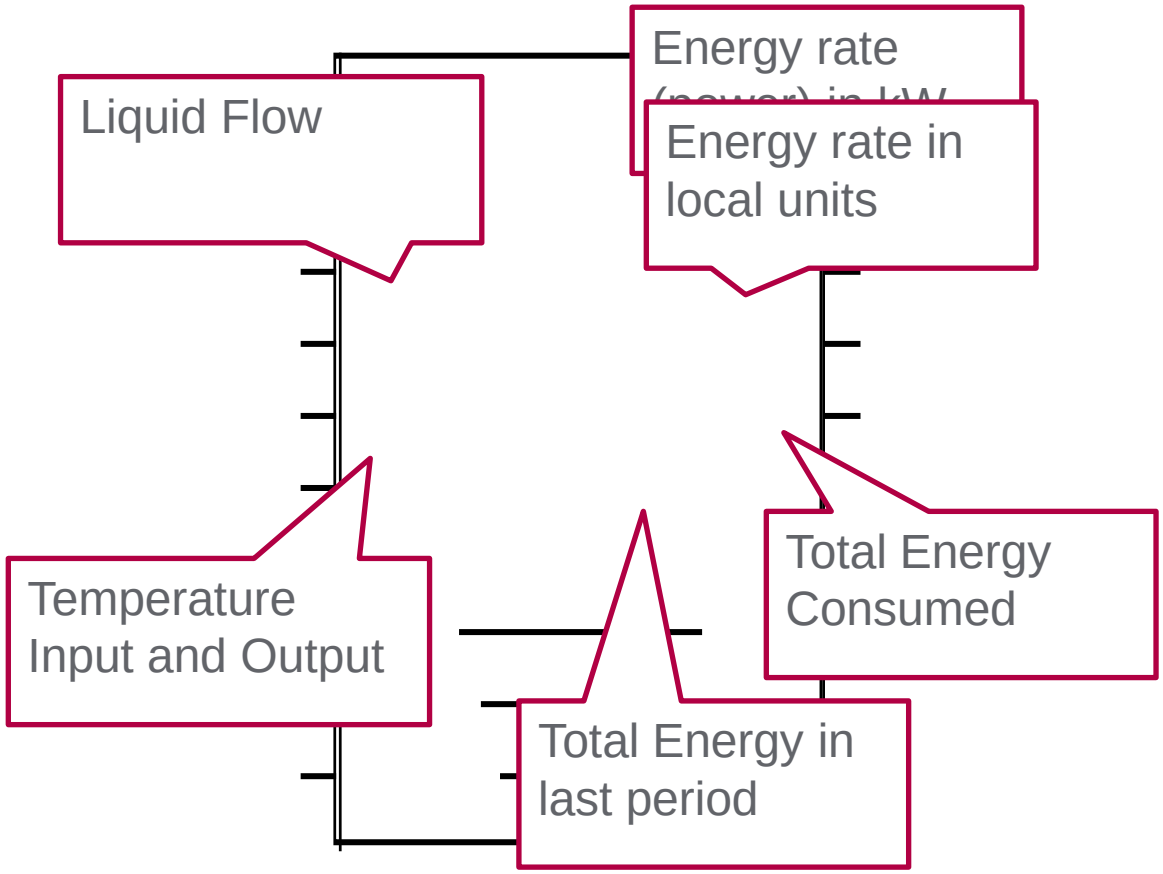
2. Embed ODVA energy compliance in new equipment

- New Equipment has ODVA Energy embedded retaining the advantages on migration but simplifying the solution.

- New and Old work seamlessly together so all customers gain benefit

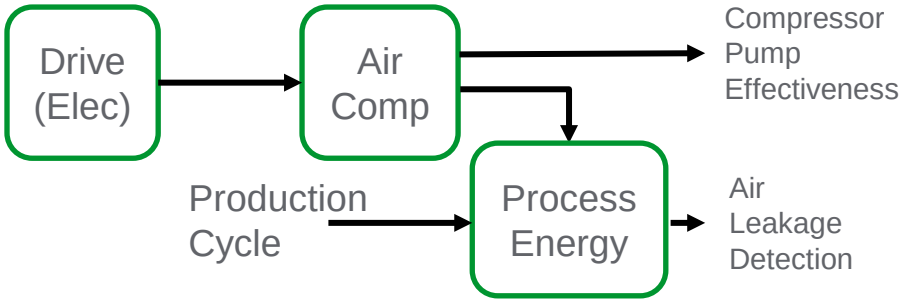
ODVA Data Compliance

- Energy Management
- Library
  - Electrical Objects
    - Meters
    - Voltage/Current
    - Virtual Devices
  - Non-Electrical
    - Thermal (Liquid)
    - Pressure (Air)
    - Fuel (Gas)
    - Boiler (Steam)
  - Process Levels
    - Aggregation



ODVA Energy For Action

- Energy Alarms
- Process Energy Block
  - Normalises energy collection and within the context of production.
  - Allows you to see issues with processes consuming too much energy (even during idle time)
  - Makes your energy measurement valuable for process action

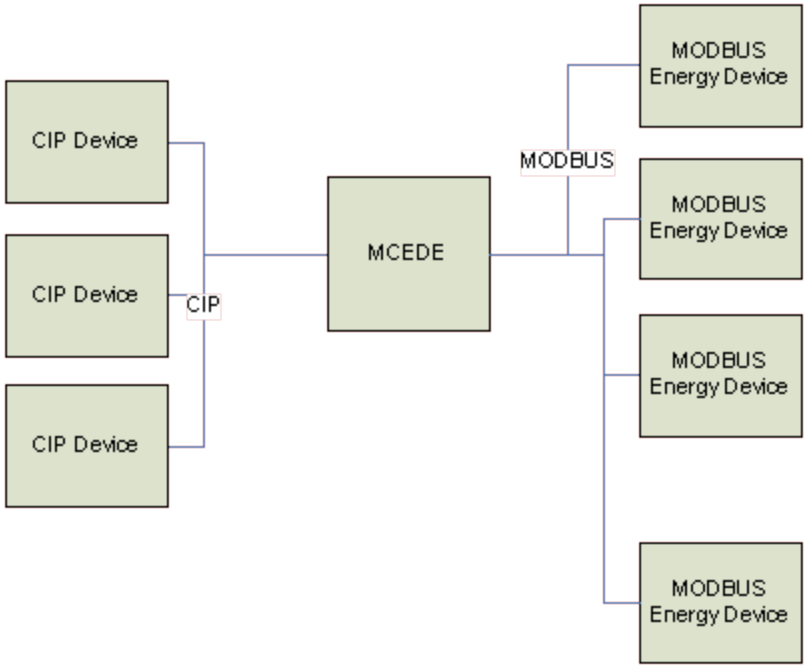


Acquiring energy data from legacy systems

- Many MODBUS devices exist that measure power and energy
- No consistent data representation
  - Across manufacturers
  - Within manufacturers
- Need custom software interfaces
- Popularity of MODBUS will result in continued similar product offers

MODBUS to CIP Energy Data Extractor (MCEDE)

- Collects energy data from MODBUS devices and puts it into CIP Energy objects
- MODBUS port(s)
  - Serial
  - Ethernet
- CIP port(s)
  - EtherNet/IP
  - DeviceNet
  - Etc.
- Implementation Platform(s)
  - PC
  - Dedicated

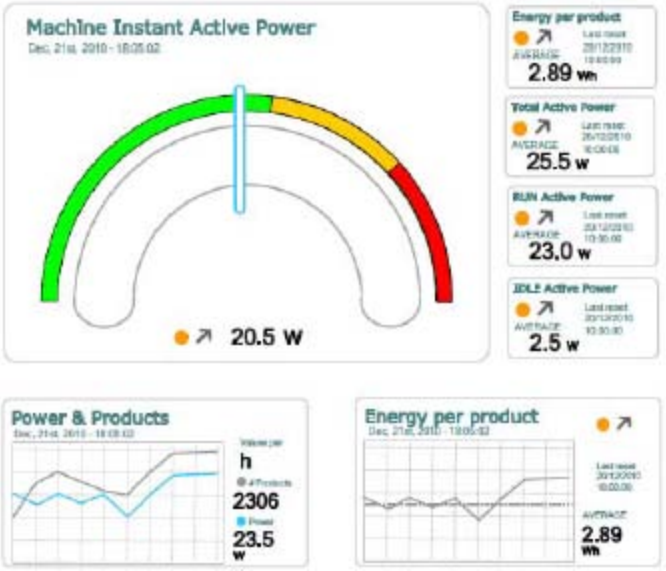


Basic MCEDE Functions

- A set of MODBUS energy device descriptions
- A set of data type conversion functions
- A configuration function
- A method to add/delete MODBUS energy device descriptions
- A scan function to periodically read MODBUS data
- A discovery function to search for MODBUS devices (optional)
- A MODBUS driver
- A CIP driver
- An energy object service handler

New Offers with CIP Energy Objects built in

- Altivar Process
- Energy Objects
  - Managed by our Ethernet/IP interface
    - All Mandatory interfaces
    - Partial Optional interfaces
  - CIP Base Energy Object
    - Class Code 4Eh
  - CIP Electrical Energy Object
    - Class Code 4Fh



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Schneider Electric

LISTEN. THINK. SOLVE.®

Optimization of Energy Usage:

Energy-Aware Devices

Clifford J. Whitehead

PUBLIC INFORMATION

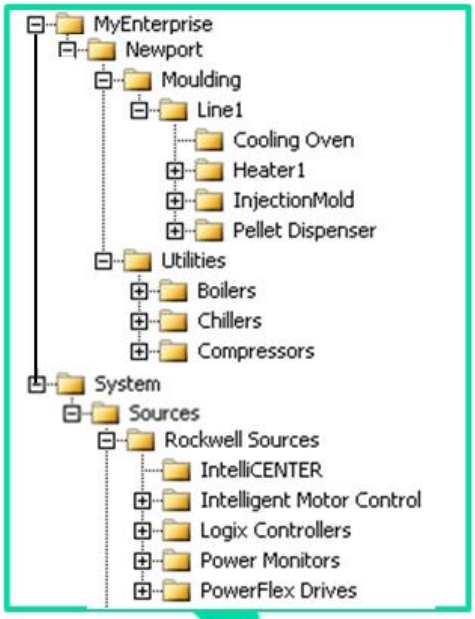
Allen-Bradley • Rockwell Software

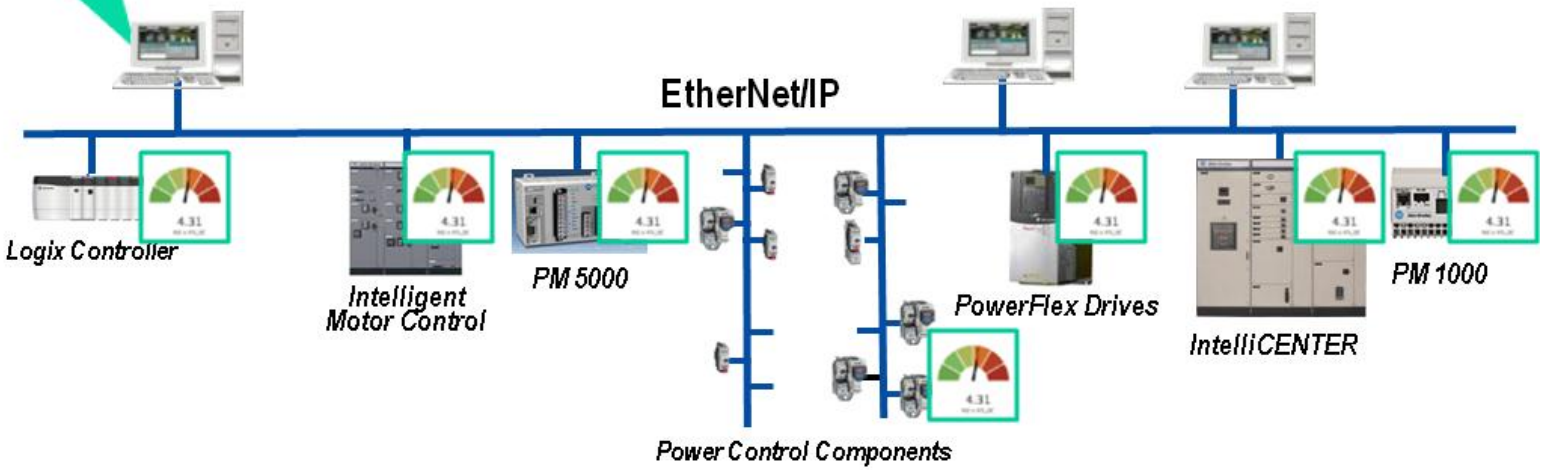
Rockwell Automation

Energy-Aware Devices

Leveraging Investment

Rockwell Automation






THE GRID!

Phase 3 – Transacting Energy

Development of a standardized interface

- ODVA does not anticipate direct connection of devices to the Smart Grid
- Collaborating with other SDOs
  - ASHRAE/NEMA Facility Smart Grid Information Model

For more information

To learn more about ODVA's energy initiative, visit *www.odva.org* and click on *Optimization of Energy Usage*

To get involved in the ODVA Energy activities, contact ODVA at:

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