Ohio Energy

19th ANNUAL Ohio Energy Management Conference

Workshop Q

Advanced Supply & Energy Management … New Tools & Technology to Manage & Reduce Energy Use

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Wednesday, February 25, 2015
3:15 p.m. to 4:30 p.m.

Biographical Information

Paul Super, Sales Manager, Key Accounts East, Direct Energy Business
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Direct: 412-667-6138 Mobile: 412-432-8908
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Paul Super leads the East Key National Accounts sales team for Direct Energy Business, located in Pittsburgh PA. The team helps make National and Key Customer businesses better through industry leading natural gas and power offerings as well as assisting them with energy management Solutions. Prior to joining Direct Energy in 2013, Paul held several leadership positions at FirstEnergy Solutions. Paul holds a B.S. in Chemical Engineering from The Ohio State University, an MBA from Cleveland State University and is a lifetime member of AEE, with both CEM and IGC certifications.

Art Ruiz, Jr., Regional Sales Manager
Panoramic Power, 44 W. 28th Street 8th Floor New York, NY 10001
Direct: (719) 290-6043 Art.Ruiz@PanPwr.com

Art manages the Western Region for Panoramic Power and is the strategic account lead for Direct Energy in North America. Art has spent most of his career within the enterprise software solutions space working with Fortune 500 companies. Art joined Panoramic Power in early 2014 and quarterbacks an integrated solutions team that includes systems engineers, deployment team members & energy analysts to provide a turn-key energy management and intelligence solution to our clients.

Michael A. Krygowski, Advisory Services Origination, Direct Energy Business
1001 Liberty Ave Pittsburgh, PA 15222
412-667-5695 Fax: 412-667-6110 Mike.Krygowski@directenergy.com

Mike began his career in the energy industry right of out college. In 2004 Mike joined Strategic Energy on the 24 hour desk scheduling and trading power to meet the demand of the retail book across PJM, MISO, NYISO and NEPOOL. Mike continued his path on the wholesale side of the business as he was promoted to the short term trader for ERCOT in 2007. After a period of almost 2 years the role evolved into a Sr. Market Intelligence Analyst covering all regions. Mike was responsible for hedging for all large customers specifically on the PowerPortfolio product. This role also provided customer support with market updates, analysis and technical sales support. In early 2014 Mike joined the Advisory Services team and provides support to all of sales and customers across Direct Energy. He is focusing on managed supply and creative demand management solutions. There are a number of solutions offered by the Advisory Services team including a consultative approach to total energy management. Mike is Project Manager within Direct Energy for the Panoramic Power partnership and solution.

Mike is a graduate of Penn State University with a B.S. in Business Management

Workshop Q

Advanced Energy Management: New Technology to Manage & Reduce Energy Use

February 25, 2015

Direct Energy™ Business

Advanced Energy Management

February 2015

Direct Energy™ Business

Agenda

- Introductions
- Who is Direct Energy Business
- Managed Supply

New Technologies

- Demand Response
- Energy Efficiency
- Solar
- Panoramic

Direct Energy Business

Presenters

- Paul Super

  Direct Energy Business; National Key Account Sales Team

- Mike Krygowsky

  Direct Energy Business; Advisory Services Originator

- Art Ruiz

  Account Executive, Panoramic Power

Financial Strength and Stability

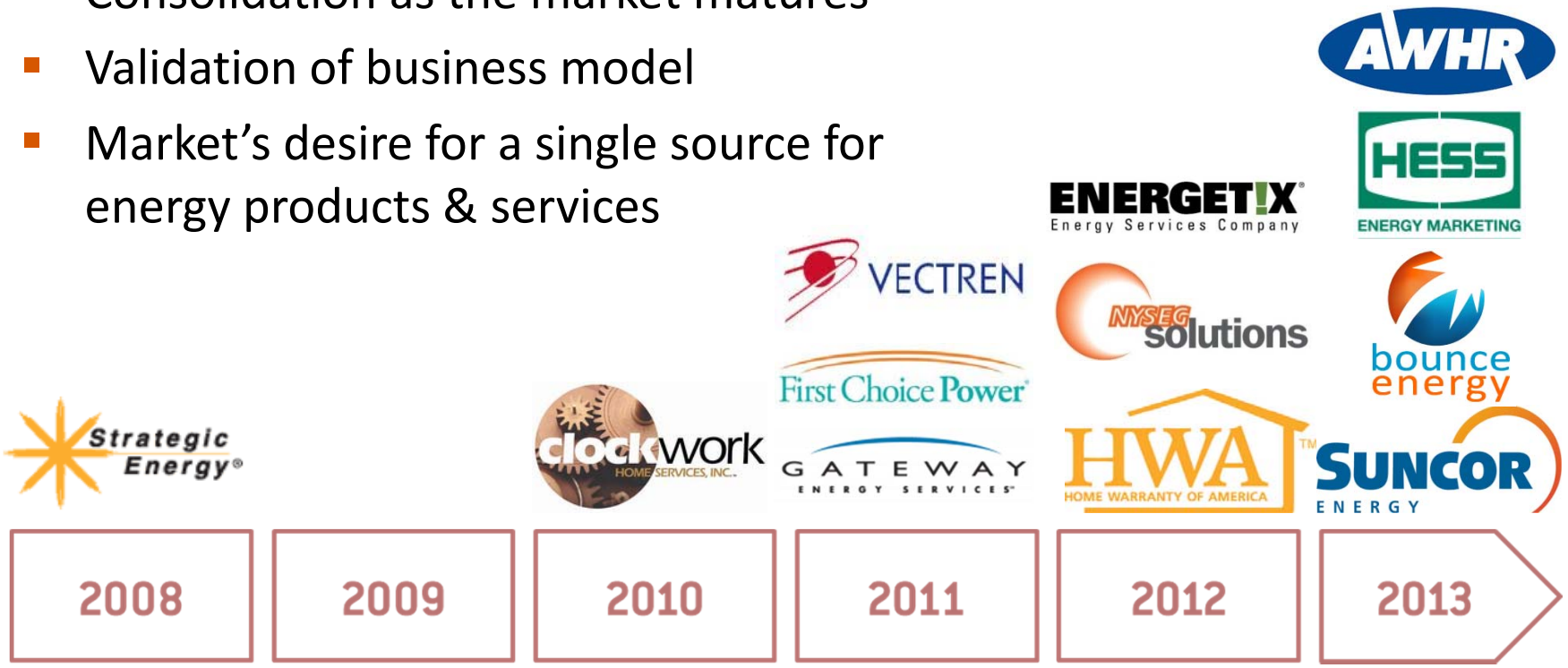
Direct Energy is wholly-owned by Centrica plc, one of the world's leading integrated energy companies

- Operates in seven countries
- Over 34,000 employees worldwide
- 2013 revenues of £26.5 billion
  - $43.96 Billion US
- **A- credit rating (S&P) and trades on the London Stock Exchange (CNA)**
- Centrica is a Top 30 FTSE 100 company
- Centrica is listed in the Top 25 companies in the world for carbon emissions disclosure by the Carbon Disclosure Project

Commitment to the Business

Direct Energy has invested more than **$3 billion** over the last several years in strategic acquisitions

- Consolidation as the market matures
- Validation of business model
- Market's desire for a single source for energy products & services



Direct Energy's Lines of Business

Direct Energy Business

- Electricity and Natural Gas Supply
- Renewables, including funding for solar PPA, cash and grid connected projects
- Energy Management Solutions

Direct Energy Residential

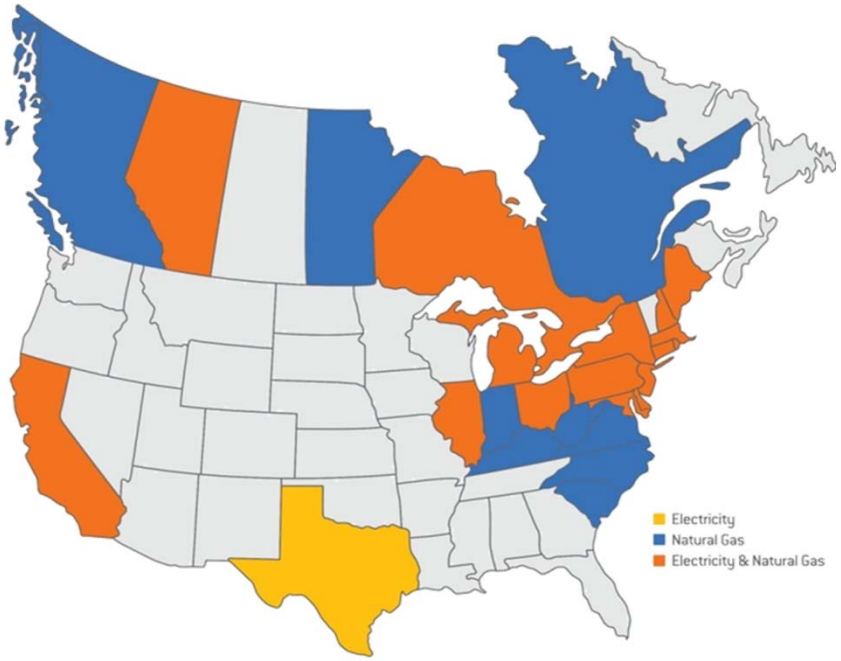
- Largest residential electricity and natural gas supplier in North America with more than 5.8 million customers.
- Solar and energy management programs

Direct Energy Services

- HVAC Installation,
- Protection plans & repair services
- Plumbing, water heaters & facility maintenance
- Energy Management & efficiency services

Direct Energy routinely offers entity-specific residential supply and services programs for the employees of its Key Account, Education and other business customers

Direct Energy Business



QUICK FACTS

- More than **$10b company**
- More than **250,000 customers** across North America
- **22 U.S. states** and five Canadian provinces
- More than **85 TWh** and more than **500 Bcf** supplied
- More than **350 MW of DR** load
- Integrated upstream and trading capabilities
- Wholly-owned by Centrica plc with an **A- credit rating** (S&P)

#1 Natural Gas Supplier in Eastern US

#2 Power Supplier in the US

Now #1!

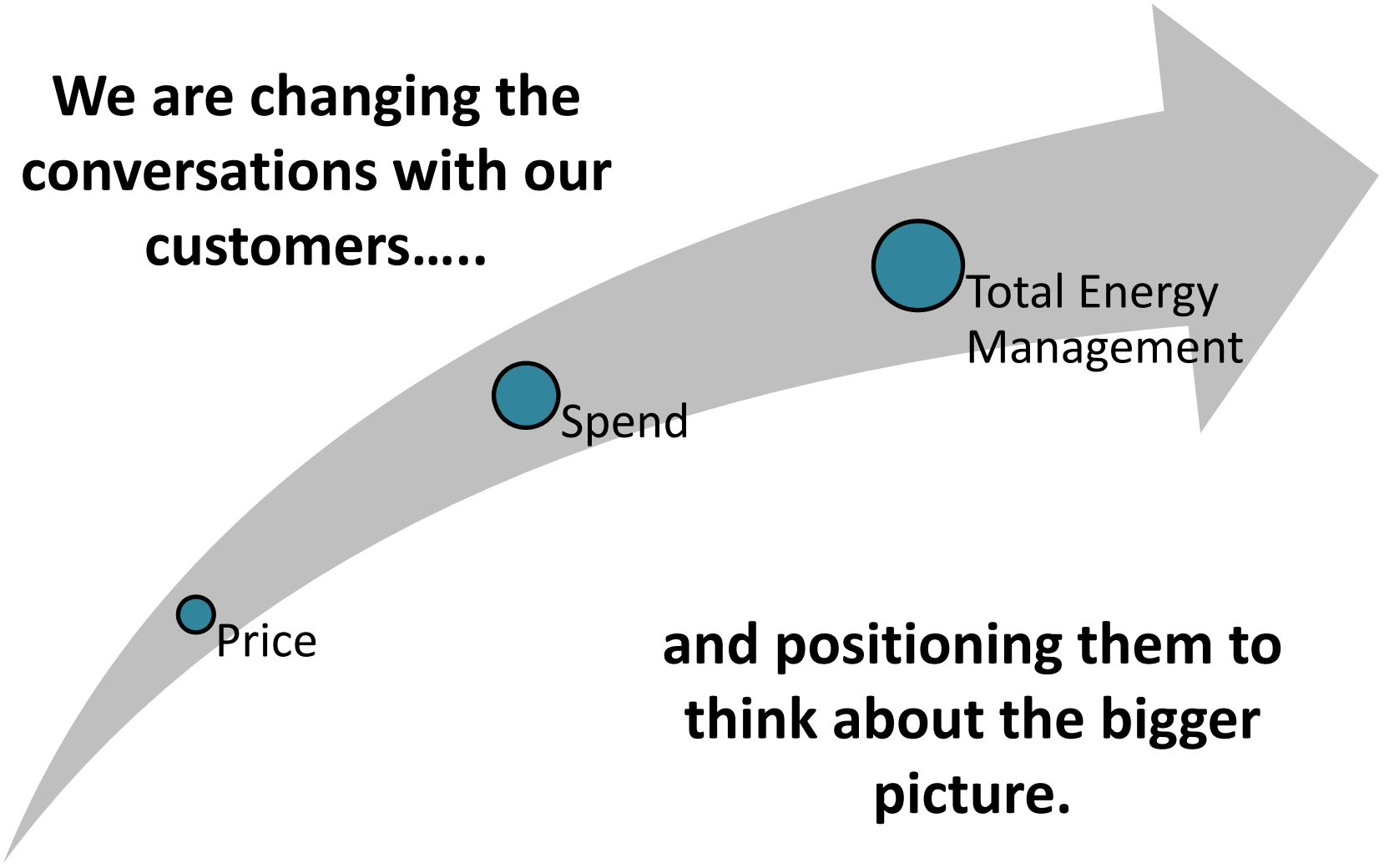
Total Energy Management

Michael Krygowski
Advisory Services Origination

Direct Energy Business

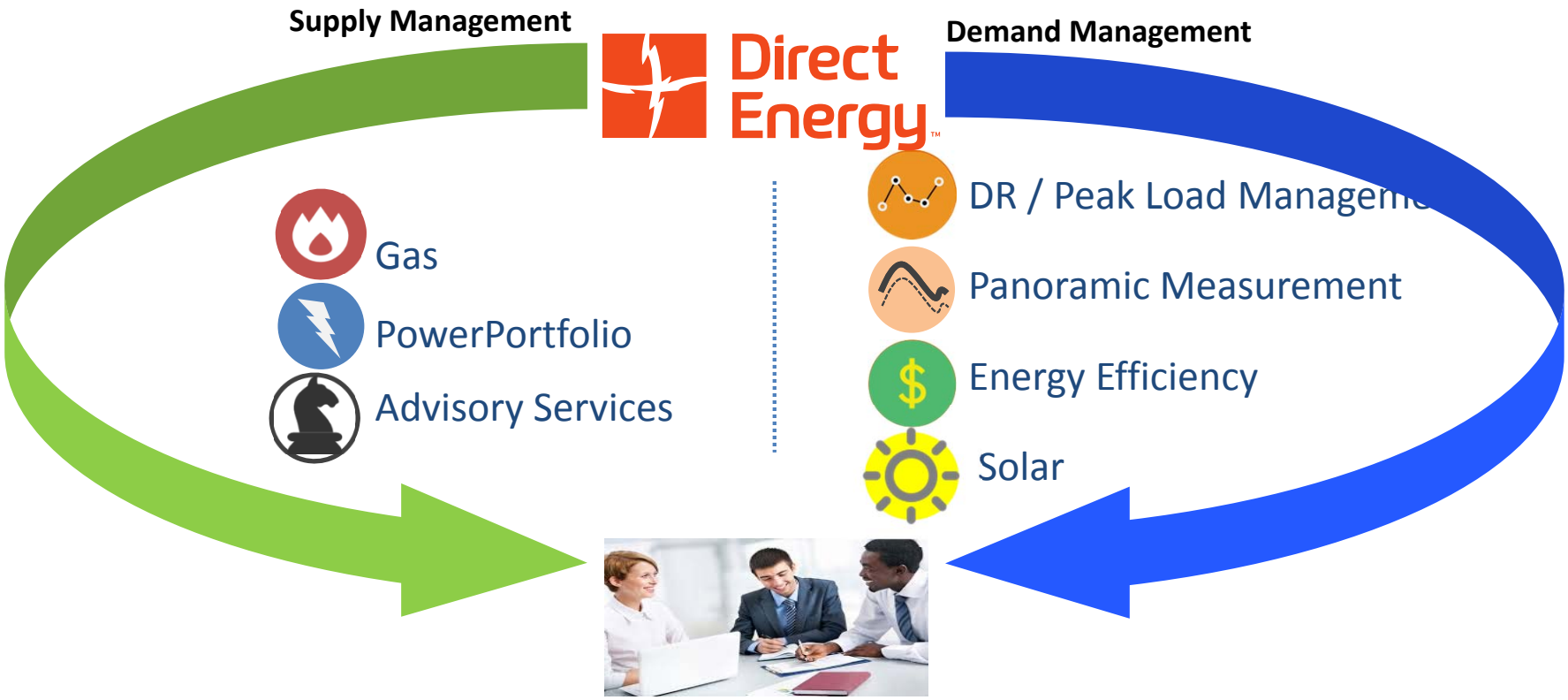
The Importance of Spend vs. Price

We are changing the conversations with our customers…..



and positioning them to think about the bigger picture.

Managing Both Sides of the Equation

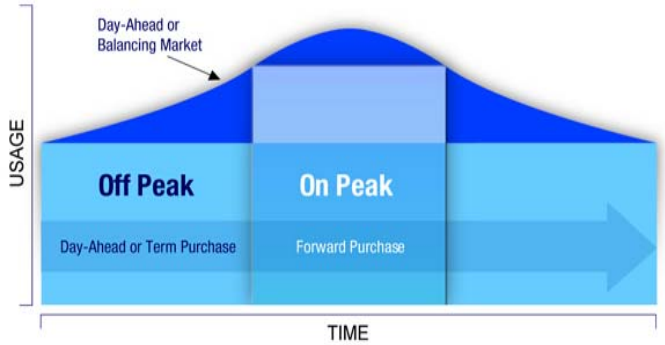


Product offerings and market expertise to meet your business needs

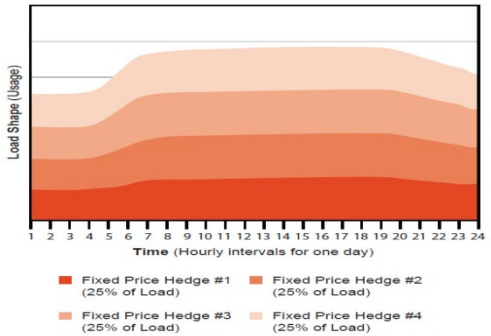
Why Take a Managed Approach?

Product	Advantages	Disadvantages
Fixed	• Price Certainty	• Only one chance to "time" the market • Risk and shaping premiums • No access to index market
Index	• Ability to participate in the Index market • Transparency	• Risk and exposure to market volatility • Inability to predict/manage costs
Managed	• Layering capabilities to mitigate risk and lock in value when market dips • Access to wholesale market and index markets • Maximize benefit from Total Energy Management Solutions	• Potential for risk depending on strategy and product structure • Hedging flexibility depending on size

PowerPortfolio Product Structure



Load Following Block & Index



Efficiency Project Solutions

EfficiencyEdge is an on-bill financing program, supported between Direct Energy Business and The Efficiency Network, that offers you a fast and easy way to reduce energy consumption and costs with no need for up-front capital investment

1. **Quickly identify opportunities** to reduce energy consumption and maintenance costs
2. **Prioritize projects** with the greatest opportunity to reduce usage
3. **Identify and secure all available incentives and rebates on your behalf** with the greatest opportunity to reduce usage
4. **Execute efficiency upgrades** in a timely, high-quality, cost effective manner
5. **Integrate project costs into an energy supply agreement** so you can benefit from on-bill financing, rather than incurring up front funding costs

TEN THE EFFICIENCY NETWORK

Direct Energy Business

Demand Response in OH

Customer Impact	Payment	Benefits
	• Customer gets a % share of program revenue. Negotiated for each customer • Split could range from 60-90% of the program revenue depending on customer size and competitiveness of the market • More load available; greater the revenue %	• Creates a revenue stream by the customer being willing and/or able to curtail energy usage • Removes high priced generation from the grid • Better insight into real time energy usage via Power Port • Tax benefit if demand response is bundled with commodity

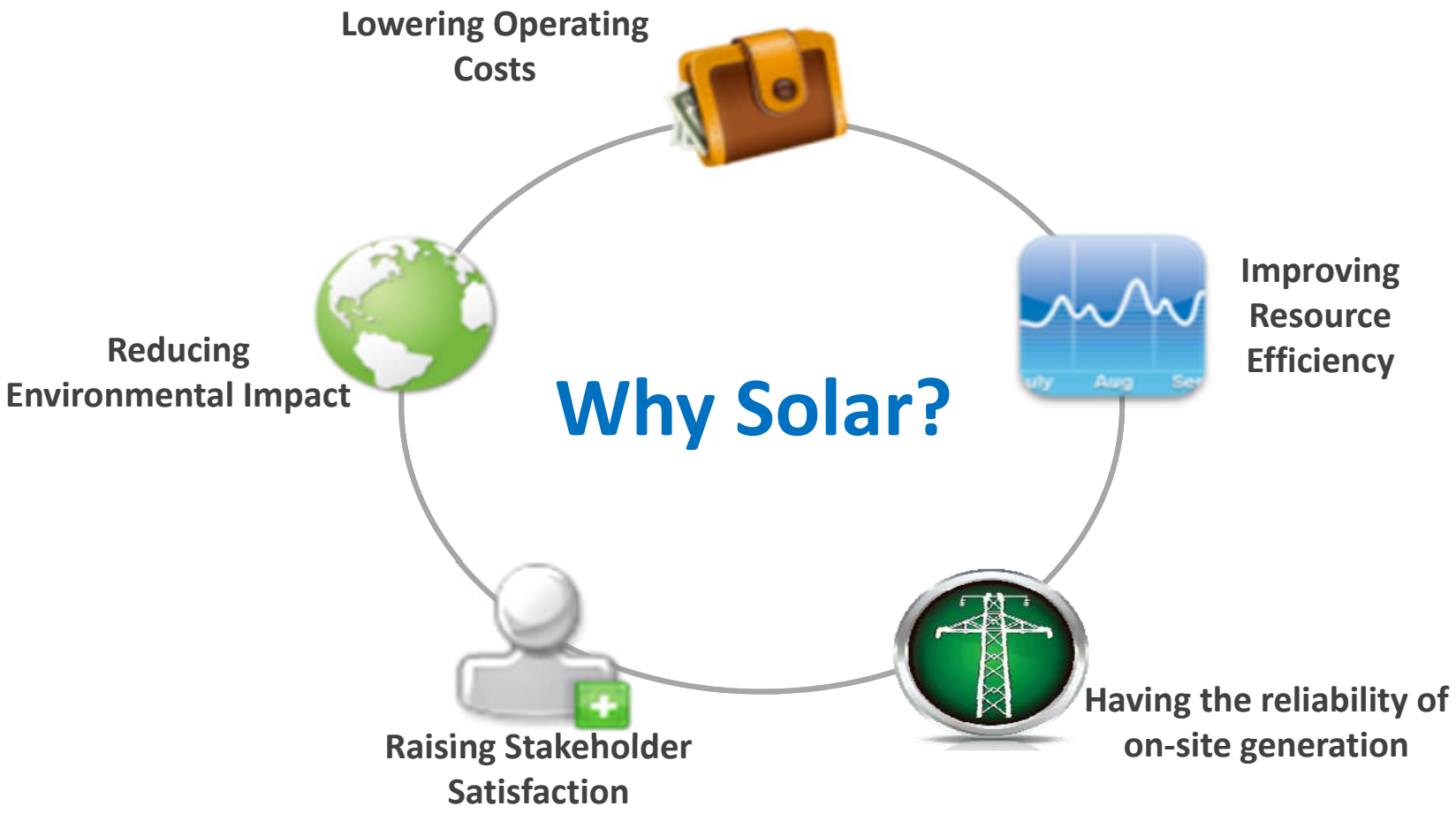
PJM Zones	2015-16	2016-17	2017-18	3 yr Est. Payout
	Customer Rev.	Customer Rev.	Customer Rev.	
AEP, DAY, DEOK	$34,614	$17,336	$30,958	**$82,907**
ATSI	$88,949	$27,579	$30,958	**$147,486**

Direct Energy

Assumptions

- Customer revenue is assuming curtailment of 1 MW and 80/20 split between the CSP
- Estimated revenue values do not account for energy payment

Is now the right time for Solar?



- ***No upfront costs via long-term PPA or cash option***
- ***Onsite and remote alternatives***

Panoramic Power Device Monitoring

The solution detects energy usage via non-invasive, self-powered, wireless sensors that are attached at the individual circuit level. The bridge delivers energy information from the sensors every 10 seconds and routes it the solution's cloud–based, asset-level EMS.

1 Snap

- Easy install
- Wireless
- No disruption
- No maintenance
- Unlimited scale

2 Connect

- Plug & Play
- Cellular or WiFi

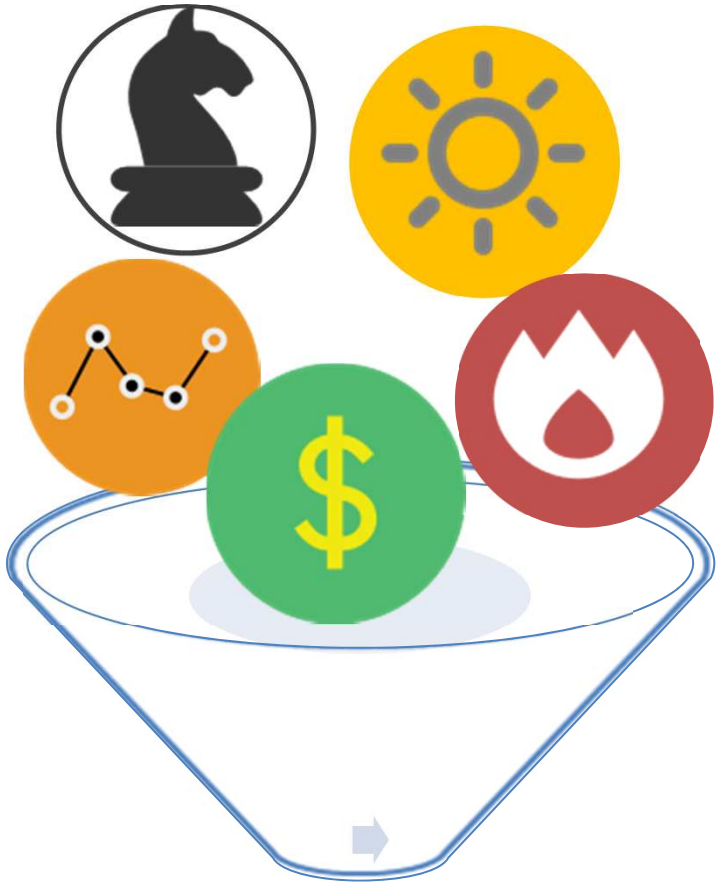
3 Set Up

- Role definition
- Executive reports and alerts
- Set goals
- Measure benchmarks

4 Start Saving

- Scheduled reports
- Real time alerts
- Online analytics
- Manage chain-wide

Bringing it All Together



ADVISORY SERVICES

Panoramic POWER™

Smart Energy. Smart Business.

Energy Management & Intelligence

Data › Insight › Actionable Results

Art Ruiz, Jr.
Panoramic
Regio nager

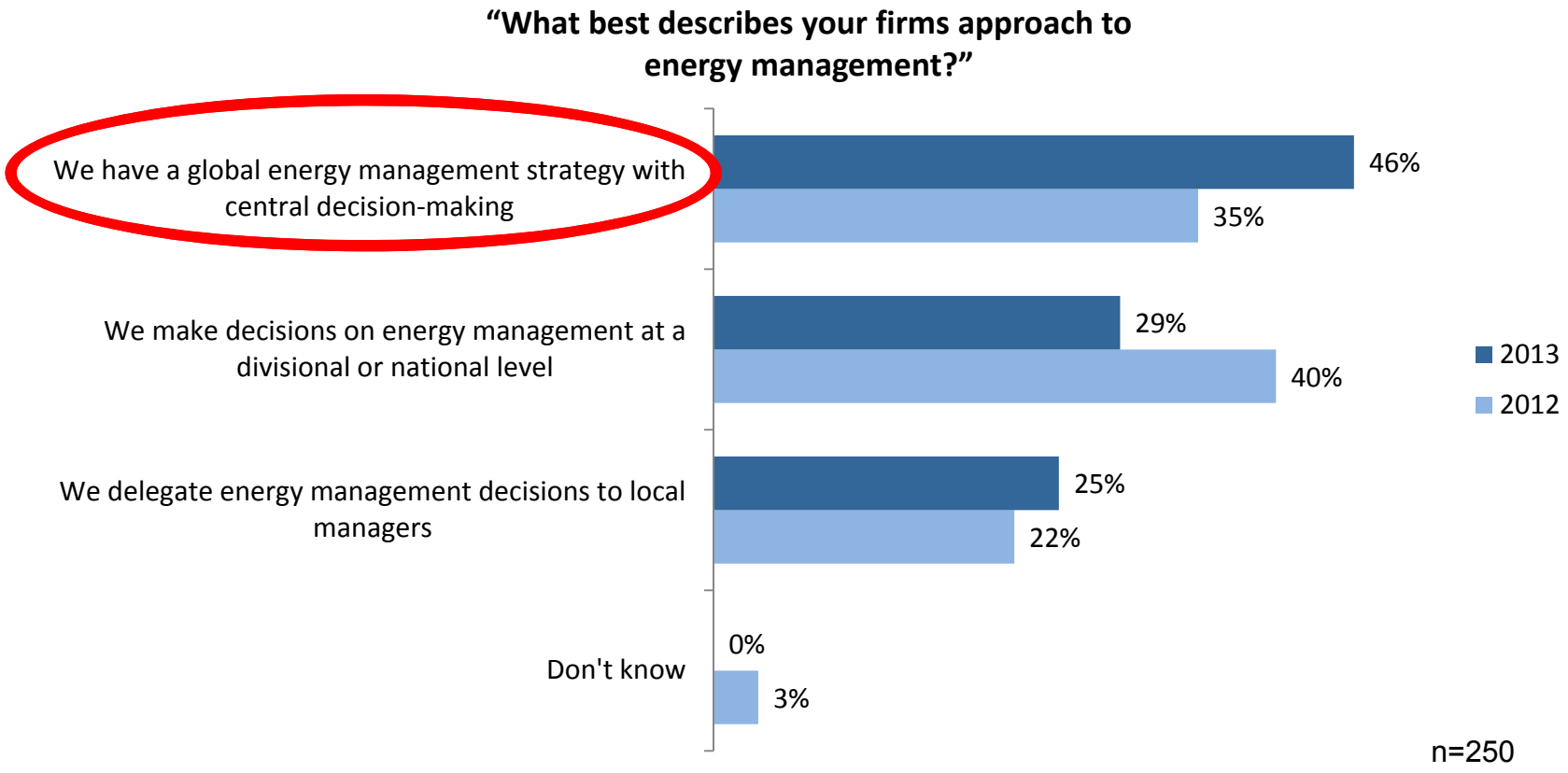
r Agenda -

Trends

Challenges

Industry Trends

An increasing number of firms are shifting to centralized global energy management strategies



Cost savings and compliance are the two most significant drivers for firms investing in energy management

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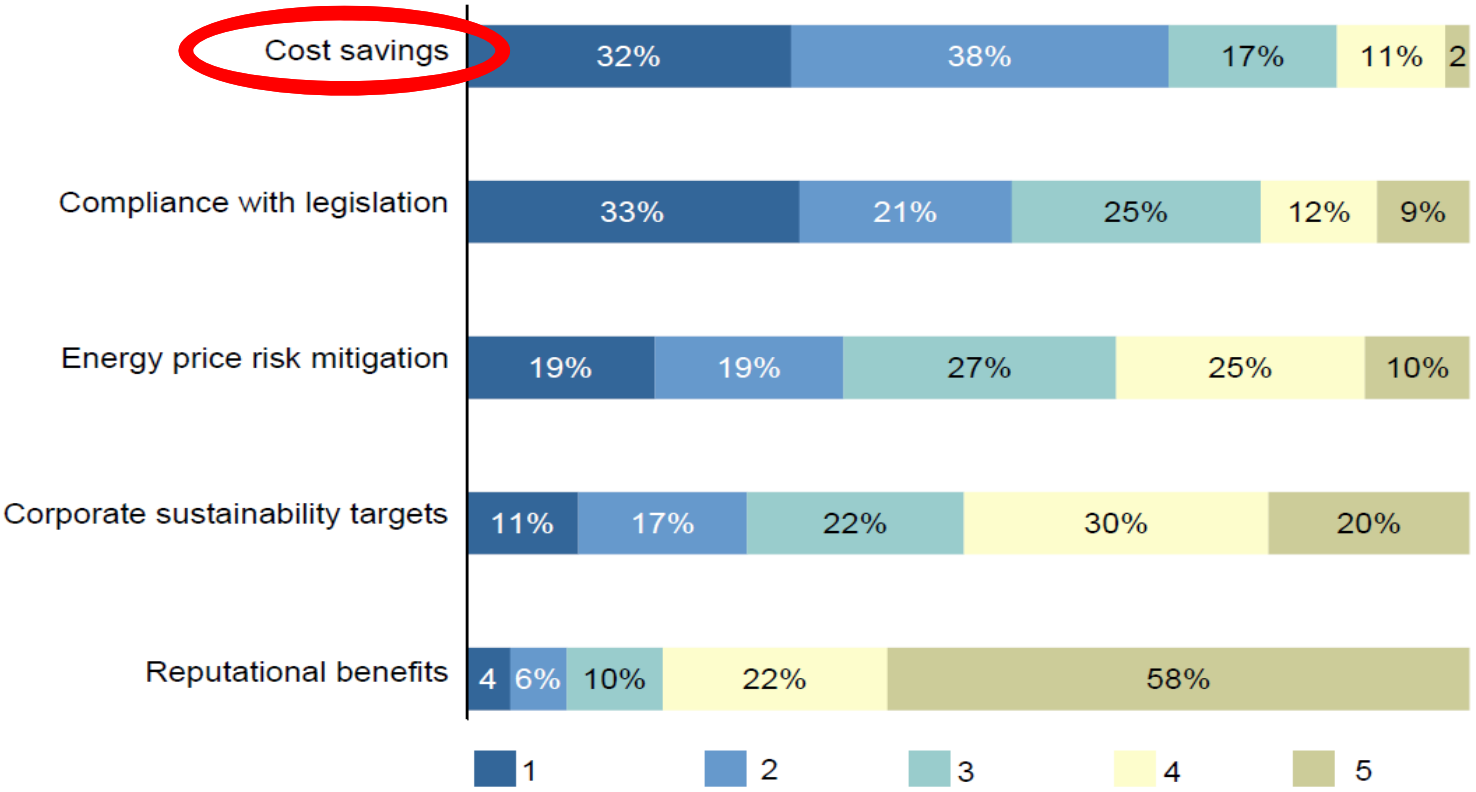
VERDANTIX

"Please rank the importance of the following factors for your organization when looking to invest in energy management" (1 is the most important, 5 the least important)?



Firms are placing energy data management at the top of their improvement lists

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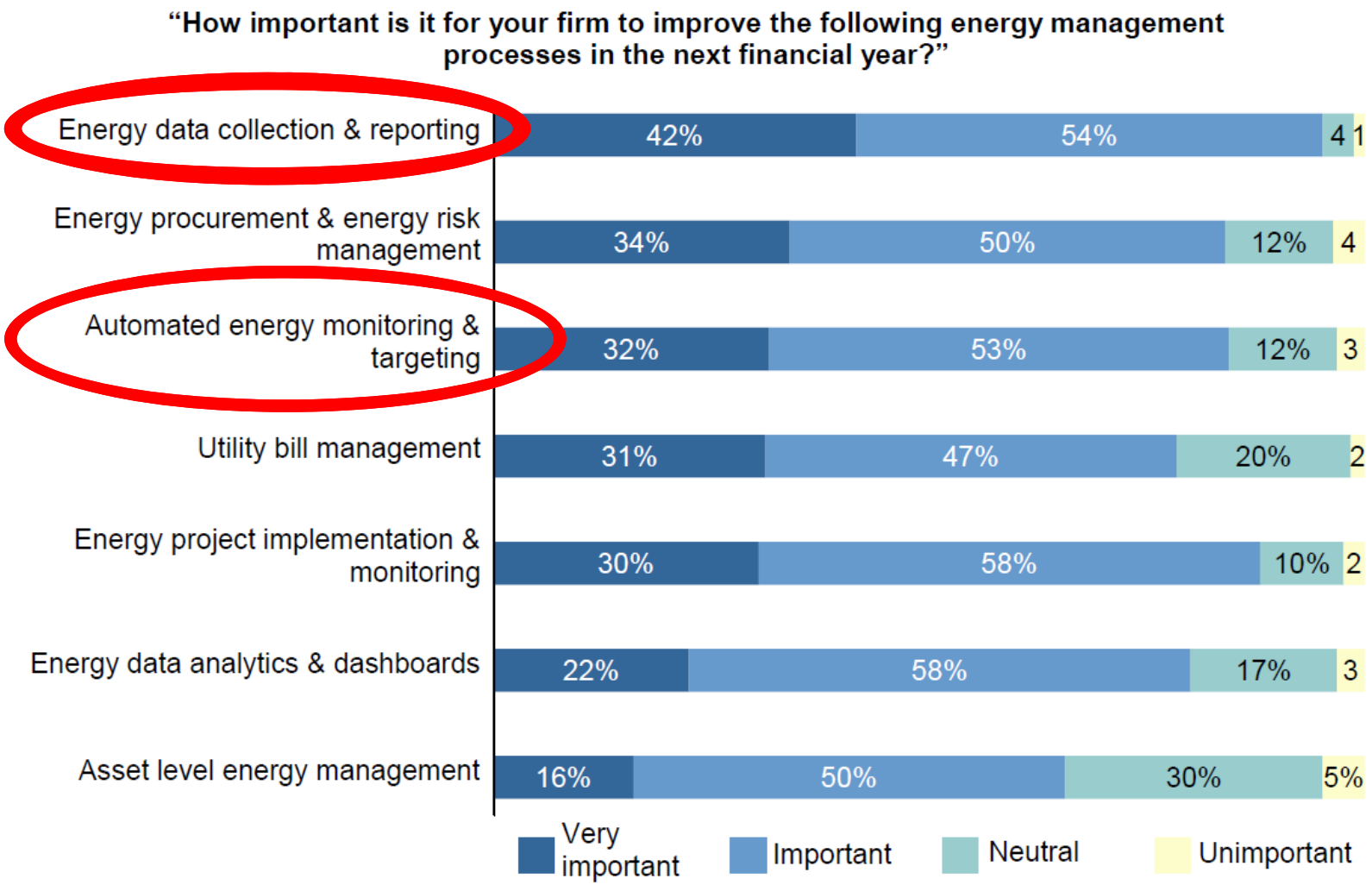
VERDANTIX



A data management system facilitates the sharing of information throughout a firm

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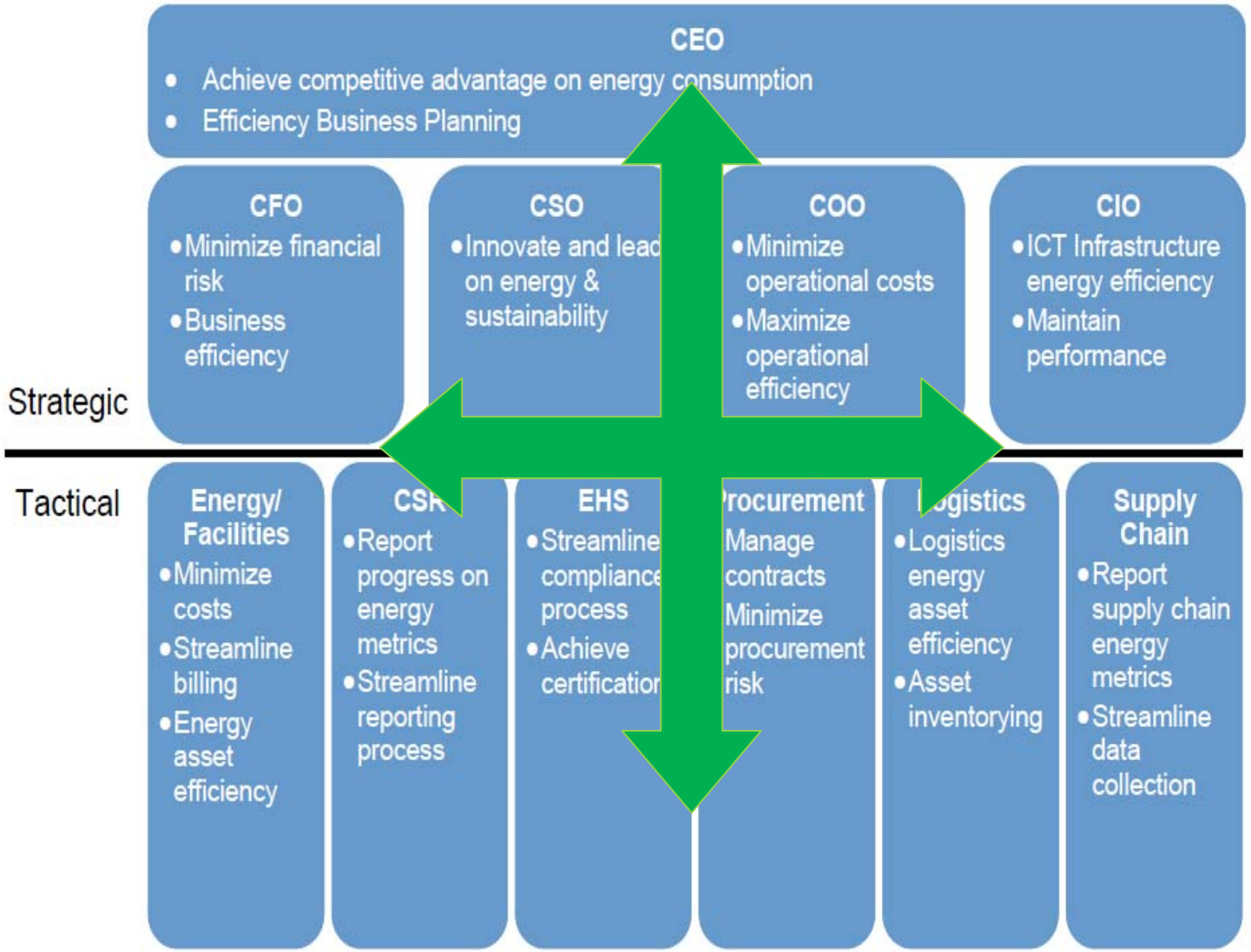
VERDANTIX



Key Industry Challenges

Key Industry Challenges

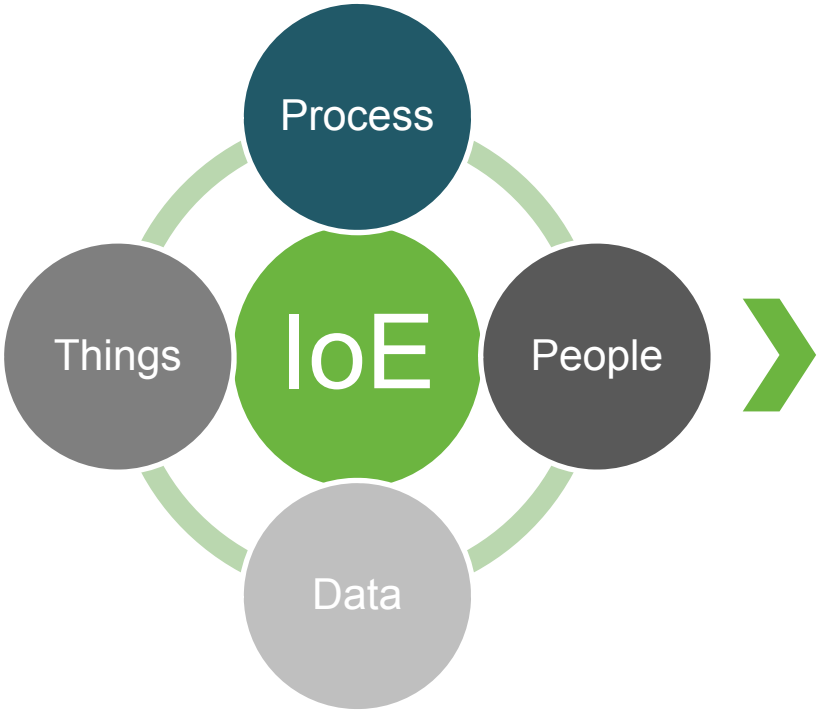
- Lack of Visibility Into Existing Energy Management Initiatives
- Lack of Key Performance Indicators (KPIs) for Equipment & Facilities
- Inconsistent & Unusable Energy Data
- More Reactive Than Proactive Approach
- Limited Internal Expertise To Interpret & Apply Energy Insight
- Current Energy Solutions Are Cost Prohibitive & Not Scalable
- **No Predictable or Quantifiable (ROI) Return On Investment!**

You Can't Manage What You Don't Measure

How can you generate an actionable and quantifiable ROI with facility level monitoring?

Moving from metering buildings to real-time device level monitoring

IoE + Energy Intelligence = Cost Savings



- Operational Efficiency
- Energy Efficiency
- Interrelated Systems Performance
- Advanced Failure Detection
- Peak Load Reduction Strategies
- Rapid Energy Modeling
- Efficiency Benchmarking & Comparisons
- Behavioral Recommendations

Cutting Edge Technology + Powerful Analytics Engine

- Wireless
- Self-Powered
- Miniature
- Non-Invasive
- Maintenance Free
- Cost Effective

Wireless, Self-Powered & Non-Invasive.

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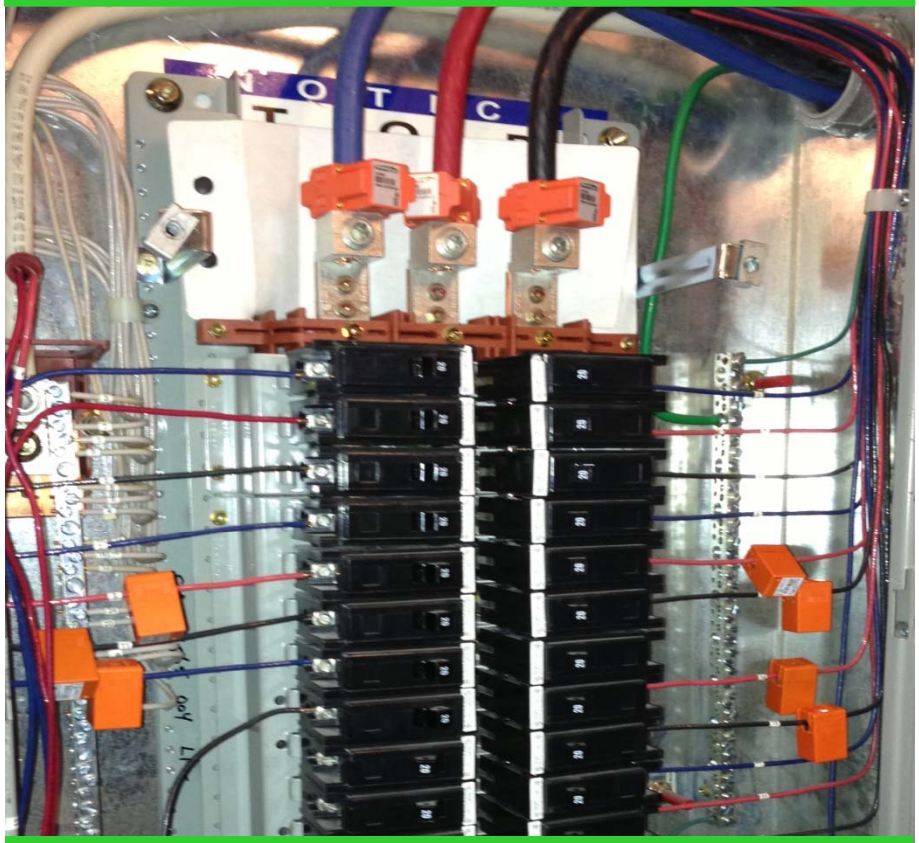


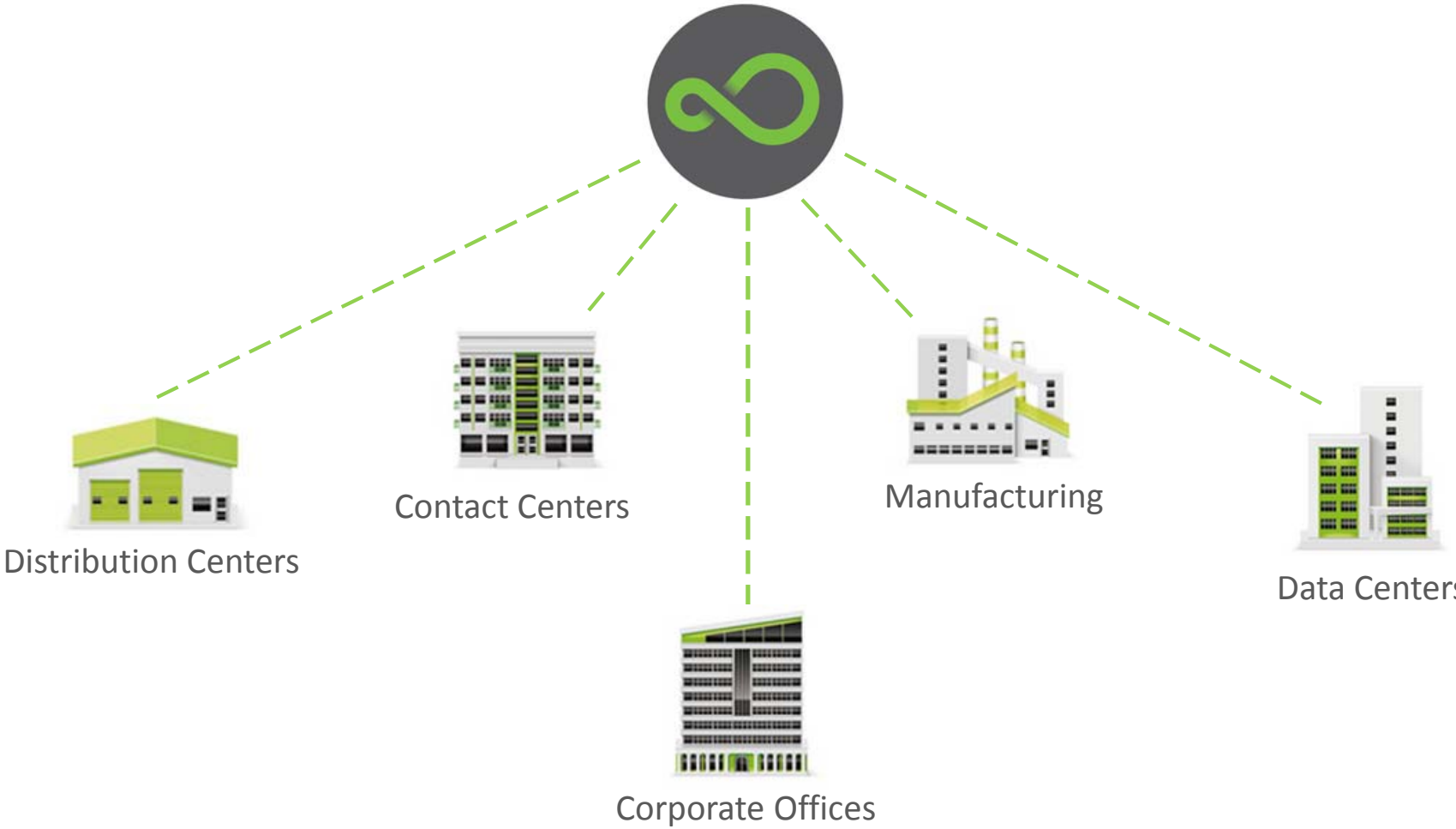
Non-Invasive, Wireless, Self-Powered

Current Methods

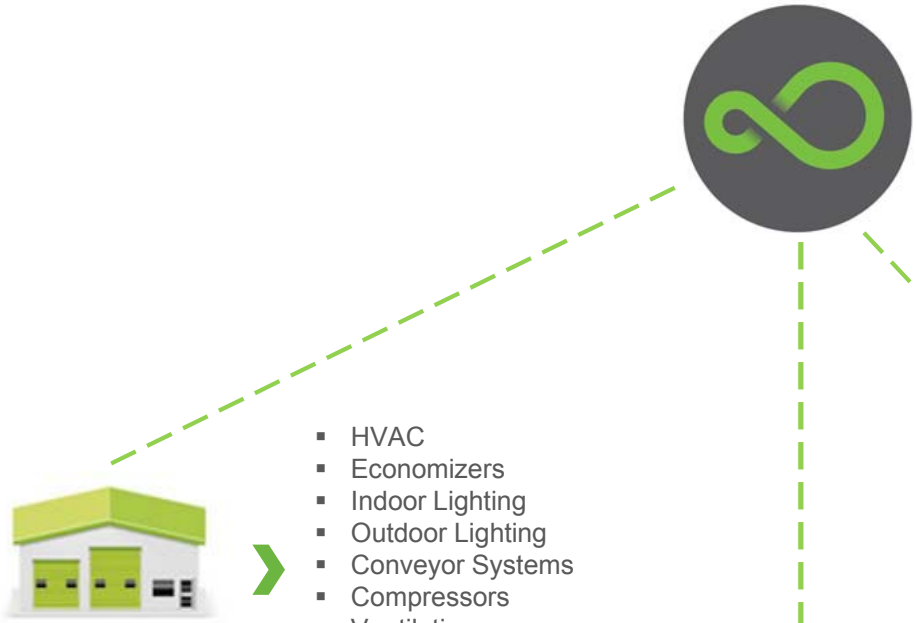
Intrusive, Labor Intensive, Wired


Perspective Shift

Your Energy Ecosystem



Derive An ROI From A Systems / Equipment Level



Distribution Centers

- HVAC
- Economizers
- Indoor Lighting
- Outdoor Lighting
- Conveyor Systems
- Compressors
- Ventilation
- Fork Lifts
- Charging Stations
- Machinery
- Lift Bay Doors
- Hydraulic Baler
- Packaging Machinery
- Batch Scales

Manufacturing

- Exhaust Systems
- Bag Houses
- HVAC
- Chillers
- Oxide Mixers
- Economizers
- Circulation Pumps
- Lathes
- Mills
- Presses
- Extruders
- Grinders
- Painting Equipment
- Turning Centers
- Air Compressors
- Stamping Presses
- Support Equipment
- Punching Machines
- Plasma Cutters
- Folding Machines
- Metal Cutters
- Metal Forming Machines
- Plastics Molding Machines
- Material Handling Equipment
- Pallet Machinery

Corporate Offices

- HVAC
- Elevators
- Air Handlers
- Indoor Lighting
- Outdoor Lighting
- Servers / Data Center
- Security Systems
- Signage

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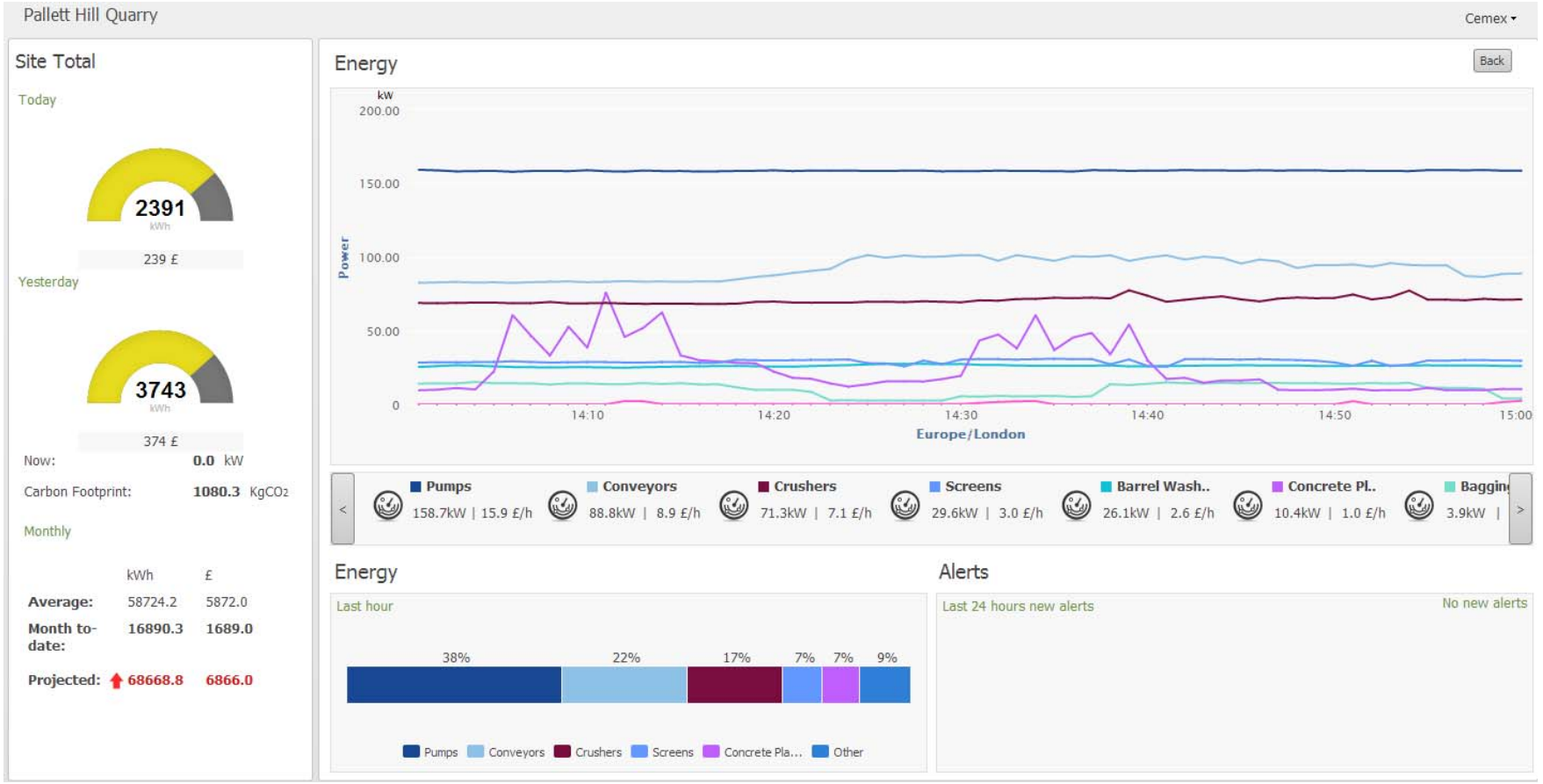
✓ Operational Efficiency

Operational Efficiency – Equipment Level

- Live Monitoring at equipment level.
- Tracking Pumps, Conveyors, Crushers, Screens, Barrel Washers, Bagging, Etc.
- Displays current load and hourly cost for each equipment category



Operational Efficiency – Conveyor System Insight

Operational Efficiency - Opportunity

- Grey line indicates time when conveyors were running empty (idling)
- The ‘Idle’ criteria is set by conveyor ie. Running between X and Y amps indicates conveyor is empty, yielding lower productivity.

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✓ Energy Efficiency

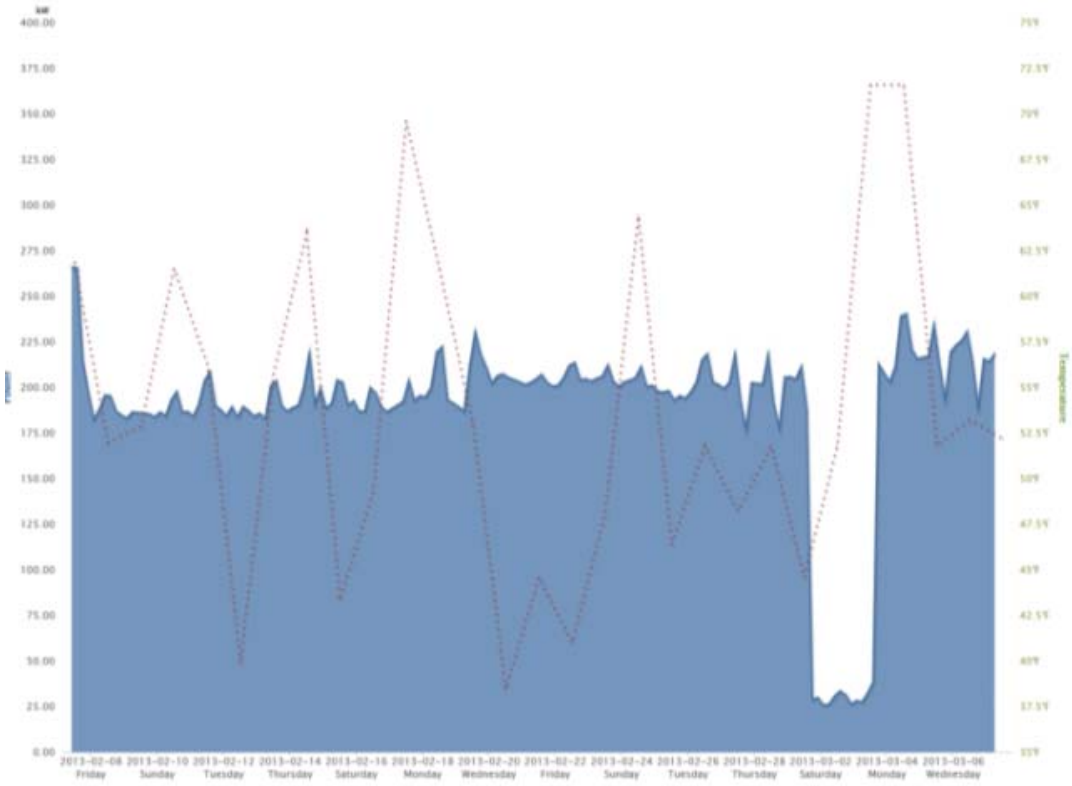
Energy Efficiency – Measure The Invisible

- Quickly Benchmark, Compare & Identify Anomalies By System, Store, City, Region, State & Country
- Categorize By Types of Equipment, Systems, Etc

Energy Efficiency: Detection

ISSUES DETECTION:

- RTUs Running 24/7 With Excessive System Cycling
- KPIs 3 Times Above Average
- No Correlation With Outside Temperature
- BMS Settings Incorrect
- 5 Economizers Broken



Energy Efficiency: Data Analysis & Correction

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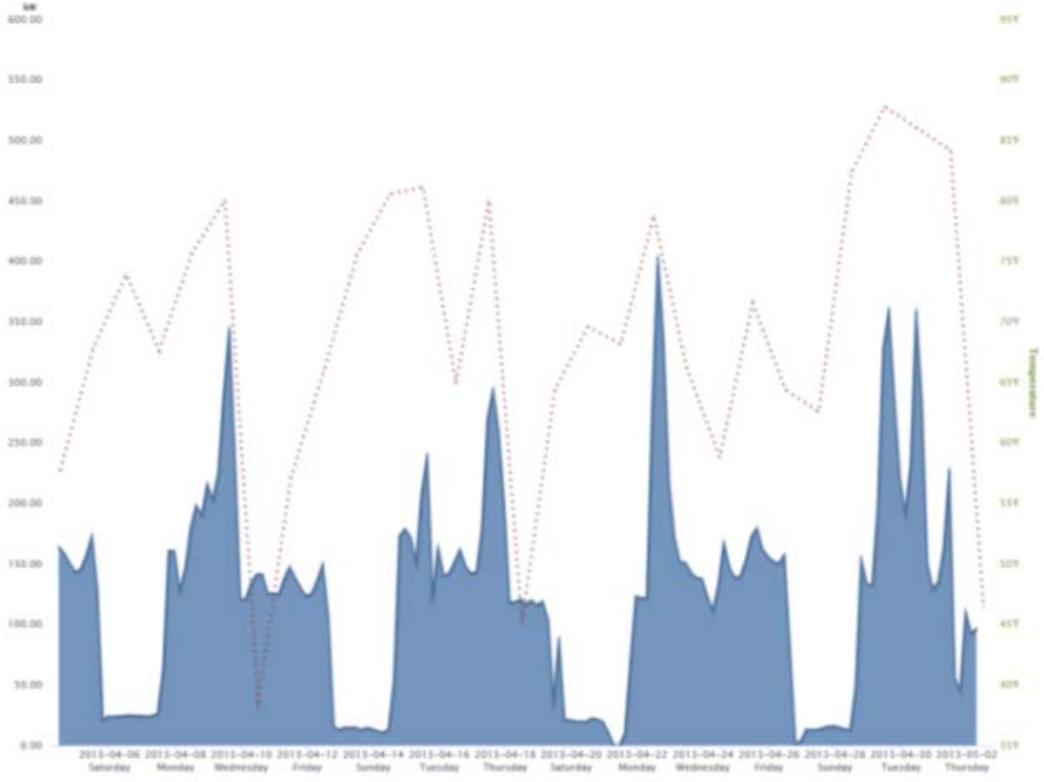
SYSTEM CORRECTION:

- RTUs Running Efficiently
- Correlation With Outside Temperature
- BMS Settings Recalibrated
- Economizers Fixed



BOTTOM LINE:
$48,230 SAVINGS (30%)

- Simple ROI 5 Months
- Increased Site Profitability
- Quantifiable Results

Energy Intelligence: What If We Could Predict It?

Energy Intelligence: What If We Could Predict It?

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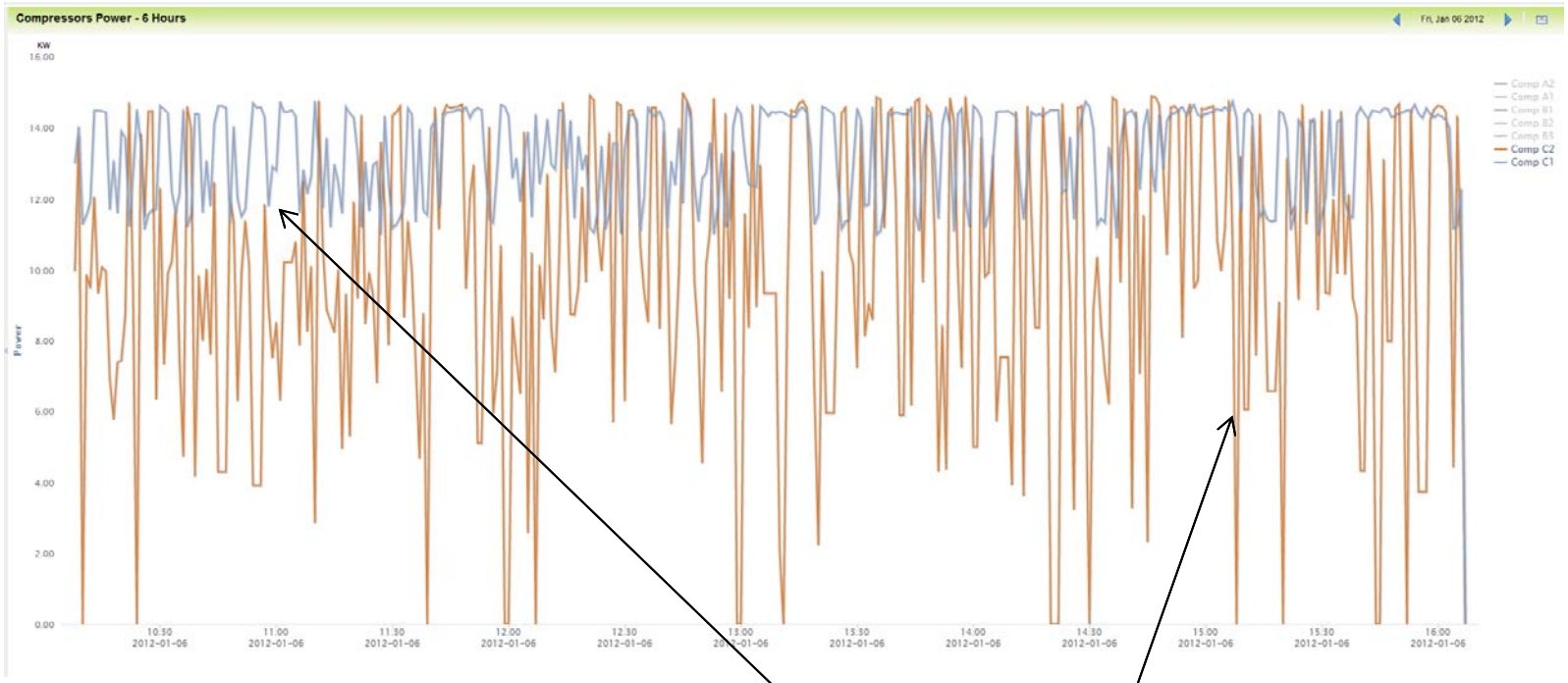
- ✓ Advanced Failure Detection
- ✓ Interrelated Systems Performance

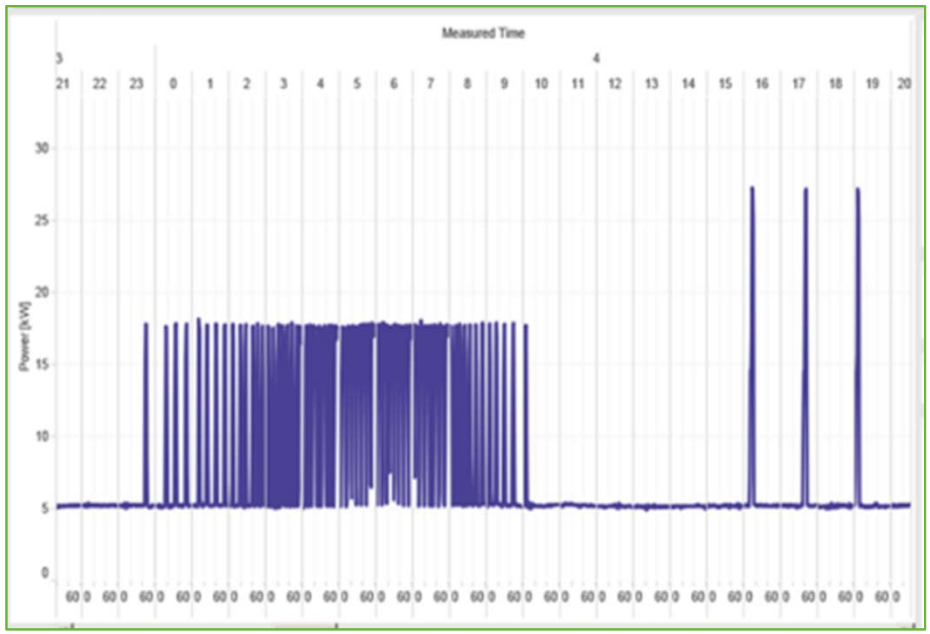
Importance of Key Performance Indicators (KPIs)

- Run time between Compressors C1 and C2 is unbalanced - maintenance mismatch
- Switching lead/lag to allow even compressor operation



Compressor	C1	C2
Short Cycles per Day	0	177.5

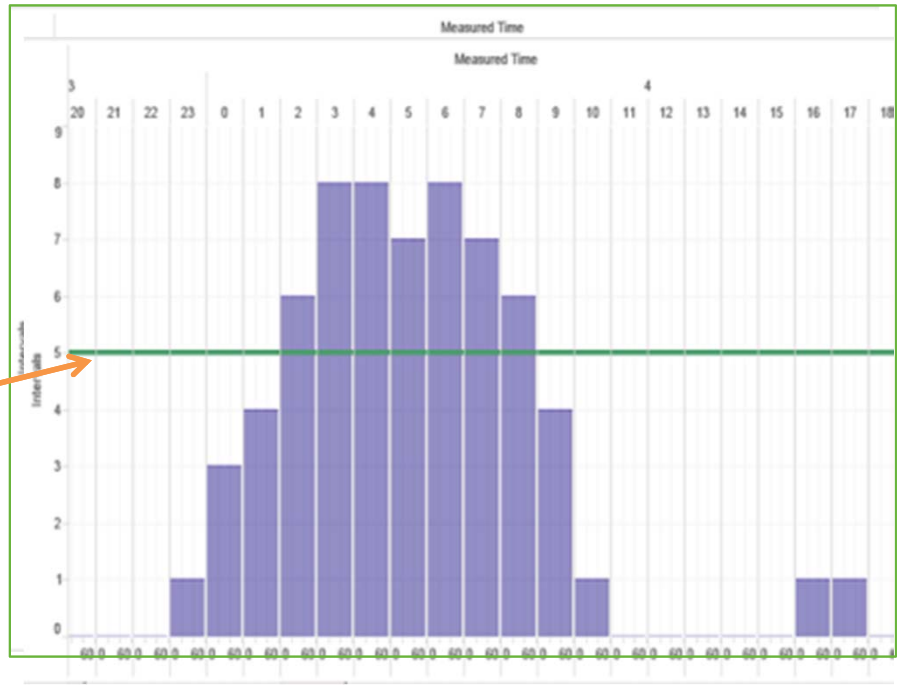
Real-Time Notification



Short cycling identified

Automatic alerts based on KPI

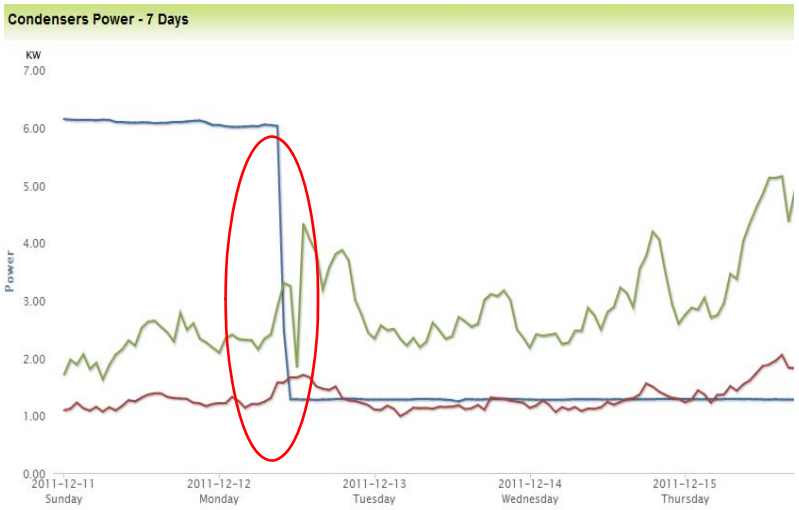
Cycling KPI level



Advanced Failure Detection

Savings: $7,828

- 110kWh/day = $4,828/year;
- Maintenance & repair = $3,000

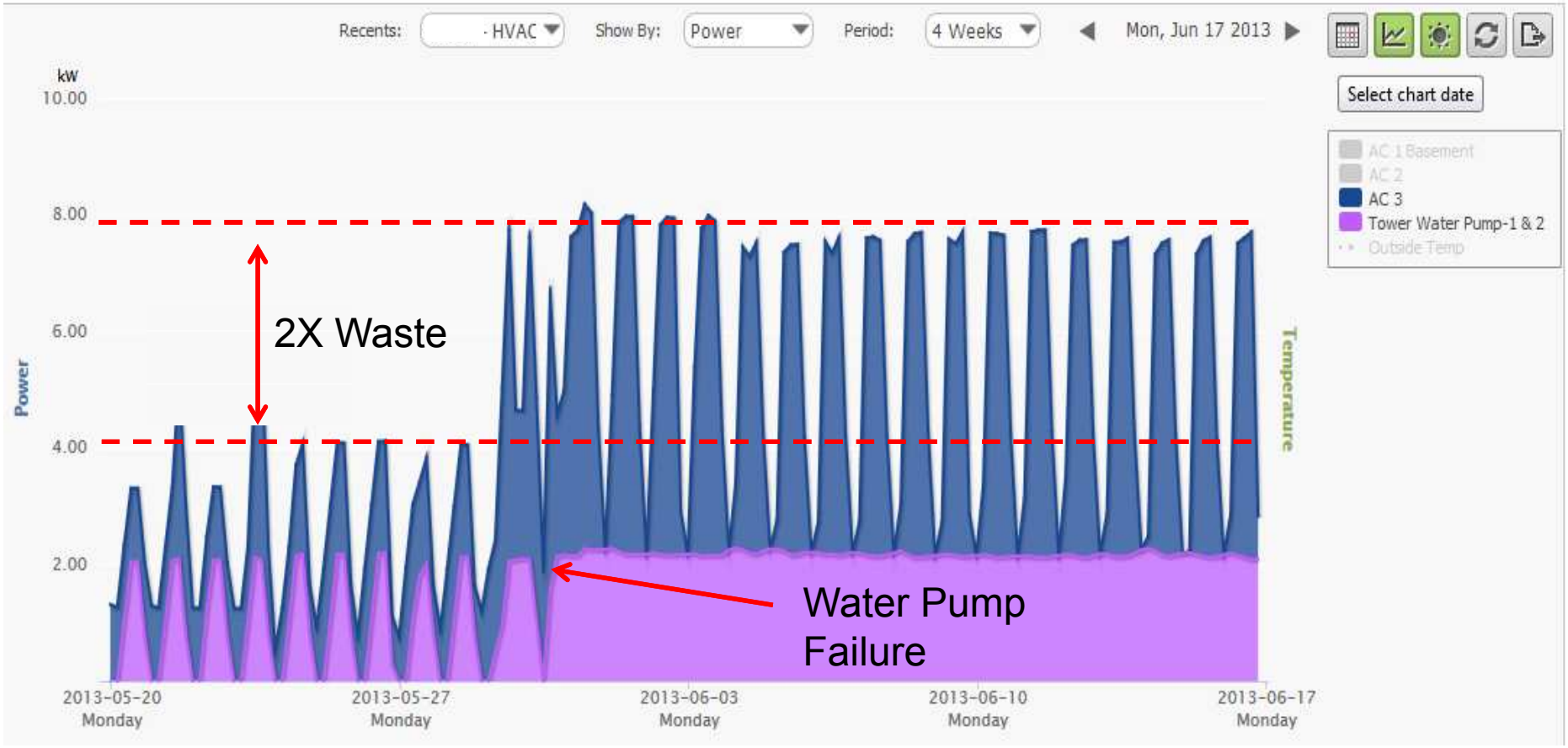


After power outage, Condenser unit rack lost control (running flat out 100%)

Six weeks later: total failure

Interrelated Systems Performance

- Maintenance decisions based on device failure alert - fix or replace?
- Water pump malfunction affected AC unit 3 causing 100% increase energy waste



Energy Intelligence: Changing The Way We Think

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- ✓ Behavioral Recommendations
- ✓ BMS Setting Oversight

BMS Setting Oversight & Correction

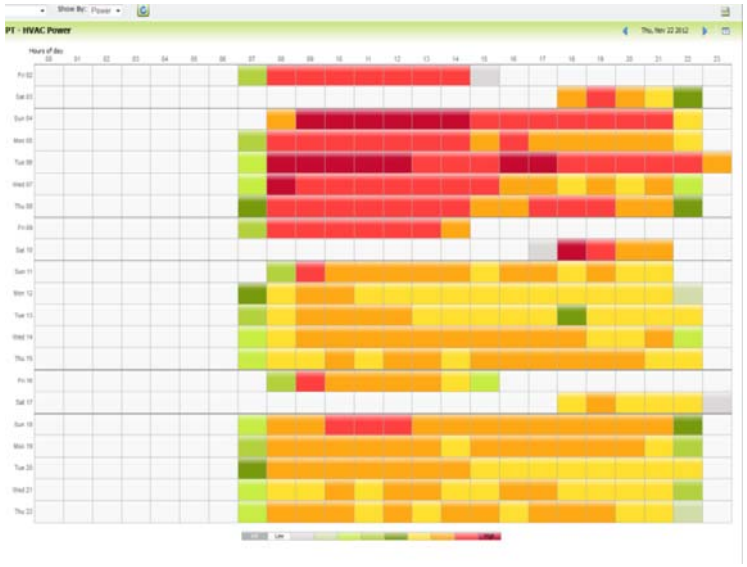
Savings: $10,502

Off hours HVAC system operations

- BMS scheduling issue
- Overworked systems and additional maintenance

BEFORE

AC running during night hours



AFTER

Normal operation

Energy Intelligence: Energy Data On Demand

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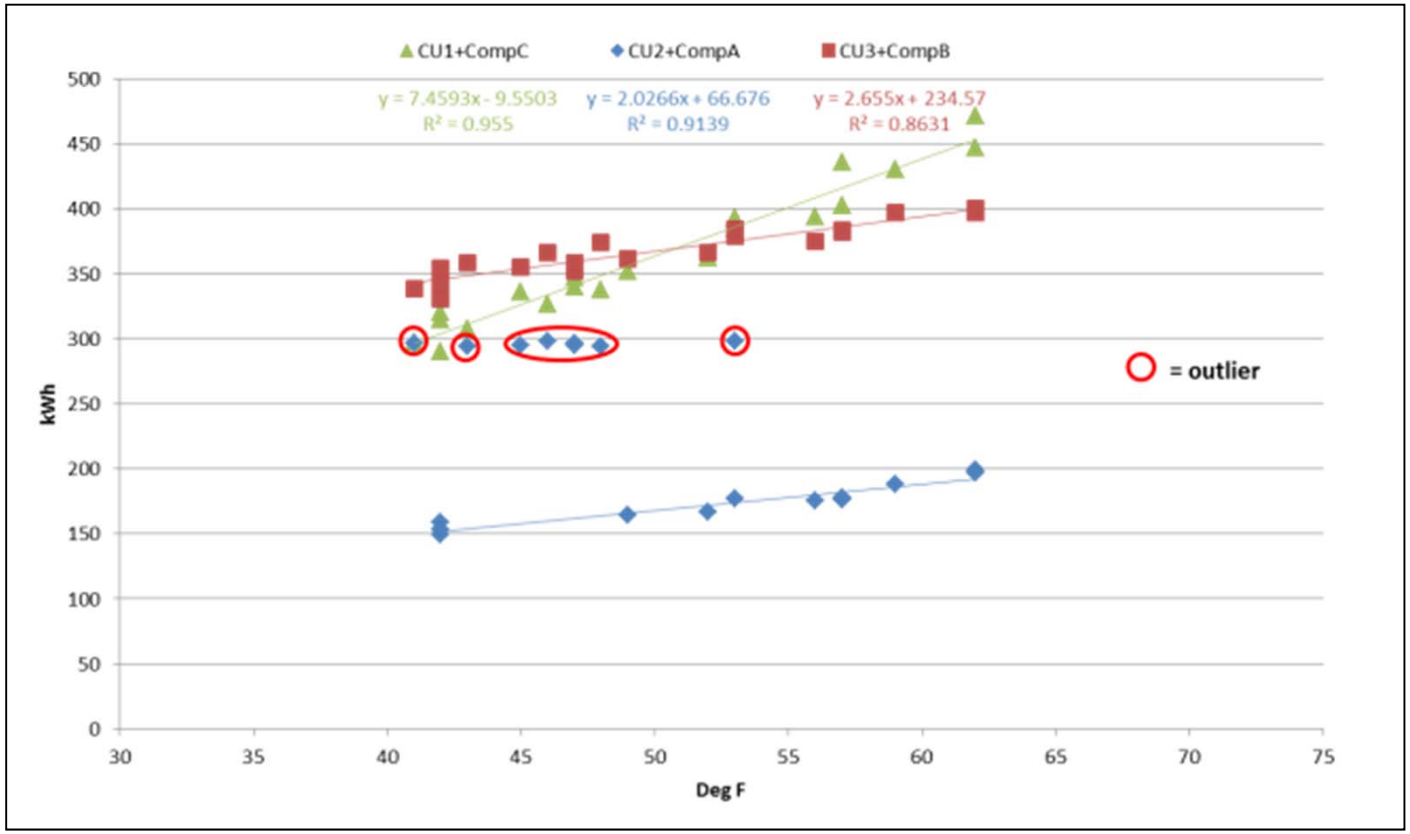
- ✓ Efficiency Benchmarks & Comparisons
- ✓ Rapid Energy Modeling

Efficiency Benchmarking & Comparisons

Distribution of power consumption, %

Rapid Energy Modeling

- Condenser/compressor unit + temperature correlations
  - Detecting anomalies (alerts) on a subsystem level
  - Energy use prediction
  - Asset performance optimization



Questions?