Intelligent Efficiency: Delivering 21st Century Energy Savings

Panelists:
Theresa Spurling-Wood, Alachua County Public Schools
Marshall Runkel, Clean Energy Works
Paul Hamilton, Schneider Electric

Moderator: Ethan A. Rogers, ACEEE

U.S. DOE Better Building Summit
May 28th, 2015: 10:00 am to 11:30 am
Low-cost sensors, ubiquitous internet connectivity, and other technological advances are opening new doors for energy efficiency in homes, buildings and factories. Sometimes called "intelligent efficiency," this network-based, high-tech approach could cut the nation's energy use by 12 to 24%.

Intelligent Efficiency

- a systems-based, holistic approach to saving energy.

People-Centered Efficiency

Optimization through Automation

Substitution

Crosscutting Intelligent Infrastructure

Source: ACEEE
Opportunity:

[Graph showing commercial and industrial annual energy cost savings from 2015 to 2035. The graph includes three scenarios: Low, Mid, and High. The Y-axis represents billion dollars, and the X-axis represents the years from 2015 to 2035. The graph shows an increase in cost savings as time progresses, with the High Scenario having the highest savings.]

Source: ACEEE
Intelligent Efficiency:
Delivering 21st Century Energy Savings

Theresa A Spurling-Wood, CIE, GGP, LEED AP
• **Free** tool

• Helps you find out how your local schools (buildings) are performing compared to similar building profiles.

• Helps locate unusual data – which assists with locating issues that need investigation.

• [https://portfoliomanager.energystar.gov/pm/login.html](https://portfoliomanager.energystar.gov/pm/login.html)
67% of schools in our portfolio are on target

Better Buildings Challenge
20% energy use reduction by 2020

42 Different Sites

• Locate and confirm location of “all” your utility meters
• ACPS has 6 different electric utility providers
• Confirm the associated fees and rates
• Partner with your utility providers
Allows **Site Comparisons** of similar design and build

Why data so different?
Rawlings Elem
used for comparison

Glen Springs Elem
Retro-commissioning results
Actual real dollars saved every month forever in addition to monies refunded through negotiations using EPA Portfolio Manager data - by finding an electric meter multiplier error

• The City agrees to credit monthly against the School Board’s “Account #xxxxx Elementary School” up to $5,187.36, but no more than the amount of that month’s electric bill, per month until the $186,745.10 is paid in full.

• If the School Board’s monthly electric bill is less than $5,187.36, the City will apply the excess credit against the Board’s next month’s electric bill.
Turn off non-critical loads in unoccupied areas. 
Match school schedules, usage patterns, and upgrades needed by IT on PC’s using KACE system by DELL

**17,000** are on nightly shut down program

Notes:
1. Additional Software may be necessary for PC’s.
2. Cost of shut down program has now escalated by charging for *number of computers using program* * this runs up costs
Why Intelligent Controls?
Behavior modification vs automation controls

Energy Use in Office Buildings
US Department of Energy

- Heating & Cooling: 34%
- Office Equipment: 24%
- Lighting: 30%
- Other: 12%

Source EUI Trend (kBtu/ft²)

Why Intelligent Controls?

Key requirements:

- An unlimited number of schedules
- Local or remote web-based access
- Thermostat grouping for rapid re-programming and monitoring
- Temperature setback by area, based on a user definable combination of schedule, occupancy and events
- Set point override based on occupancy status and door/window openings
- Limited local range settings at thermostat keypad

Managed Systems can double the efficiency of unmanaged controls, including:

- Occupancy Sensors
- Photocells
- Programmable Thermostats
- “Smart” Plug Strips

- Out of the box solution that is easy and cost-effective to install
- Scalable solution for projects of all sizes, including facilities which do not have the budget for PLC Systems.
- Wireless networking provides a managed system with the installation cost of unmanaged equipment
- Ability to transform basic, unmanaged devices into parts of a “smart” networked solution.
Why Intelligent Controls?

- **Baseline:**
  System that provides real-time energy consumption for lighting, HVAC equipment, and plug loads

- **Stand-alone Controls:**
  Occupancy-based decisions to turn on/off lighting, plug loads and easily over-ridden programmable thermostats *(if people remember)*

- **Intelligent Controls:**
  Off site scheduling of all lighting, set points, and plug loads

![Graph showing kWh per day for different scenarios with legends for No Controls, Unmanaged Controls, and Managed Controls.]
• **Easy to Install:**
  - Reduced wiring and labor cost
  - Automated, self-discovering “plug and play” set up
  - Wireless communication between devices
  - Wizard-based installation and scheduling

• **Easy to Manage:**
  - Simple interface for monitoring and control
  - Remote connectivity anytime and from anywhere
  - Automated system alerts and alarming

• **Easy to Own:**
  - Scalable solution that grows
  - Self-healing mesh network
  - Expandable platform that provides HVAC, lighting, metering and plug load capability.
Installation – Managed Solution

Remote Temperature Probe

24 VAC

Door/ Window Contact

Thermostat

Occupancy or Vacancy Sensor

Devices operate as stand alone if there is a wireless system malfunction
Provides:
Centralized and remote management of packaged HVAC via wireless thermostats. Management based on schedule, occupancy and events.

- Input Voltage: 24VAC 50/60 HZ
- Relay Rating: 24VAC @ 1 Amp max. per relay
- Keyboard and/or set point lock out
- Remote / onboard sensor averaging
- 3 V Lithium battery for power failure only
- Operates in either network or stand alone mode.

Incorporate door/window switch to change inefficient habits

Signal Range
1000’ Unobstructed

Equipment Compatibility
- 1 Heat/ 1 Cool
- 2 Heat/ 2 Cool
- 3 Heat/ 2 Cool Heat Pump
- 3 Heat/ 2 Cool Dual Fuel
Typical Classroom Lighting

Turning off lights when unoccupied in 2000 classrooms means savings varies with occupants habits.

Classroom 1
- 20 light fixtures
- ON 12 hours
- 3 lamps x 32 watts = 96 watts
- = $746.49 per year

Classroom 2
- 20 light fixtures
- ON 12 hours
- 3 lamps x 32 watts = 96 watts
- = $746.49 per year

Classroom 3
- 20 light fixtures
- ON 12 hours
- 3 lamps x 32 watts = 96 watts
- = $746.49 per year
Installation – Typical Unmanaged Controls

- Lighting Fixture or Circuit
- Standard Occupancy Sensor
- 20A Power Pack
- 120 or 277vAC 20A Power Feed
- Local Switch
Installation – Simple Managed Solution

- Lighting Fixture or Circuit
- Standard Occupancy Sensor
- 120 or 277vAC 20A Power Feed
- Autani ARC Series Room Controller
- Local Switch
What is needed to make it all work?

- Software that is reliable, powerful, and easy to use.
- Hardware that includes a variety of innovative devices that are also stand alone if wireless system has a failure
- ZigBee wireless communication system because it eliminates network wiring with a secure, reliable self healing mesh network.
- Internet connectivity is an option, not a requirement. WAN/LAN

**Software system** coordinates thermostat management based on schedule, occupancy, and curtailment events.

- Up to the minute consumption and savings data represented through charts, graphs and reports
- Real-time alerting for user defined and system events via email or smart phone
- Temperature set points and overrides are dynamically scheduled, and can be modified by demand response events
## ROI – SmartLet with Scheduling

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Load (watts)</td>
<td>1440</td>
<td>163</td>
<td>100</td>
<td>310</td>
<td>109</td>
<td>438</td>
<td>120</td>
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<tr>
<td>Avg $ per kWh</td>
<td>$ 0.10</td>
<td>$ 0.10</td>
<td>$ 0.10</td>
<td>$ 0.10</td>
<td>$ 0.10</td>
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<tr>
<td>Est Rebate per kWh</td>
<td>$ 0.05</td>
<td>$ 0.05</td>
<td>$ 0.05</td>
<td>$ 0.05</td>
<td>$ 0.05</td>
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</table>

### Unmanaged Operation

<table>
<thead>
<tr>
<th></th>
<th>Hours on per day</th>
<th>Days on per year</th>
<th>kWH per day</th>
<th>kWH per year</th>
<th>CO2 Footprint/ year</th>
<th>Cost per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unmanaged Operation</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>24</td>
<td>180</td>
<td>34.56</td>
<td>6221</td>
<td>9580</td>
<td>$ 620.23</td>
</tr>
<tr>
<td>Avg Cost/ SmartLet</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
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</table>

### Managed Operation

<table>
<thead>
<tr>
<th></th>
<th>Hours on per day</th>
<th>Days on per year</th>
<th>kWH per day</th>
<th>kWH per year</th>
<th>CO2 Footprint/ year</th>
<th>Cost per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managed Operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>180</td>
<td>17.28</td>
<td>3110.4</td>
<td>4790</td>
<td>$ 310.11</td>
</tr>
<tr>
<td>Avg Cost/ SmartLet</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
<td>$ 125.00</td>
</tr>
</tbody>
</table>

### Managed Savings

<table>
<thead>
<tr>
<th></th>
<th>kWh Saved/ Year</th>
<th>$ Saved/ Year</th>
<th>lbs CO2 saved/ year</th>
<th>Estimated Payback - without rebates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managed Savings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3111</td>
<td>$ 310.13</td>
<td>4791</td>
<td></td>
</tr>
</tbody>
</table>

### Estimated Payback (months)

|                          |                  |                 |                    |                                     |
| Avg Cost/ SmartLet       | $ 125.00         | $ 125.00        | $ 125.00            | $ 125.00                           |
| Avg Cost/ MINI Sensor    | $ -              | $ -             | $ -                | $ -                                 |
| Avg Cost/ EMC PC Client  | $ -              | $ 25.00         | $ -                | $ -                                 |

### Payback (months)

<table>
<thead>
<tr>
<th></th>
<th>5</th>
<th>25</th>
<th>34</th>
<th>11</th>
<th>31</th>
<th>8</th>
<th>29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payback (months)</td>
<td>5</td>
<td>25</td>
<td>34</td>
<td>11</td>
<td>31</td>
<td>8</td>
<td>29</td>
</tr>
</tbody>
</table>
Intuitive Scheduling

24 x 7 Schedule Events

Define device behavior based on occupancy

Define when behavior occurs
Graphical Data Logging
BUILDING INFORMATION MODELING (BIM).

A unique ongoing cost savings partnership between Higher Ed and K12 Sector

Following slides are provided by:
Dr. R. Raymond Issa
Hamzah Shanbari
Nathan Blinn
University of Florida, M.E. Rinker, Sr. School of Construction Management
BCN6785 - Construction Information Systems Students
BIM

3-Dimensional representation of the built environment with embedded information regarding materials & system selections with their associated properties.

- All building systems are modeled to be dimensionally accurate and represent the defined specifications.
- Architectural, structural, mechanical and plumbing models are linked together to provide a complete virtual representation of the building.
- Collaborative process used to aid in the construction, documentation and analysis of buildings.
- The software package Autodesk Revit was utilized to develop the models.

MEP Model: Produced in BCN6785 – Construction Information Systems
Gavin Hancock, Daniella Daswatta, Pranav Agrawal and Jerry Hong
Actual School Models

Glen Springs Elementary

Complete Model:
Produced in BCN6785 – Construction Information Systems
Hamed Hakim, Hengyao Huang, Chankyu Lee and Peng Ren

Idylwild Elementary School

Complete Model:
Produced in BCN6785 – Construction Information Systems
Mark Dunn, James Sorce, Yifan Su and Ebenezer Tackey-Otoo
Many school blueprints are complex because site buildings usually have been renovated many times over their 80 plus years and the site capacity changes with population growth.

Students are provided a unique real-world experience developing their models from as-built drawings. Local on-site visits are beneficial to interpret data.

Upon completion of the models, the BIM models are turned over to the school district at no cost.

The district can use them for Energy Modeling and equipment changeout simulations.
SPECIAL THANKS:

DR. RAYMOND ISSA
UNIVERSITY OF FLORIDA

JD BRAKE
SLIDE MATERIALS
WEBCOMFORT SYSTEMS

KIK KOPPITCH
GAINESVILLE REGIONAL UTILITIES
WEBCOMFORT HVAC CONTROL SYSTEM PROJECT

Theresa A Spurling-Wood, CIE, GGP, LEED AP
spurlita@gm.sbac.edu
Home Performance Meets Home Automation

Marshall Runkel
Director of Contractor Services
IoT Market = Big Growth

CEW Goal

Borrow momentum from IoT (Internet of Things) market to attract Home Performance customers.
No Longer Fiction

New Products
Thermostats
CO+Smoke Detectors
Lighting
Security
Locks
Coffee!!!
Etc…
New and Existing Brands

- ZigBee
- ecobee
- August
- Philips
- Nest
- LIFX
- Mr. Coffee
- Xfinity
- Smarter
CEW Nest Pilot

➔ Offer free Nest thermostat (or smoke+CO detector) as incentive for signing up with CEW and executing a Home Performance project.
➔ Use existing and new marketing channels to communicate offer.
➔ Train staff and contractors.
➔ Evaluate outcomes.
Why Nest?

➔ Nest Pro network initiative.
➔ Brand recognition.
➔ Integrated CO+smoke alarm aligns with Home Performance.
➔ Willingness to partner on marketing.
User Interface
Home Page

Thermostat and CO+Smoke detector.
User Interface

Energy Home

Intuitive

Allows remote control/monitoring of thermostat settings.
<table>
<thead>
<tr>
<th>Day</th>
<th>Usage</th>
<th>Energy History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon 27</td>
<td>60, 65, 60</td>
<td>Enables homeowner to easily analyze and understand energy usage.</td>
</tr>
<tr>
<td>Tues 28</td>
<td>No usage</td>
<td>Auto-away documentation.</td>
</tr>
<tr>
<td>Wed 27</td>
<td>11/4 hr</td>
<td>Leaf reward signal for efficient usage pattern.</td>
</tr>
<tr>
<td>Fri 24</td>
<td>1 1/2 hr</td>
<td>Accounts for weather.</td>
</tr>
<tr>
<td>Thu 23</td>
<td>2 hr</td>
<td></td>
</tr>
</tbody>
</table>
Monitor multiple sensors.

User Interface

Protect Home

<table>
<thead>
<tr>
<th>Dining Room</th>
<th>OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstairs</td>
<td>OK</td>
</tr>
</tbody>
</table>

Monitor multiple sensors.

Sensors connect with thermostat.
### User Interface

**History Page**

- Shows activity sensor history.
- Verifies smoke/CO sensors are working properly.

#### Activity Sensor History

<table>
<thead>
<tr>
<th>Date</th>
<th>Time Slots (M</th>
<th>6A</th>
<th>NOON</th>
<th>6P</th>
<th>M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mon 27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tue 28</td>
<td></td>
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<td></td>
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<tr>
<td>Wed 29</td>
<td></td>
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<tr>
<td>Thu 30</td>
<td></td>
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<td></td>
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<tr>
<td>Fri 31</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

- Sun 26: Activity sensor history for April 26 with a checkmark indicating proper working.
- Fri 24: Activity sensor history for April 24 with a checkmark indicating proper working.
- Thu 23: Activity sensor history for April 23 with a checkmark indicating proper working.
- Wed 22: Activity sensor history for April 22 with the label "OK".
Program Promotion

All CEW Markets:
Nov/Dec ‘Apply By’
Jan/Feb – sign work proposal

Professionally installed Nest at no cost to customer ($450 value)

Promotion driven by Direct Mail, Social Media, Local Newspaper outreach

Meet the next generation thermostat.
Most people leave the house at one temperature and forget to change it. So the Nest Learning Thermostat learns your schedule, programs itself and can be controlled from your phone. Nest Thermostat can lower your heating and cooling bills up to 20%. Complete home energy upgrades with Clean Energy Works and your nest is free.*

*Limited time offer. See letter for details. Apply at ceewa.org/nest
Smart thermostat from Clean Energy Works: Increased comfort, cut energy bills with low-cost to pricy upgrades

Public Relations

Nest Promotion

Winter Weather
Dear [FULL_NAME],

The City of Portland wants to help you save energy and create a more comfortable, safer and healthier home.

Clean Energy Works (CEW) began in 2009 as a pilot partnership with the City of Portland. Today, CEW is the state’s largest non-profit home performance provider, helping thousands of Oregon homeowners make their homes more comfortable, while reducing the energy wasted by leaky walls, old windows and outdated heating and cooling systems. The Bureau of Planning and Sustainability continues to partner with CEW to bring the benefits of home performance to as many Portland homeowners as possible.

You may be eligible for Instant Rebates up to [REBATE]% and no money down financing when you install home energy upgrades through Clean Energy Works. Apply by October 31, 2014 and you will qualify for an extra $250** bonus for a total of $3,250 in savings. Visit www.cewo.org/bps and enter Instant Rebate Code: LGPDX17. Once your application is processed, Clean Energy Works will:

- Match you with a Clean Energy Works Certified Contractor - specially trained in home performance and building science.
- Conduct a 100 Point Performance Check (worth $250), to pinpoint essential upgrades to optimize your home.
- Offer no-money-down financing from Clean Energy Works’ local lending partners, so you can upgrade your home with no upfront costs.
- Deliver one-stop convenience: Insulation, windows, heating and cooling systems, radon and seismic upgrades, solar and more bundled into one convenient project.
- Inspect the work: Once your upgrades are installed, Clean Energy Works will perform a FREE independent inspection (worth $250) for peace of mind and complete 100% quality assurance.

Apply now at www.cewo.org/bps with Instant Rebate code LGPDX17 by October 31, 2014, to confirm that you qualify for savings up to $3,250. Or, for more information call Clean Energy Works toll free at 1-855-870-0049.

Sincerely,

Andria Jacob
Program Manager

**Minimum investment per upgrade required. Rebates are available to qualified applicants that complete CEW upgrade projects on a first-come, first-served basis, are subject to availability, non-transferable and subject to change without prior notice. Energy Trust of Oregon cash incentives are available through Clean Energy Works to reduce the total project cost and help customers access energy savings on home upgrades. See crossing for additional restrictions. Clean Energy Works upgrades, rebates and promotions receive no funding from the City of Portland General Fund.

**Offer is available only to new applications received by CEW between October 1, 2014 and October 31, 2014.
Ongoing Facebook Campaign

➔ Nest Promotion
➔ Seasonal campaigns to drive online evaluations and applications
➔ Touches all markets
➔ Boosted posts
Energy Savings Results

Table 1. Gas and Electric Savings Results

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Pre-Nest Usage</th>
<th>Energy Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Natural Gas (therms/yr)</td>
<td>735</td>
<td></td>
</tr>
<tr>
<td>Electricity (kWh/yr)</td>
<td>624</td>
<td></td>
</tr>
</tbody>
</table>

Outcomes

➔ Internet advertising was more effective than direct mail.
➔ Offer was more powerful as a conversion tool than an inducement to sign up for CEW.
➔ Contractors are now offering Nest and/or other IoT products on most proposals.
Thank You!

Marshall Runkel
marshall.runkel@cewo.org 971.544.8713
Intelligent Efficiency: Delivering 21st Century Energy Savings

Advancing Intelligent Efficiency Technology in the Industrial Sector

Paul Hamilton
VP Government Relations
Schneider Electric
May 28, 2015
The Driver

The intersection of IT and Energy Management will create new opportunities to accelerate energy efficiency.

Data will make Energy Visible
A convergence of technologies in the Data Enabled Factory

- **Intelligent efficiency.** Energy savings resulting from ICT-enabled connection of sensors, devices, systems, facilities, and users.

- **Smart manufacturing.** Superior productivity resulting from the integration of all aspects of manufacturing.

- **Internet of Things.** Machine to Machine (M2M) interaction through the Internet

Source: ACEEE
Where is Energy Used in Industry?

Proportions of Energy Used in Manufacturing (MECS)

- Process Heating: 46%
- Process Cooling and Refrigeration: 4%
- Machine Drive: 27%
- Electro-Chemical Processes: 4%
- Other Process Use: 3%
- Facility HVAC (g): 10%
- Facility Lighting: 3%
- Other Facility/Non Process Use: 3%

84% of Energy Consumed in Manufacturing is PROCESS Related.
Maturity Levels of an Industrial Energy Management Program

- **Energy Awareness**
  - Fixing the basics and understanding the opportunity in moving beyond the infrastructure for greater energy impact.

- **Energy Optimization**
  - Automate active energy management into the process to remove energy waste at the source.

- **Continuous Improvement**
  - Track energy data, quantify energy waste in the process and identify projects for continuous improvement.

---

Control System Connectivity

Industrial Energy Management Program Maturity Level

- **Rudimentary**
- **Process-Centered**
- **Advanced**

---

Stronger Link between *Energy Efficiency* and *Process Efficiency*
Driving Efficiency across the Enterprise.

The collection of data across the enterprise in cloud based systems will drive intelligent efficiency.

Source: Time Magazine, What is Smart Manufacturing
Energy Management Dashboards

Enterprise Level Dashboard
Commodities Purchasing Data

Enterprise Level Dashboards:
Sustainability Metrics

Per-site Energy and Emissions Measurements with Invoice Participation Status
Operational Level Dashboards

Site kWh per Ton, week by week
1 Week periods

Control of Peak Demand Threshold Based on Energy Forecast

Pareto Analysis, Energy Events by Cause
Control Level Dashboards

Machine-level Energy Data Showing Real-time Energy Consumption

Control Level: Machine-based Dashboard

Bottling Line devices are still using power in standby, during a zero production period.
Control Level Dashboards

Energy Profiles of Two Pumps, Compared Side-by-Side

Maintained Pump (light green) compared to worn Pump (dark green) after 1.5 days operation
The Challenges & Evolutions
Cyber Physical Systems (CPS) change the existing automation hierarchy

- Over the last ~30 years a well-defined 5-layer automation architecture has formed.
  - Field devices (e.g., sensors) level send data via analog signals to logical controllers.
  - SCADA systems perform (remote) control.
  - Manufacturing Execution Systems perform tasks such as production scheduling.
  - Top-level ERP systems facilitate management reporting and business management.

- 5 layers might not be needed in the future
  - Sensors send data directly to the cloud.
  - Services (e.g., production scheduling) automatically subscribe to necessary data in real-time

Source: IoT Analytics Quantifying the Connected World
“Smart manufacturing marries information, technology and human ingenuity to bring about a rapid revolution in the development and application of manufacturing intelligence to every aspect of business. It will fundamentally change how products are invented, manufactured, shipped and sold. It will improve worker safety and protect the environment by making zero-emissions, zero-incident manufacturing possible”. –Jim Davis, SMLC (Warren 2011)
Bringing Context to Data

Collect data from disparate sources
Accessiblity of information
Connect information to people
Speed to deployment

Operations Management
Equip. Health Management
Quality Management
Performance Management

Real-time values
- Inlet pressure
- Inlet flow
- Ambient temperature

Asset details
- Name
- Make
- Model

External Databases
- Performance curves
- Last service date
- Design documents
- Inspection best practice

Calculations
- Performance calculations
- KPI’s

Real-time Values
- Exhaust temperature
- Exhaust flow
- Measured MW output

Notifications
- Performance excursions
- Temperature difference
- High temperature

Business Events
- Downtime
- Startup
- Excursions

Source: OSI Soft
Capturing the broader IEE Opportunity

What is required to capture broad based IEE delivered through continuous improvement in process and site management?

• Use of an international standard specifying requirements for an industrial energy management system (EnMS)

• Requirements for establishing, implementing, maintaining and improving 3rd party certification

• Use of a U.S. standard to establish metrics and verify energy performance improvement.

• Rigorous M&V system for industrial use 3rd party audits to verify achievement

Source: ISO and DOE
Conclusion

- Intelligent Efficiency drives data towards information that will enable better energy management in industry.

- Adoption of energy management dashboards and business management processes will be critical to intelligent efficiency.

- Evolution of data enabled sensors and Internet of Things will bring massive new sets of data to manage across an enterprise.

- Cloud services and data analytics coupled with new business processes and dashboards will allow industry to get significant gains in energy management through intelligent efficiency.
Paul Hamilton
VP Government Affairs

Make the most of your energy™
What is Intelligent Efficiency?

Intelligent efficiency (IE) refers to a systems-based, holistic approach to saving energy.

**People-Centered Efficiency (Real-Time Feedback):**
Providing real-time information and management tools that enable consumers, building operators, manufacturers, and other users to lower energy consumption in response to changing information.

**Digital Energy Management (Automation and Optimization):**
Using sensors, controls, and computer software to automate business processes or building or vehicle operations in order to optimize energy use. This bypasses much of the need for people to respond.

**Substitution with Energy-Saving ICT Services (Dematerialization):**
Shifting behaviors, services and structure of the economy in ways that displace more energy-intensive activities in ways that reduce energy usage, i.e. e-commerce and telecommuting.

**Crosscutting Intelligent Infrastructure**
Together, all types of IE enable more integrated, smarter and more reliable infrastructure: power grids, smart cities, transportation, and communications networks.

*Source: ACEEE*
Opportunity

Projected Cost Savings from Intelligent Efficiency per ACEEE

*The industrial sector could save between $7B and $25B in energy costs per year by 2035*

Source: ACEEE
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