ETCC Open Forum

June 12th, 2013

Sacramento Municipal Utility District

Safety

- In the event of:
  - Earthquake
  - Fire
  - Evacuation in general
- CPR
- 5-911

EMERGING TECHNOLOGIES COORDINATING COUNCIL

Agenda

- **Opening Remarks and Ground Rules** – Bruce Baccei

- **Industrial Energy Intelligence** - Elhay Farkash – *Lightapp*
- **Tier 2 Advanced Power Strips** - Rod Williams and Kevin Mobbs - *Embertec*
- **Lighting and HVAC** – Wireless Controls - Tony Garcia and Jason Choong – *Daintree*

- **HVAC - Variable Speed AC Benefits** - Robert Wilkins - *Danfoss*
- **HVAC - Variable Speed AC and Heat Pump** - Mark Groskreutz - *Ingersoll-Rand/Trane*
- **HVAC - Solar & Heat-Powered AC** - Sasha Mazo & Marshal Rubinstein - *New World Machines*

- **HVAC – Economizer Control** - Darryl DeAngelis - *Belimo*
- **HVAC Controls** - Scott Gregson - *Innotech*
- **HVAC – Economizer Control** - Daniel Jones - *Honeywell*

- **Building Controls and Automation** - Richard Fellows - *KMC FlexStat*
- **Building Analytics** - Andreas Savvides - *Seldera*
- **Exterior Lighting Controls** - Robert Praske – *anyCOMM*

Utility Emerging Technologies (ET) Program Mission

To support increased energy efficiency market demand and technology supply by contributing to development, assessment and introduction of new and under-utilized energy efficiency (EE) measures (that is, technologies, practices, and tools), and by facilitating their adoption as measures supporting California's aggressive energy and demand savings goals

Graphics courtesy Southern California Edison

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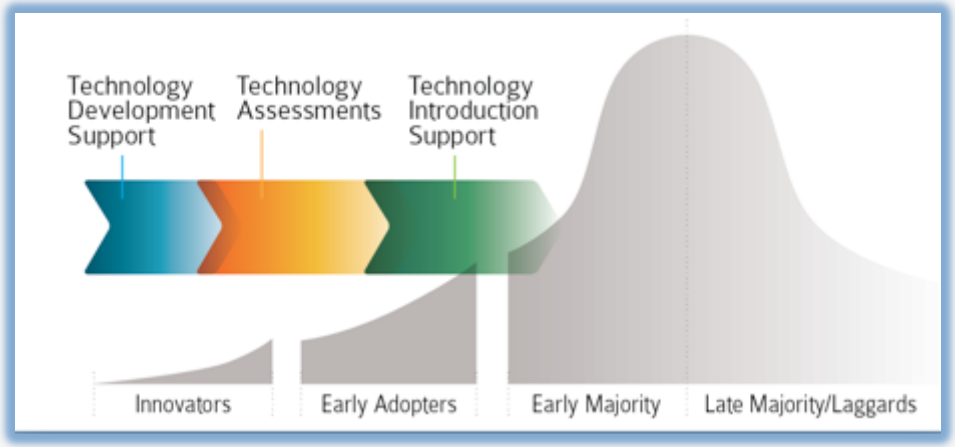
Program Elements and Strategies



Graphics courtesy Southern California Edison

TECHNOLOGY DEVELOPMENT SUPPORT

GOAL:
Increase Energy Efficiency Technology Supply

OBJECTIVES:
Engage in Targeted Technology Support Efforts

Increase Developer Outreach

TECHNOLOGY ASSESSMENTS

GOAL:
Increase the Number of Measures Offered by Programs

OBJECTIVES:
Assess Energy Efficient Technologies

Support Technology Transfer Process

TECHNOLOGY INTRODUCTION SUPPORT

GOAL:
"Seed" Market Demand

OBJECTIVES:
Conduct Demonstrations and Targeted Field Deployments

Help Increase Market Knowledge of New Technologies

What are the Utilities Looking for?

- Aligned with California's Long Term Goals
- Enables Verifiable Energy Savings
- Commercially Available

Open Forum Objectives

Keep utility program leads informed of latest emerging technology developments

Give technology developers an opportunity to share their EE and DR innovations

Ground Rules

- Speakers:
  - Remember webinar attendees
  - Timekeeper (Myra) will give 3 and 1 minute warnings
- Q&A:
  - Loading order: utility panel then audience
- All attendees:
  - Use lunch and afternoon breaks to follow up & network

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Industrial Energy Intelligence

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At a glance

Effectively manage energy data, improving profitability, operational efficiency, and the environment

Founded	2009 by Ex-Oracle experts
Clients	35 sites in the USA and Israel
Solution	Software based. End-to-end implementation
Leader	Industrial Energy Management
Bottom Line	6-15% savings in energy costs

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Selected Customers

Food & Beverage

Coca-Cola

TNUVA

SOGLOWEK SINCE 1957

יפאורה

Plastic / Paper / Tires

AMRAZ

AVGOL Nonwovens

NILIT®

ATG ALLIANCE TIRE GROUP

SHALAG SHAMIR NONWOVENS

Homeland security

רשות שדות התעופה בישראל
ISRAEL AIRPORTS AUTHORITY

IAI

Chemicals

elcon recycling center

שמן

CargalGroup

Pharma

TARO

TEVA PHARMACEUTICALS LTD

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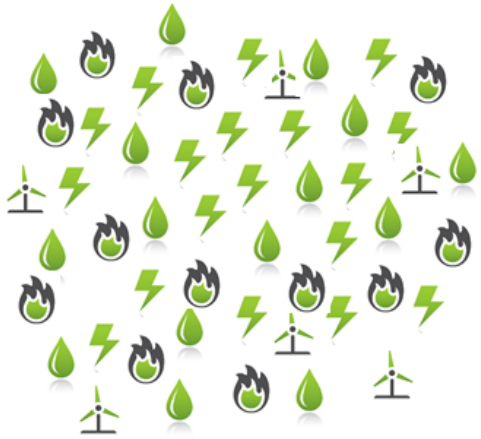
PHYSICAL



INTERNAL

Schneider Electric
Honeywell
ABB
SAP
INFOR
ORACLE
movex
Rockwell Automation
Danfoss

EXTERNAL

Real time data acquisition

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- Dynamic Groups
  - Total Energy
  - Production systems
  - Cooling systems
  - Steam system
  - Water purify system
  - _____
  - Line-23
  - Cooling production
  - Air comp - High P
  - Air comp - Low P
  - Buildings
- Division A
  - Site A
  - Site B
  - Site C
  - Distribution center
- Division B
  - North site
  - South site
- Division C
  - HQ

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Lightapp proven methodology

Organize

- **Collect** energy, internal and external data
- **Organize** in Physical and Logical groups
- **Enrich** and **validate** data and Store in a **Data Base**

Analyze

- **What** are the main energy consumers
- **What** is the energy profile
- **What** are the energy consumption drivers

Manage

- **Eliminate** consumption inefficiencies
- **Manage** TOU and rates
- **Identify** maintenance issue and failures
- **Define** KPIs, Set Alerts
- **Set** Goals
- **Initiate** Energy Efficiency Measures
- **Optimize** business decisions

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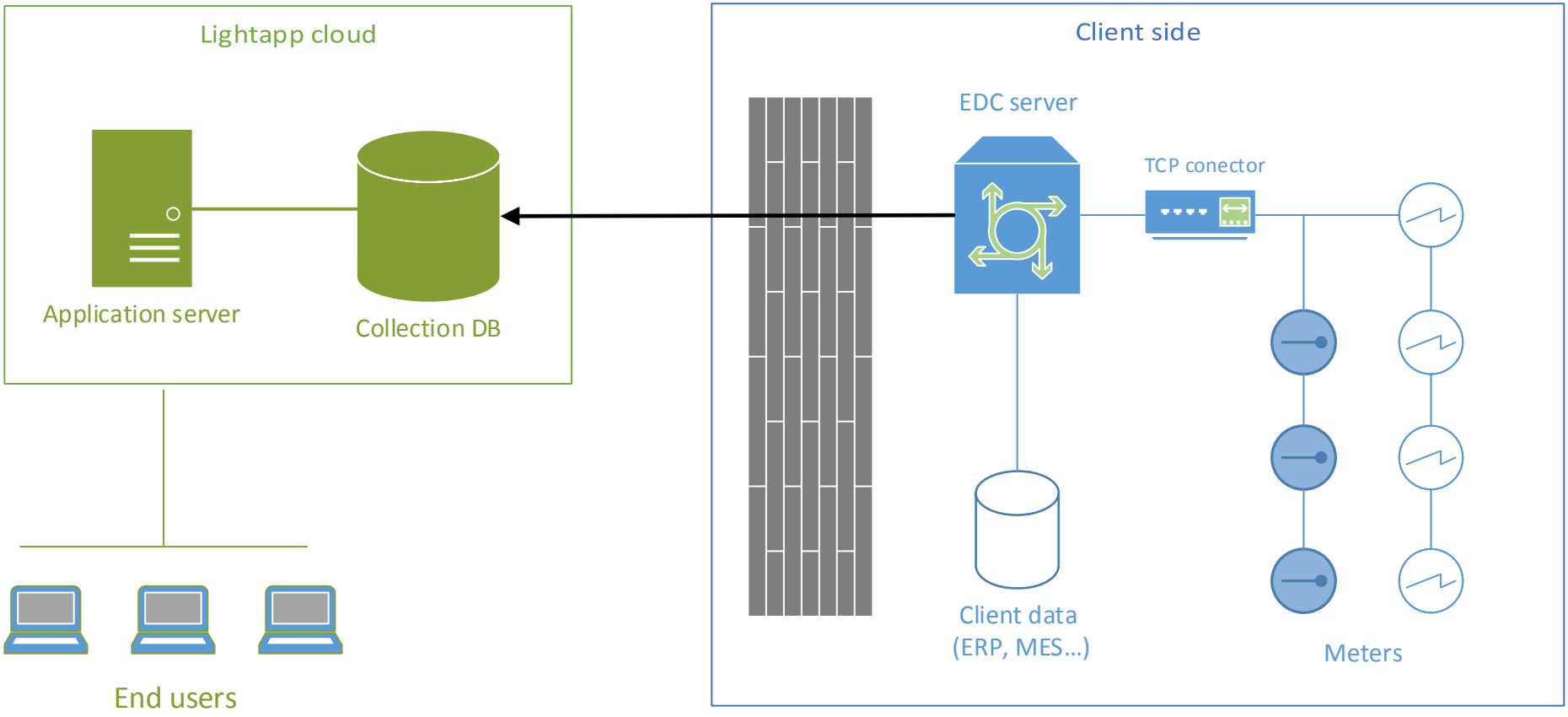
High level system architecture



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Live Demo

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Benefits

- Manage all energy sources
- Granular energy intensity (energy per product)
- Real-time energy auditing and energy reporting
- Optimize energy procurement
- Make the case for energy efficiency measures
- Demand Response - Manage peak and total demands
- Reduce energy waste and leakage
- Optimize Permanent Load Shifting
- Help customers be successful on TVP
- Engage the customer at the CFO and CEO level
- Proven implementation methodology (3 months)

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Selected case studies

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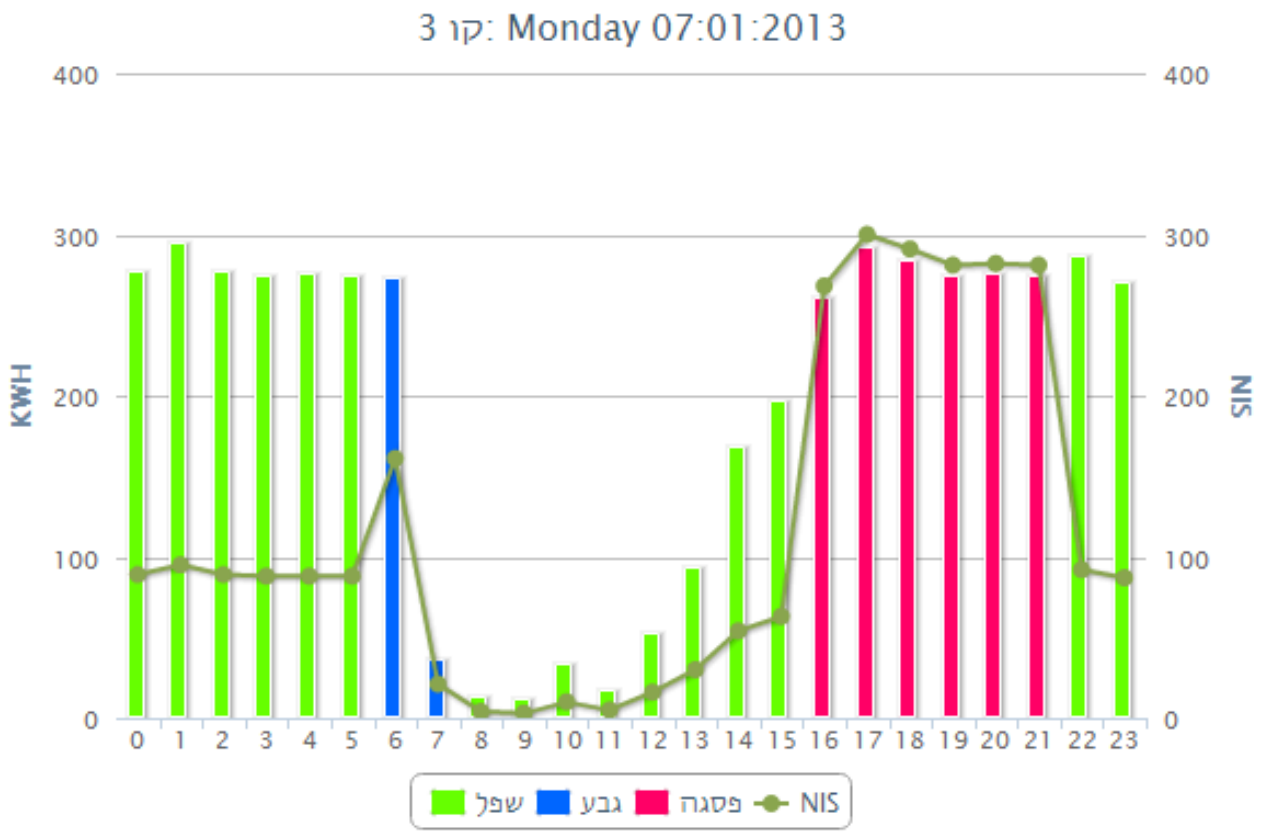
Reconfiguring Manufacturing Line



A plastic manufacturer needs to change the molds. They start in 7:00 am, just in time to ramp up production during peak…

Alerting management achieved savings of **$500** per change.

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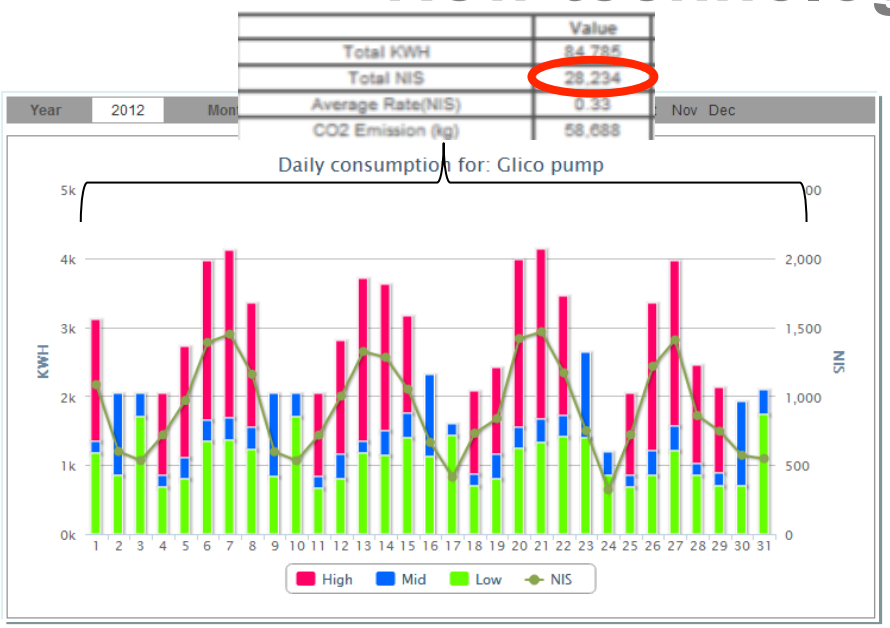
New technology implementation



VFD implementation

A food processing factory undertook an implementation of Variable Frequency Drives on 4 glycol circulation pumps. Feasibility analysis through the liLhtapp system showed ROI within 9 months and even shorter during summer tariffs.

VFD's installed on April 7th.
Immediate savings of 40% in energy consumption

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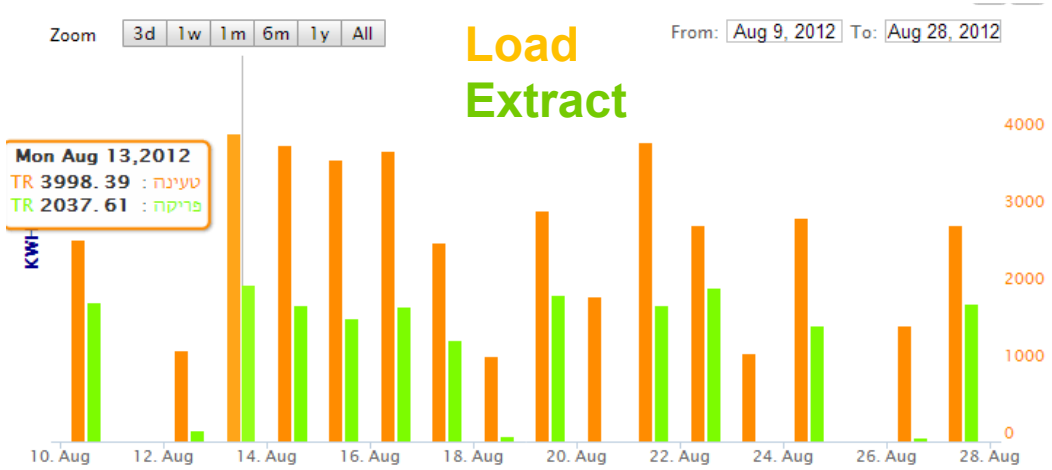
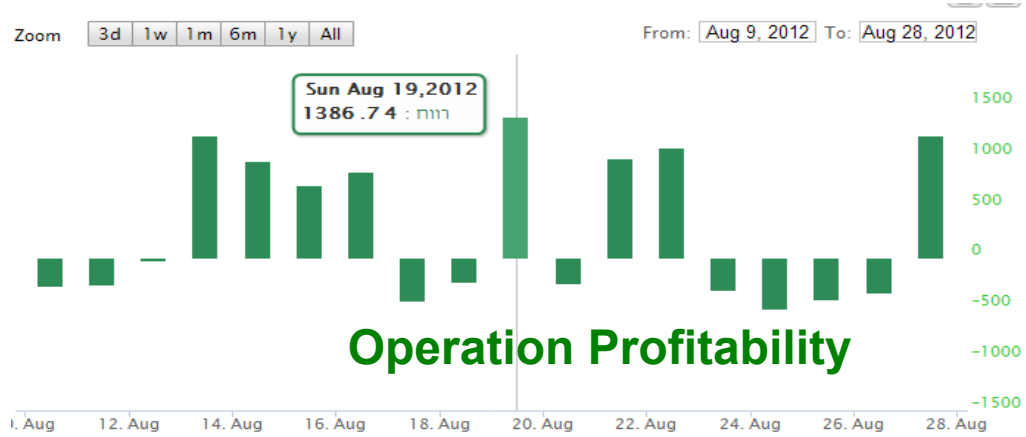
Optimize Permanent Load Shifting





Chilled water storage in a large airport terminal

Lightapp discovered:

- Only 44% energy effectiveness
- Identify days that the storage solution is wasting energy and not profitable
- Continued operation and waste even when some parts malfunctioned

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Thank You

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Embertec®

ENERGY EFFICIENCY TECHNOLOGIES

ADDRESSING ACTIVE POWER WASTE

Maximum Savings - Zero Effort

Commercial in Confidence

The Problem- Our Opportunity

- Consumers are adding more devices and larger TVs to the home everyday
- People are also leaving electronics on all the time without being used
- Consumer electronics wastes power in two distinct ways:
  - **Active Power Waste** where the product is on but not performing its main function (e.g. TV is on but is not being watched)
  - **Passive standby** where power is used by the product to keep it ready to switch on
- **An ideal energy saving device would reduce both types of wastage.**

Active Power Waste

Product Overview

- Automatic Plugload Management Device employing our Active Powerdown technology that uses an advanced micro processor that switches off AV and PC equipment that are not in use and back on when needed
- Residential and commercial
- The opportunity to dramatically reduce both **Active Waste** and eliminate passive (standby) waste
- Australian technology developed in 2009 to replace maturing CFL programs as ever increasing plugload is seen as the next EE target by the regulator

Key Benefits Emberplug

- **ACTIVE POWERDOWN™**

  With intuitive firmware and sophisticated hardware, the Emberplug stops Active Power Waste which accounts for up to 50% of electronics energy use.

- **PROVEN SAVINGS**

  Annual savings of 486kWh on AV and 408kWh PC measured through independent Field Trials.

  Addresses Active Power Waste and standby waste(436 kWh Victorian Gov Deemed Savings)

- **EASY SETUP**

  "Plug and use" for everyday people. No software, no tweaking. Automatically senses every AV device power state. No adjustments. Simple.

- **EXCEPTIONAL CONVENIENCE**

  No habit change, knows exactly when to switch off and on without the user doing anything differently.

- **EVERYDAY VERSATILITY**

  Works seamlessly and automatically with all devices, thus ensuring lifetime of the environment.

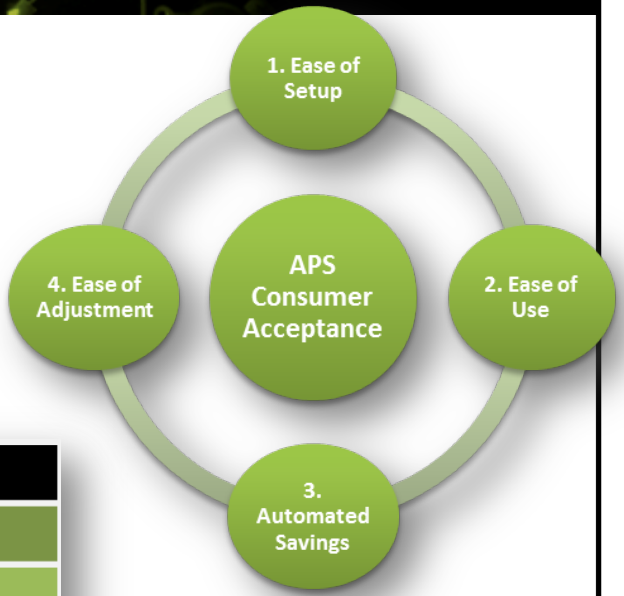
  Future products will integrates data and control with smart-home wireless protocols, eg Zigbee.

- **FUTURE PROOF**

  Designed to work with future products with different power profiles, not relying on a single current threshold trigger.

COMPETITIVE LANDSCAPE

- Tier 1 Advanced Power Strips (master control) that require manual adjustment and do not adapt to a changing environment
- APS, motion sensors and timers
- Tier1 APS has multiple barriers



APS	Tier1	Embertec Tier2
Automatic Savings*		X
Automatic Threshold Adjust		X
Saves Standby	X	X
Saves Active Waste		X
Automatically Adapts to New Devises		X
Higher Persistence Level		X
Manual Adjustment	X	

SHOULD YOU NEED TO TURN ON YOUR TV TO LISTEN TO THE RADIO?

**T1 products require a user to power down their main device to realize savings and to power up their main device to use other connected devices*

Commercial in Confidence

Field Deployed and Proven Technology- Australian Proving Ground

- Under a Direct Install program, from Aug 2011 until Jan 2013, Embertec – *with selected and approved installation partners* - has installed **over 1,800,000** units into **800,000 Australian homes**
- Resulting in a deemed annual energy savings of over 600 GWh annual and **6,000 GWh** deemed lifetime savings
- **Direct Install** into homes has proven to be a very cost effective way to reach demanding energy savings goals and is ideal for APS offering
- The cost per kWh is typically **$0.03 or less**
- Independent audits of 1000 homes by the **Victorian government** proved of **all brands** of products installed an **84% retention** rate has been achieved program wide.
- Internal audits conducted on 5% of Embertec installed products show a **98.5%** consumer retention satisfaction index due to Embertec's advanced program design and product ease of use focus

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DaintreeNetworks

Lighting and HVAC

Wireless Controls

ETCC Open Forum

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What – making your facilities smarter and cheaper to run

- **Automating** the facility or facility portfolio
- Multiple **building services**
  - Advanced lighting controls (interior/exterior), packaged thermostats, plug loads, environmental sensing, power metering
  - BACnet to BMS
- **Energy savings** (30-70%)
- **Maintenance**
  - Lamp/ballast failure detection today, HVAC soon
- Demand response and **OpenADR** (2.0)
- **Wireless** control/monitoring for
  - Cost-effective retrofit
  - Greater flexibility for renovation/new construction
- **Open standards**-based technology (ZigBee) providing product choice
- **Turnkey** for lower cost in integration and maintenance

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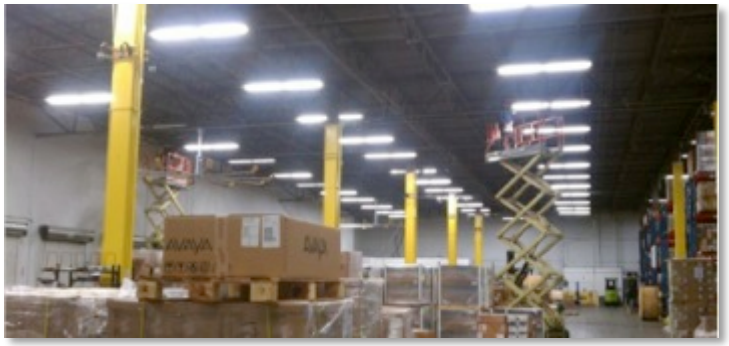
Where - reliability and benefits proven in the field

Global Communications Distributor



- **Warehouse/high bay application**
- **48% reduction in lighting energy use**
- **Now deployed in almost 20 facilities (and growing)**

"I knew there was waste in the way we were using our lighting, but until now I didn't have the tools to measure where that waste was occurring, or the granular control to make adjustments zone by zone."

- Director of Real Estate Services

United Stationers Sacramento

- **Office application**
- **Over 91% lighting energy savings from overall project**
- **Partnered with Cree for LED fixtures**

"We're thrilled with the results of this advanced lighting project. Not only are our associates pleased with their improved lighting and personal control, but we're already saving substantial energy. The project came together quickly with painless installation, and I've been impressed by the seamless integration of Cree and Daintree Networks products."

- Ted Pinnow, Maintenance Manager

Note: Photo of Global Equipment Distributor is not the actual facility installed

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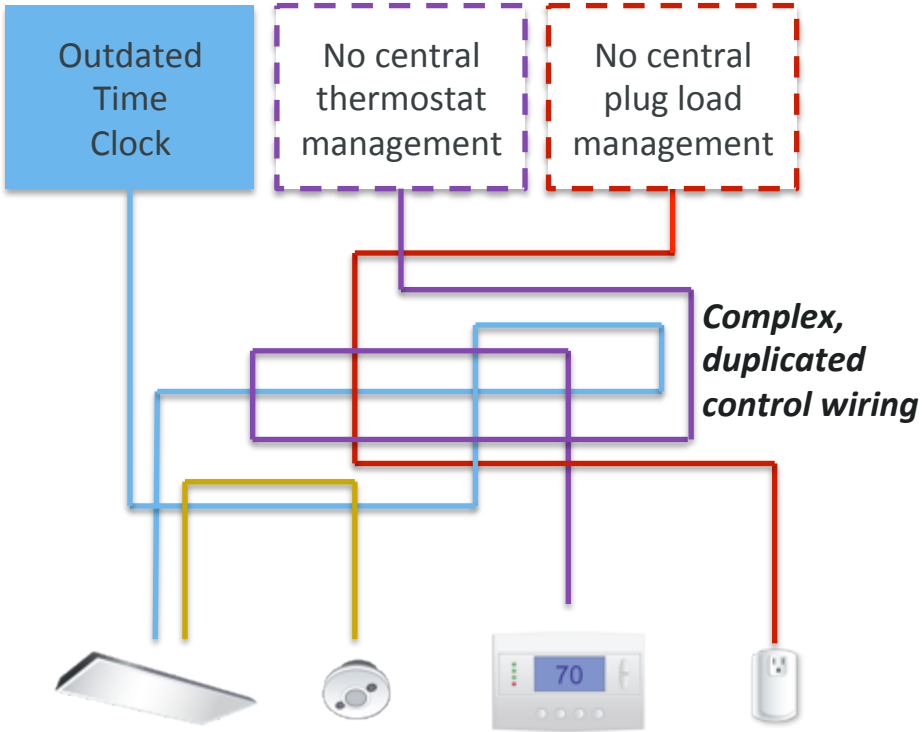
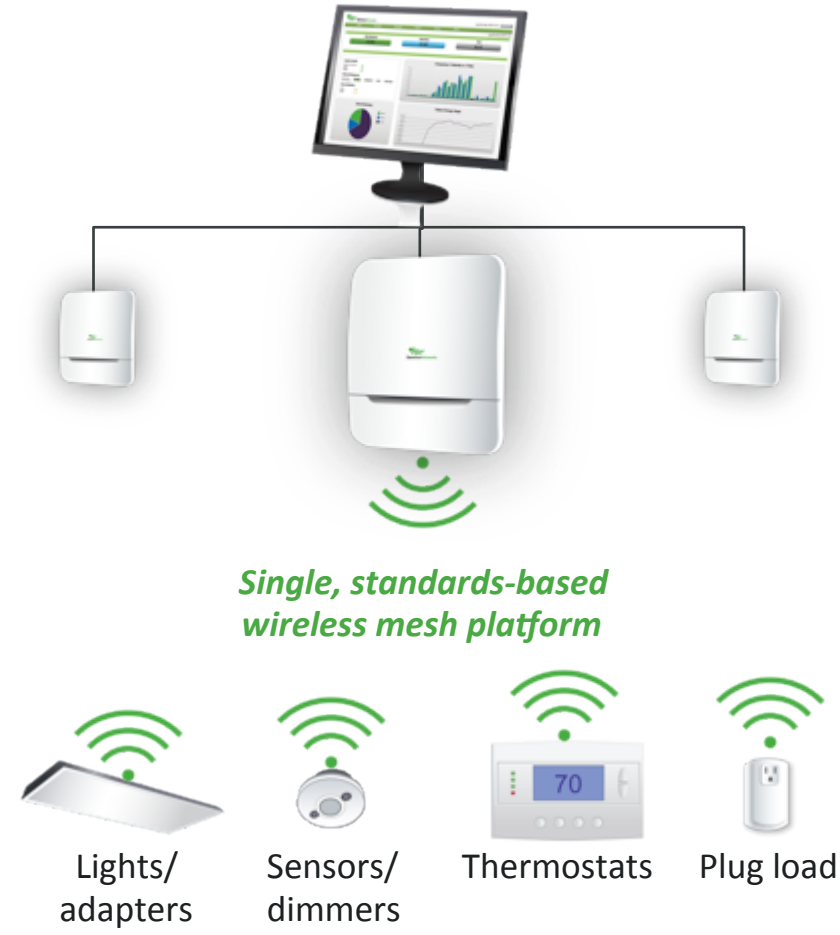
How – using a single wireless platform for all your building services – cost-effectively

Conventional Controls



ControlScope



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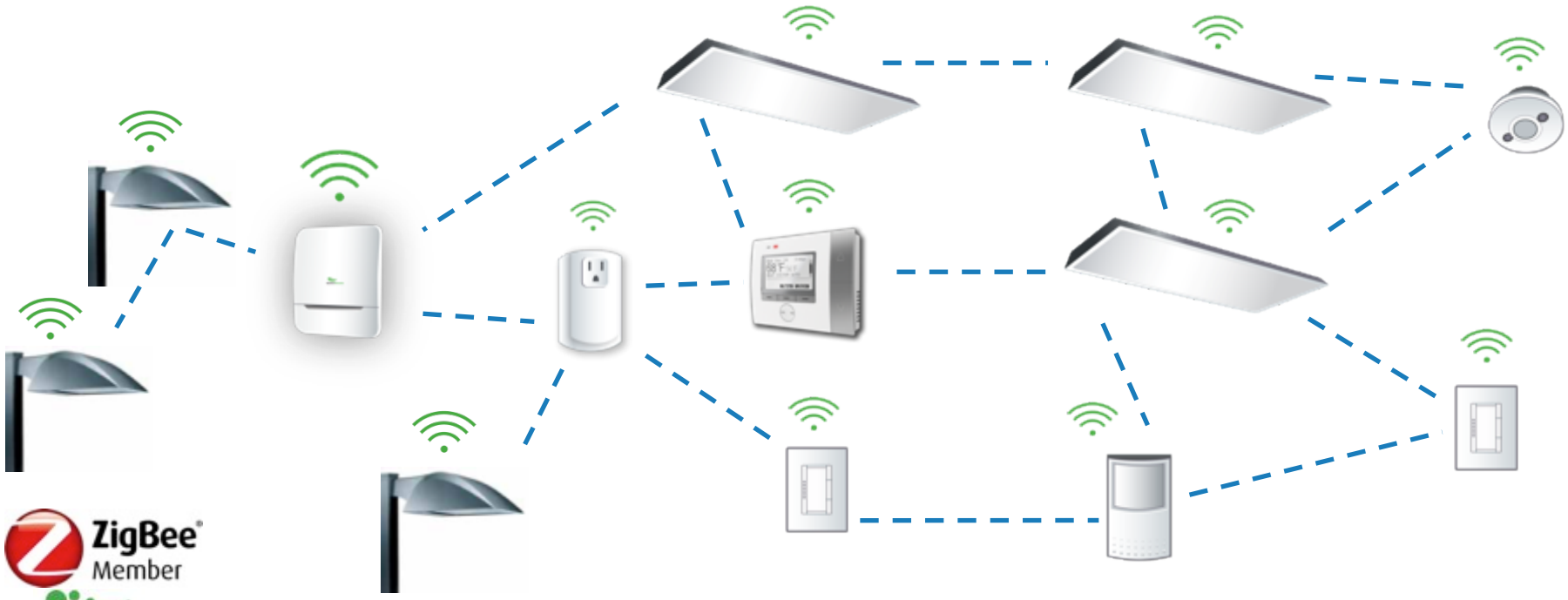
Wireless Mesh: Creating a Building Network

Every sensor, plug load, thermostat and light fixture (or group of fixtures) becomes part of a large-scale wireless communications network, with bi-directional messaging. Even if a node fails, messages automatically re-route for high reliability and self-healing.

Daintree uses the trusted ZigBee industry standard for wireless networking.



ZigBee Member

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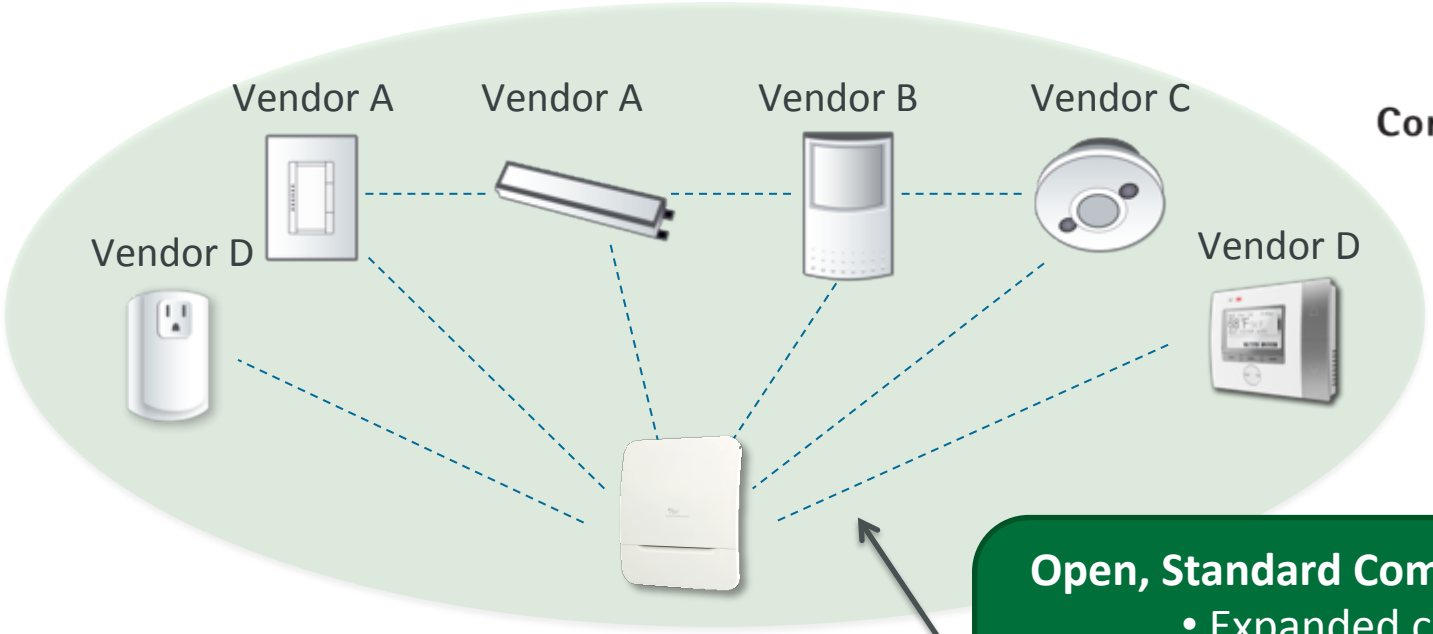
Open Standards: Eliminating Proprietary Systems

The only open, non-proprietary platform for wireless lighting controls. We use the ZigBee standard, **as written** – so vendors' devices (lighting and more) can **interoperate.**



ControlScope CONNECTED

Open, Standard Communications
- Expanded choice
- Volume = lower cost components
- Trust in reliability & longevity
- Extensible to more than lighting

ZigBee Member

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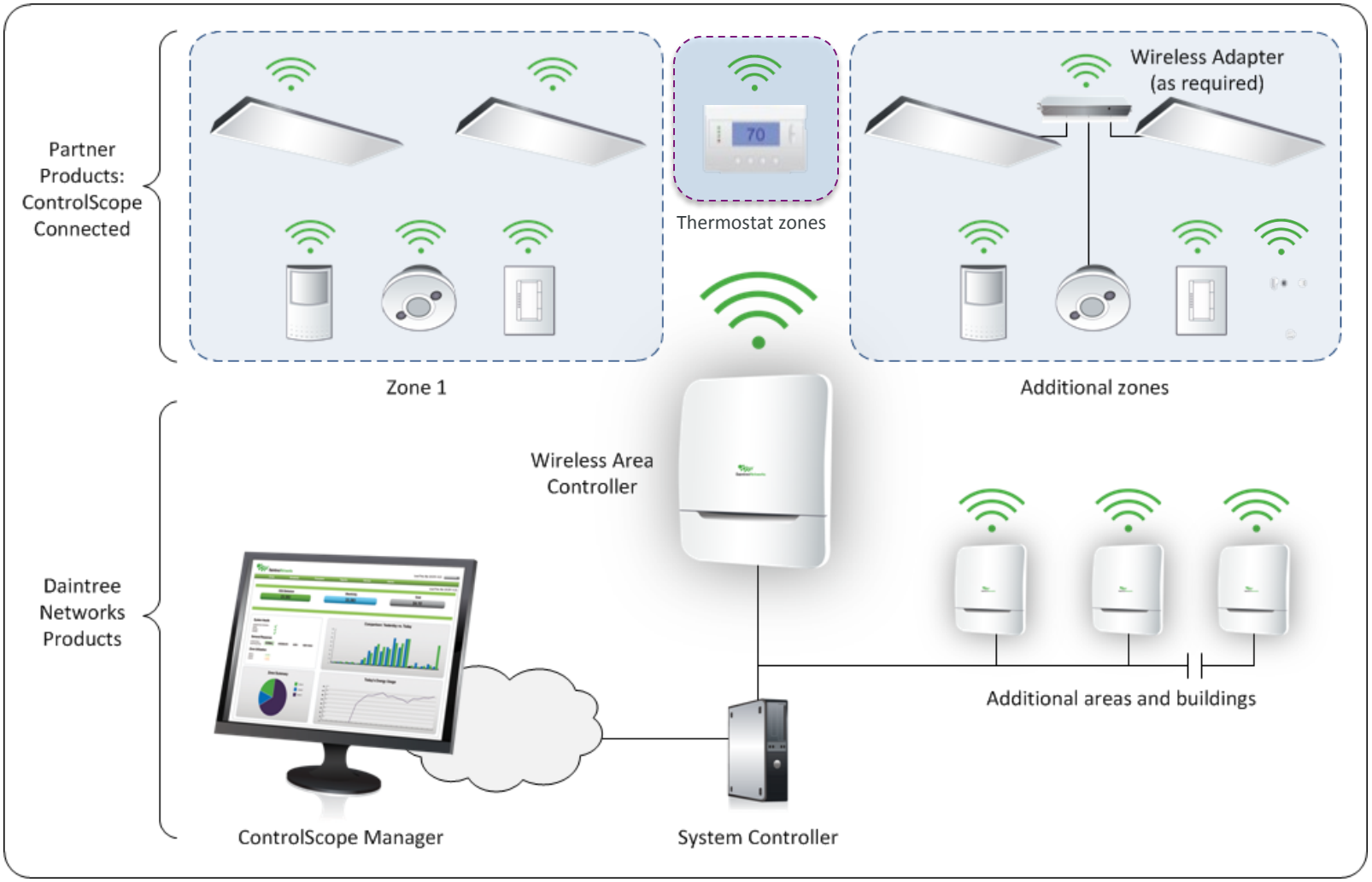
How Daintree's ControlScope System Works



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Deployment model depends on whether a BMS exists and what building services need to be managed

Commercial Office

Small Retail, Branch & Food Service

Warehouse & Industrial

BMS

BACnet

HVAC

Security

Lighting

Plug Loads

Facility under BMS control

System Controller in Data Center/ Cloud

Internet

Each facility has a single WAC, managed centrally on a turnkey system

Lighting

Plug Loads

Packaged Thermostats

Environmental Sensors

Power Monitoring

Lighting

Plug Loads

Packaged Thermostats

Environmental Sensors

Power Monitoring

Facility under single turnkey wireless system control

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Break!

Danfoss

EE and DR Benefits of Variable Speed Air-Conditioning and Heat Pump Technology

ET Open Forum

June 12th, Sacramento, CA

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Product (Technology) Overview

Variable Speed A/C and HP

- Mature: nearly 100% in Japan
- Emerging: in USA

Market Sectors:

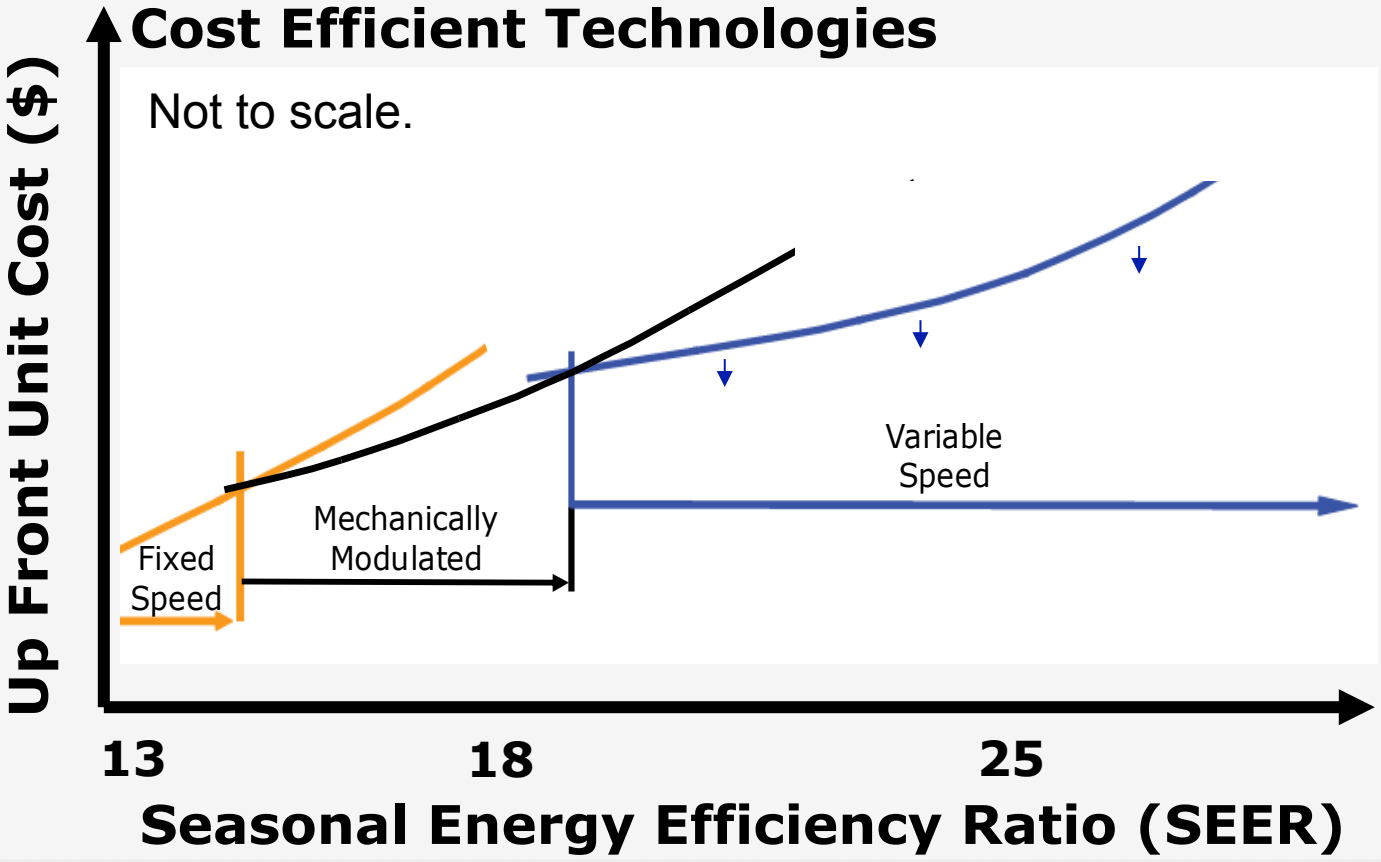
- Residential (today's topic)
- Commercial roof tops
- Chillers

Customer and Utility Benefits*:

- Energy efficiency (+30%)
- Heating capacity (+60% at 17°F)
- Superior DR & peak load price performance

* Compared to same sized fixed-speed unit

Competitive Landscape



Competitive Landscape

Parallel EE and DR (PR) benefits

- Saves energy
- Reduce peak demand more effectively
- Regulate load through transient situations
- Improves power factor and power quality

First costs—higher but gap is declining:

- 3 to 5 year simple payback

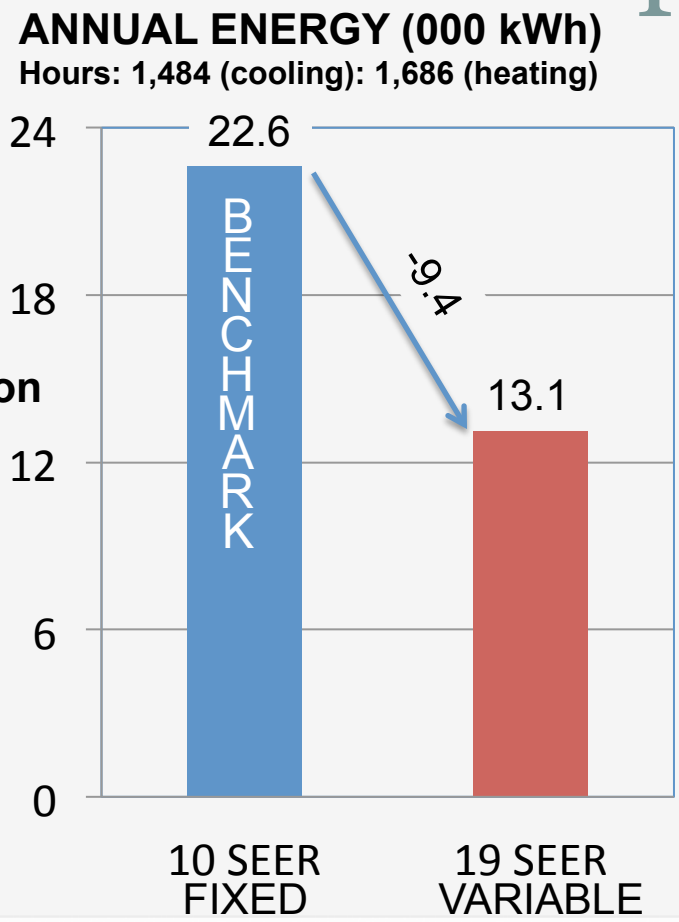
Current industry work:

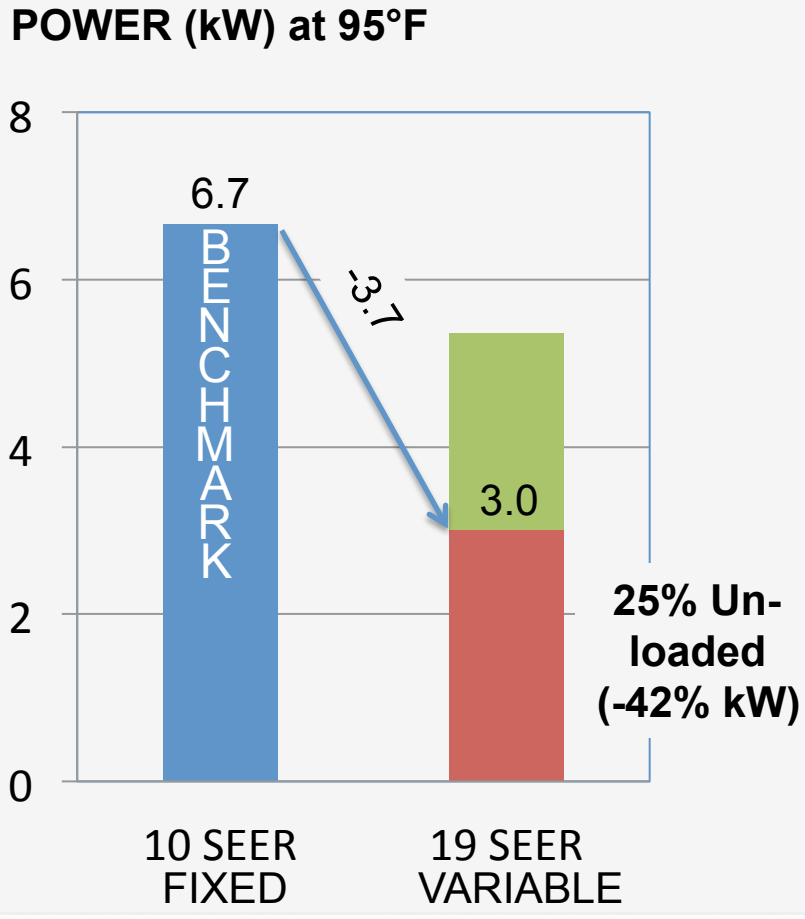
- DR performance standards
- Communication standards

Coordinated EE and DR programs needed

Product Impacts and Limits

5 Tr Heat Pump Simulation





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ETCC Presentation

June 12th, 2013

Ingersoll Rand
Residential Solutions

Ingersoll Rand Residential Solutions

Compelling Brand Experience

- Highest brand preference
- Strong channel
- Employee engagement with brands

Cost-Effective Solutions

- Operational excellence
- New product designs
- Total market focus

Differentiated Solutions

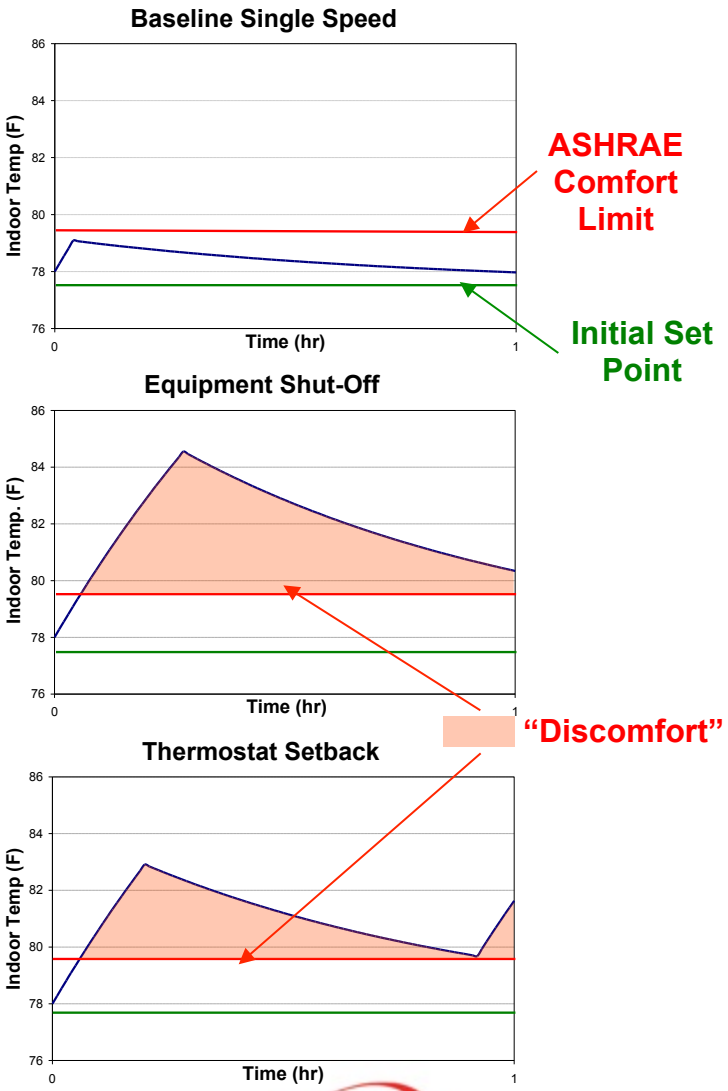
- Nexia offering to all of our channels
- Touch screen deadbolt
- Quality and reliability leadership

Today's Agenda

- **Variable Speed and Demand Response – Homeowner's View**
- **Nexia Demand Response**
- **System Diagnostics**
- **Launch Timing**

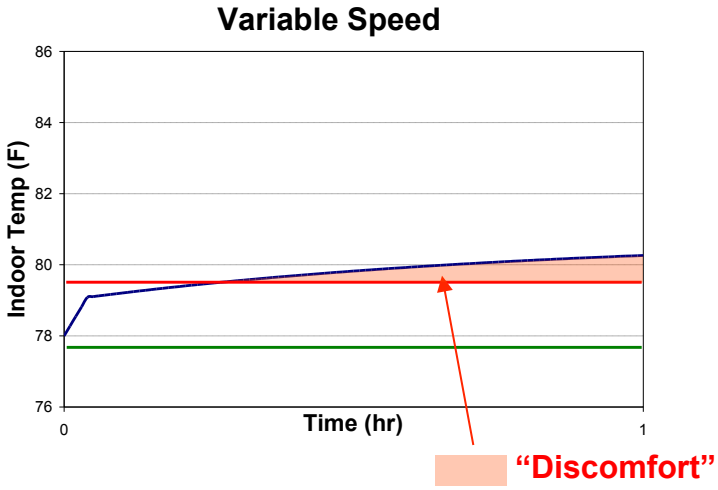
Smart Grid/ Demand Response

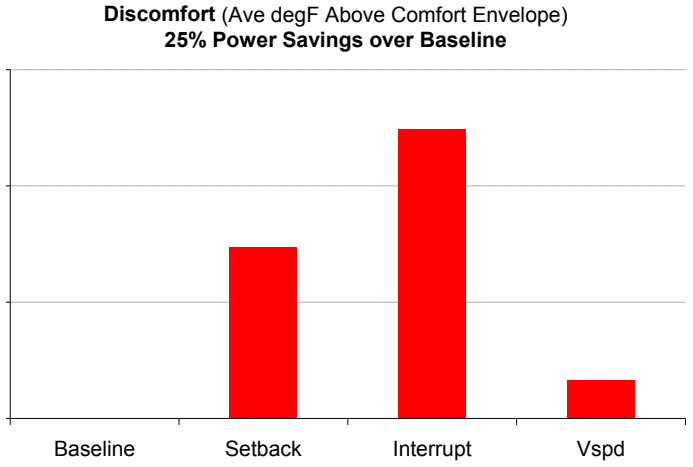
- **Modeling a DR Event**
  - Set Baseline Conditions
    - 13 EERA Equipment
    - Single Stage A/C
    - 100 deg F Day
  - Target 25% Energy Savings
  - Today's Technology
    - Equipment Shut-Off
    - T-Stat Set Back



Future System Opportunity

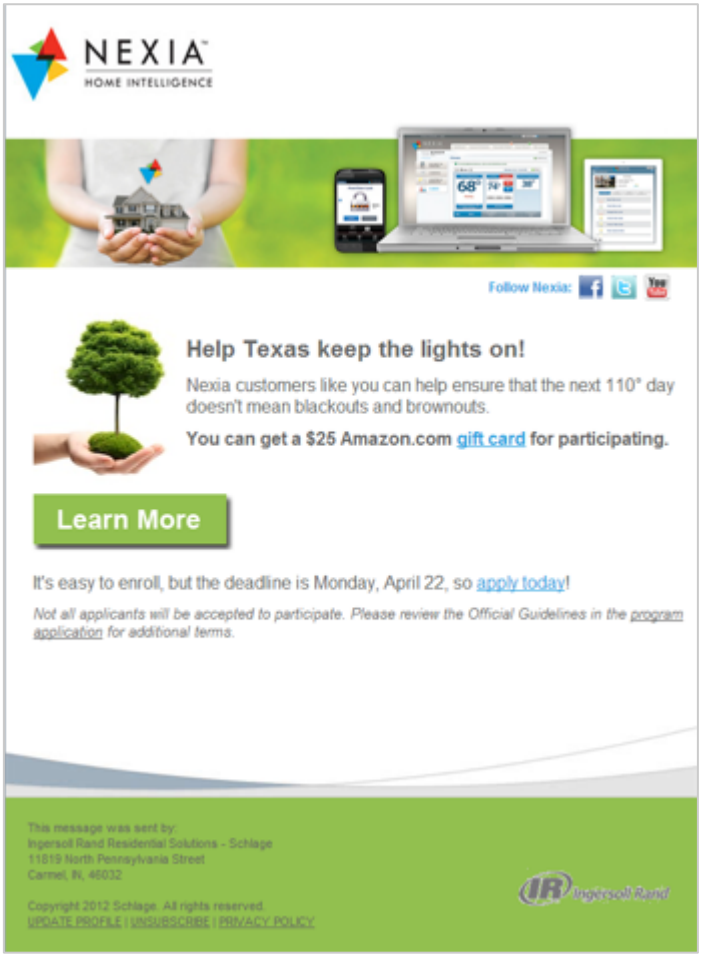
- **Variable Speed Systems**
  - 13 EERA Equipment
  - 100 deg F Day
  - Same Sizing As Baseline
  - Same 25% Energy Savings
  - Significantly less “Discomfort” for the Consumer





Nexia Demand Response

- **3 Pilot Programs this Summer**
  - **Austin Energy**
  - **ERCOT**
  - **Southern California Edison**
- **Existing Nexia Customers**
- **Different Customer Value Propositions**
- **1 Year Pilot Program**



System Diagnostics

- **Initial Launch of Portal This Summer**
  - **Dealer-Oriented**
  - **Validate System Configuration**
  - **Access System Data from Office**
  - **Aggregate Alerts Across Installed Base**
- **Fully-Featured Launch with Variable Speed**
- **Opportunities to Work with Partners on Broader Diagnostic Information**

Market Timing

- **Variable Speed**
  - **Late ‘13 / Early ‘14 Launch**
  - **20 SEER Systems**
  - **Field Trials In Process**
  - **Production-Representative Samples Available for Testing**

- **Nexia Demand Response**
  - **Now Active for Summer 2013**

- **Diagnostic Portal**
  - **Launching This Month**

Thank You

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www.ingersollrand.com

Presentation to ETCC

June 12, 2013

PROBLEM

- Vapor compression chillers:
  - Consume significant electricity
  - Drive peak electricity demand (>50% in some buildings)
  - Use ozone-depleting HFCs, CFCs & HCFCs
  - Costly to maintain
  - Cannot run on heat energy (waste heat, solar thermal, gas)

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A Potential Solution…

- Absorption chillers are powered directly by heat energy (gas, waste heat, solar thermal) & *No* ozone-depleting refrigerants

But…

- Absorption chillers are not very efficient. Also, expensive, bulky, customized to each site, costly to maintain (pump failures, etc.), have safety concerns (ammonia leaks).

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What if an Absorption Chiller was:

- Highly Efficient
- Safe
- Reliable
- Easy to Install
- Compact
- Upwardly Scalable
- Affordable

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The IceBook

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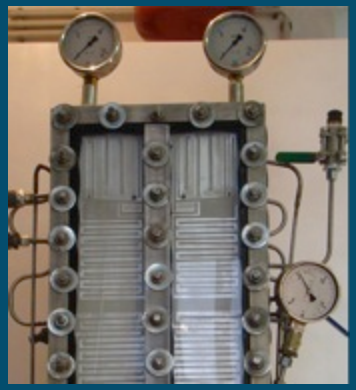
Micro-Channel Absorption Chiller

The Icebook is as big an advance over existing absorption chillers…



…as the integrated circuit was over the valve and transistor

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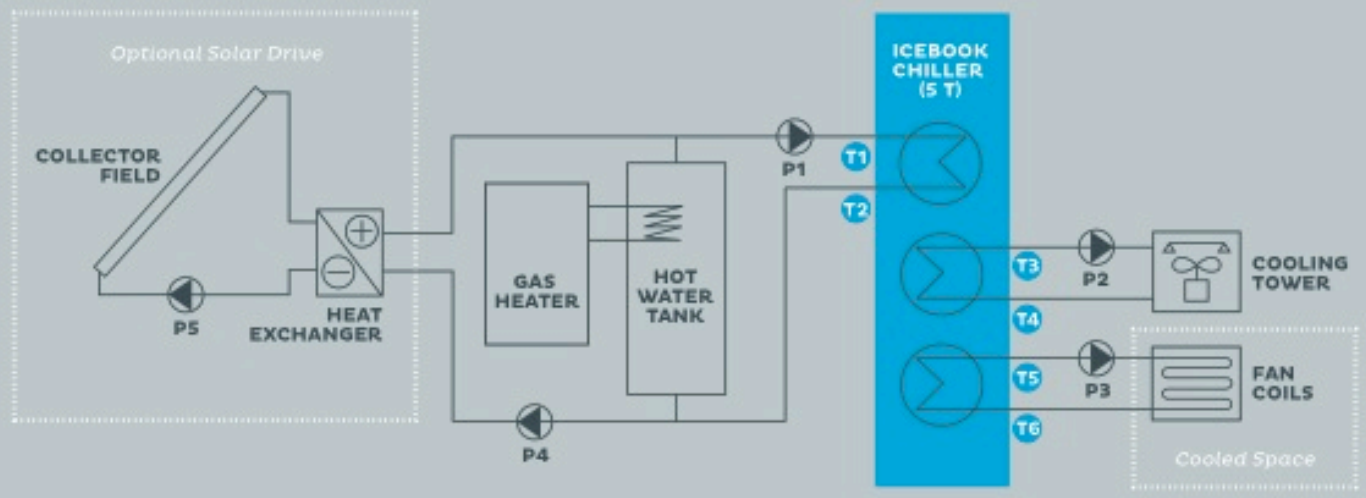
TYPICAL CONNECTION SCHEMATIC FOR 5 TON ICEBOOK (17,600 kW$_{REF}$)



TEMPERATURE GUIDELINES

Differs depending on location and installation

- T1 = 91°C / 195°F
- T2 = 71°C / 158°F
- T3 = 39°C / 102°F depends on ambient conditions
- T4 = 29°C / 84°F depends on ambient & cooling tower efficiency
- T5 = 10°C / 50°F
- T6 = 16°C / 61°F

PUMP GUIDELINES

Differs depending on location and installation

- **P1** = 1350 L/Hr (357 gal/Hr)
- **P2** = 4200 L/Hr (1110 gal/Hr)
- **P3** = 2530 L/Hr (668 gal/Hr)
- **P4, P5** depends on solar collector field design

Based upon modeling data and lab testing. Real world performance may vary.

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The Ice Book

- New chiller based on an entirely new thermodynamic cooling cycle: A Micro-Channel Absorption Chiller
  - Entire absorption cycle is cut into a flat sheet as micro-channels
  - Sealed by 2 solid sheets on either side, under pressure
- No ammonia pumps
  - Most expensive part of legacy absorption chillers
  - Prone to breaking & causing ammonia leaks
- Compact size (1 Ton basic unit size)
  - Allows installation in small spaces
  - Rooftop or mechanical room

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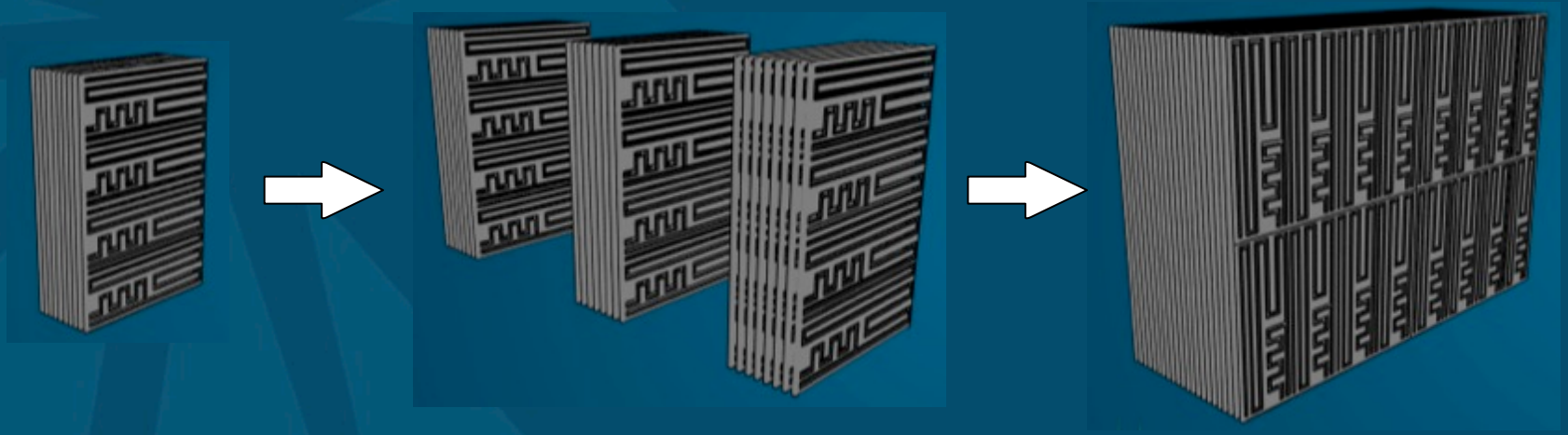
LINEAR SCABILITY



Scales upward like servers in a server rack…

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Features

- Highly Efficient
  - Saves End User $$$ and reduces GHG emissions
  - Input temp as low as 167°F (75°C) {not possible with legacy absorption chillers}
  - 195°F input temp results in COP ~ 1.0
  - Higher driving temps result in even higher COP
- Affordable
  - Installed cost < 50% of legacy absorption chillers
  - 35+ year lifespan
  - Low O&M due to sealed system, no moving parts & no ammonia pump
- Less than 5% of ammonia of conventional absorption chillers
  - Hermetically sealed
  - Alleviates safety concerns
  - No HFCs, CFCs or HCFCs

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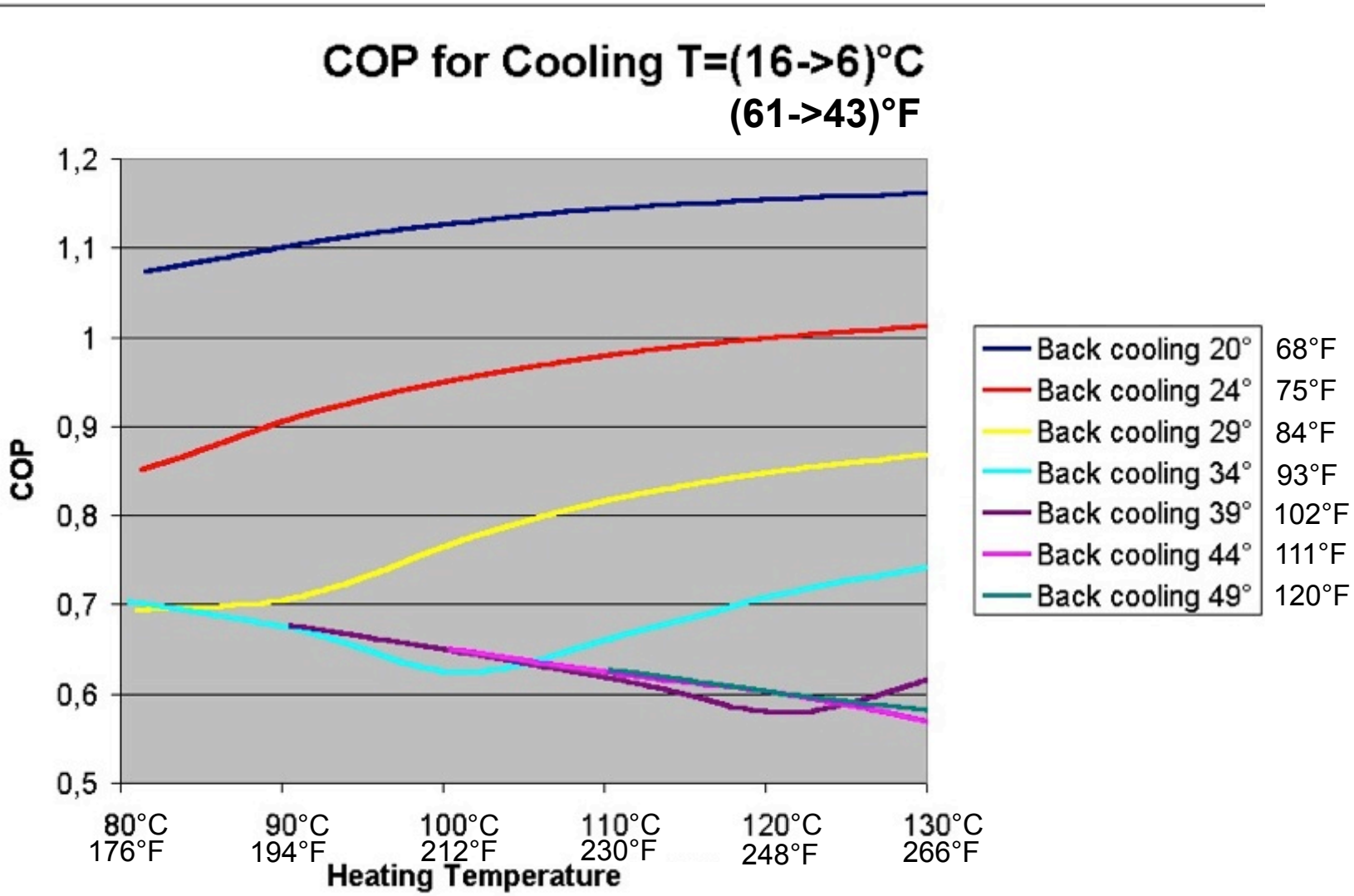

Based upon modeling data and lab testing. Real world performance may vary.

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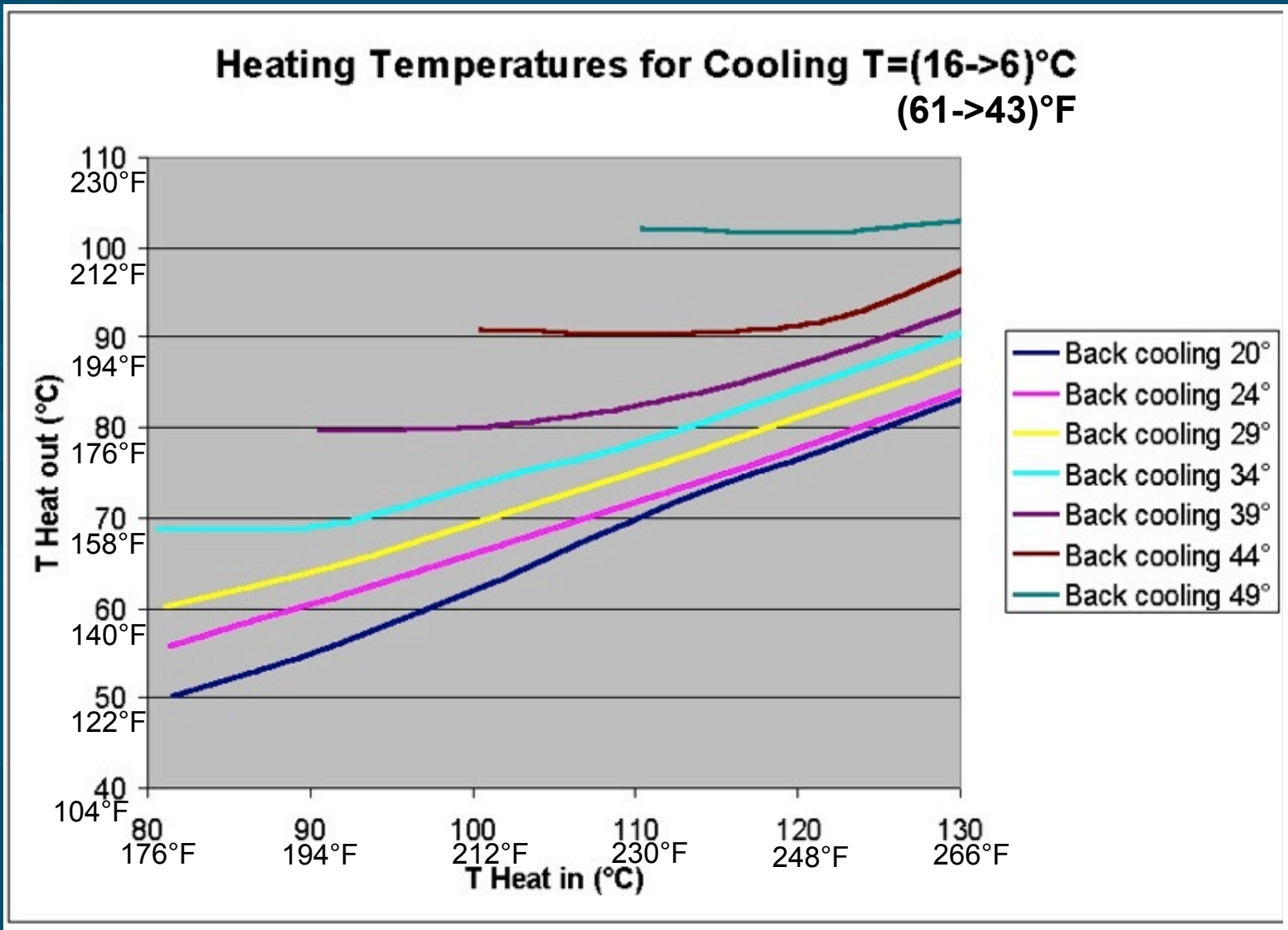

Based upon modeling data and lab testing. Real world performance may vary.

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Applications

- Powered by Solar Thermal
  - First affordable solar cooling solution to be available
  - Up to 80% electricity reduction
- Powered by Gas
  - Utility savings for Customers
  - GHG emissions reduced (only ~35% of energy produced by gas-fired power plant reaches end user)
- Powered by Waste Heat
- "Net-Zero Energy Ready" Hybrid Installations
  - Install with Gas now… Ready for Solar Thermal at any point

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Applications

- Compact size
  - 1 Ton basic IceBook size (due to micro-channel design)
  - Scales upward to 150+ Tons
- Wide number of applications where absorption chillers not typically used
  - Larger Applications: Commercial central HVAC systems for Office Buildings
  - Smaller Applications: Commercial RTUs, Residential
  - Data Centers
  - Other applications: Chilled drinking water, refrigeration, cold rooms, disaster relief ice making

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Thank you

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Lunch

ZIP Economizer™

BELIMO Americas

ET Open Forum

June 12th, Sacramento, CA

EMERGING TECHNOLOGIES COORDINATING COUNCIL

BELIMO

Product Overview

- The ZIP Economizer is a digital economizer system with a 2x16 LCD user interface and a modular form allowing for future functionality

- It is designed for improved energy savings, reliability, and ease of use, and is suited for retrofit of older analog economizer systems and for new direct expansion electromechanical Roof Top Units (RTUs) 2-30 tons to provide Free Cooling, Mechanical Cooling Management, and Demand Control Ventilation (DCV)

- Belimo developed the ZIP Economizer in direct response to the many market studies that indicated that the existing solutions were both unreliable and complicated. As a company that continually introduces damper actuator and control valve products that are market transforming, we felt is was time to expand from products to solutions. The economizer system, as such a performance device, is a natural progression.

Market Problem

- High Limit setting incorrect in 72% of economizers
- Sensors problematic in 20% of economizers
- 24% of damper don't move - drive components broken
- Service Technicians have challenges troubleshooting
- CEC T24 Economizer Acceptance Test timely to run, estimated ½ - 2 hours

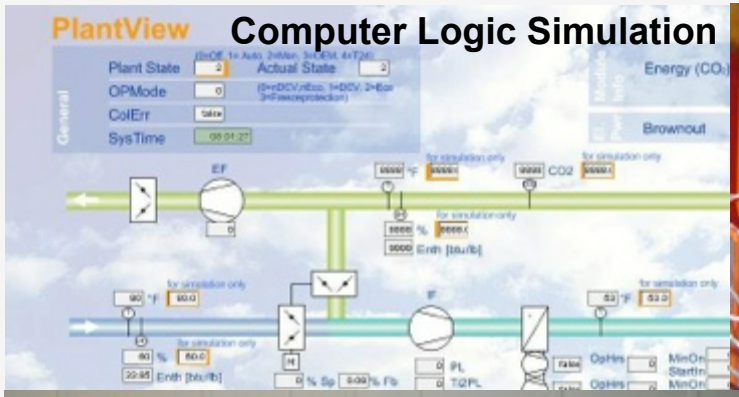
ZIP Economizer Solution

- T24 High Limit configured by job location ZIP Code
- Higher quality, better protected, calibration traceable sensors
- Use of direct drive actuators and FDD for proper operation
- FDD alarms and alarm history, on-board information "help text"
- Built in NA7.5.4 (Economizer) test < 5 min, also modes for NA7.5.1.2 (Ventilation), NA7.5.2 (RTU), NA7.5.5 (DCV)

Additional Functionality – Energy, Safety, Comfort

- 2nd stage (compressor) on limit when SAT is satisfied
- Mechanical Cooling (compressors) off limit when OAT is low
- Damper must be full open before 2nd stage “Integrated Cooling” initiated and remains open until 2nd stage is satisfied
- SAT low limit disables compressor(s), until temperature recovers
- Minimum On/Off compressor run time
- No simultaneous On/Off of compressors 1 and 2
- Brownout protection to disable compressors
- Blackout random On delay
- Pre-Occupancy Purge input

Lab Functional and Environmental Testing



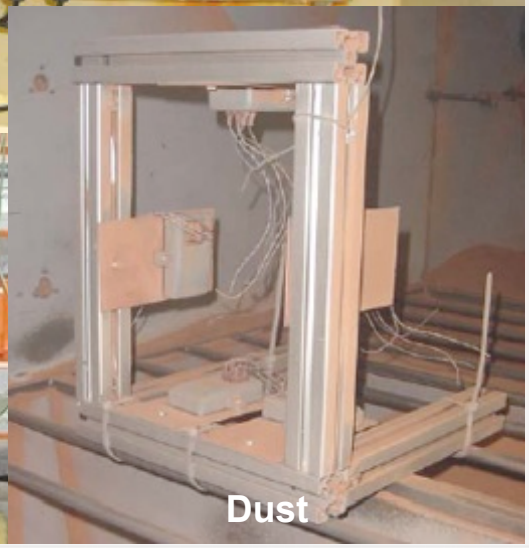
Computer Logic Simulation

Salt Spray

Psychometric Chamber Analysis

Computerized Sequencing

Vibration


Dust

ETCC EMERGING TECHNOLOGIES COORDINATING COUNCIL

BELIMO

Field Functional and Environmental Testing

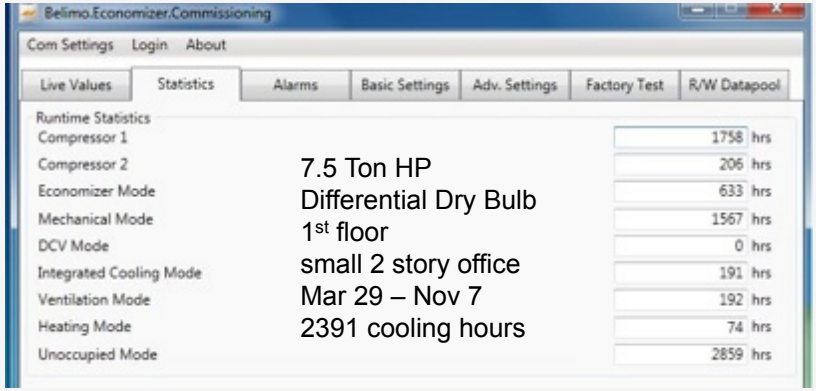
Competitive Landscape

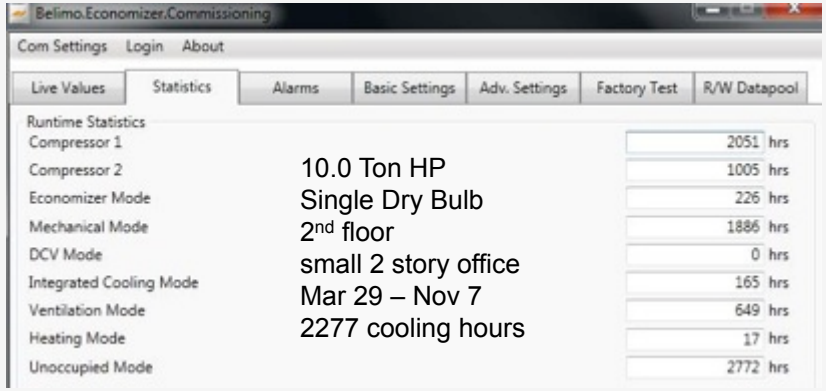
- This new digital system is focused on replacing 20th century generation analog economizer controls, sensors, and actuators

- The market leader for existing analog economizer controls, sensors, and actuators is Honeywell. There is additional competition from resident RTU OEM solutions (e.g. Lennox Prodigy™, Trane ReliaTel™, Carrier PremierLink™…)

- There has been limited market competition for a unitary RTU economizer solution until now. We believe that providing a better solution supported with award wining technical support will result in market share.

Product Impacts and Limits





- The 2011 CASE report indicated economizer savings from 76 kWh/yr – 418 kWh/yr dependent on building use and climate zone.
- We would argue it is also dependent on changeover strategy, sensor location, room set point, occupancy program, equipment sizing…
- Approximately 25% of the RTUs are sold with OEM or other DDC controls. In this case the ZIP Economizer is not suited for new or retrofit installation.

CONTACT INFORMATION

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Networking and Sustainability

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www.ZIPeconomizer.com

Emerging Technologies with HVAC Controls

INNOTECH AMERICA

SMUD

LIVINGSTON ENERGY INNOVATIONS

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Softwar
e

Energy

Controls

BMS

INNOTECH Innovative technology

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Did you know?

INNOTECH AMERICA

- Innotech are a 100% privately-owned company of DDC/BMS/ EMS Products.
- Innotech Product has been manufactured for 28 years and have been operating in North America for 10 years.
- Innotech operate on a global scale and have 23 dealers across North America, and export internationally to over 12 countries including Asia Pacific, Europe and South Africa.
- Innotech pass on all of their software tools at either no cost or a once off cost. In this respect there is no monopoly of service with the Innotech Product and life cycle costs are low. This is quite unique to our Product. Our free Maxim software ensures true “Open Technology”.
- All of our software, firmware and hardware is designed in house. Many of the designs are based on customer feedback.

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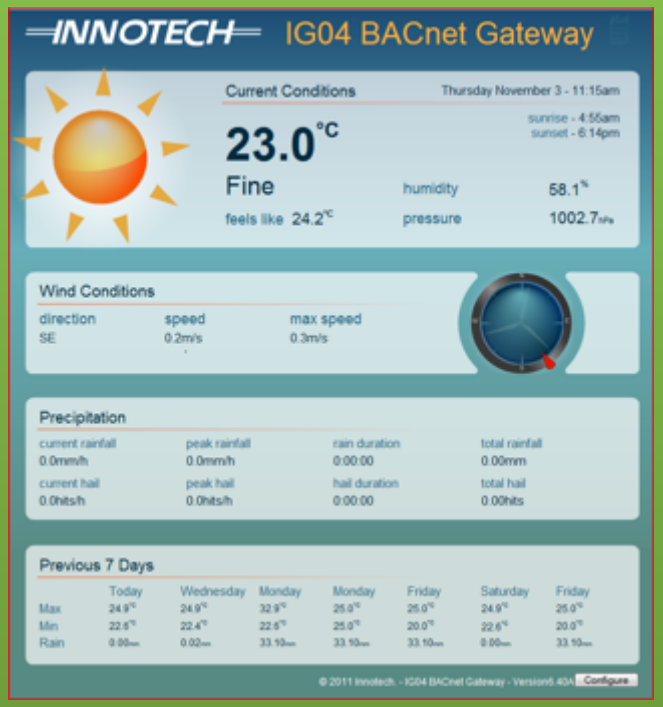
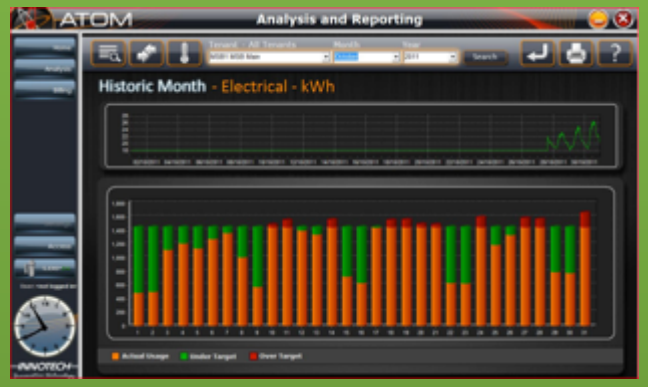
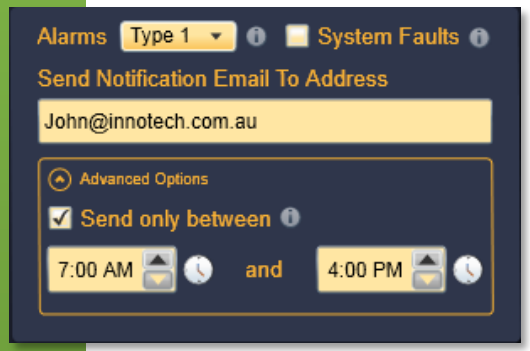
New Technology / Green Products

- InnSIGHT Supervisor Web Server
- IG04 Vaisala BACnet Gateway
- ATOM Sustainability Software

innSIGHT Supervisor Web Server







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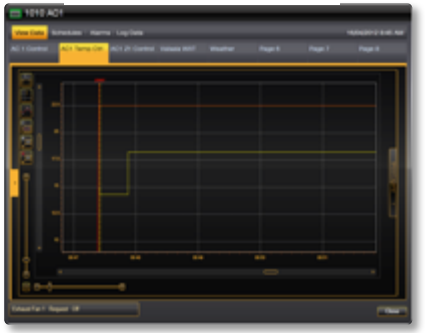
Innotech Control Systems

IWS01 innSIGHT - Real-time, Historical, Alarms

- 5 concurrent user access in a standard web browser
- Automatic population of Innotech Devices – Plug & Play
- Alarm status and adjustable email notifications
- Log data extraction and viewing from all devices in the browser
- Access to all device Time-Schedules
- All controller logs can be viewed and extracted to a CSV file
- Real-time monitoring and trending of all viewable variables



innSIGHT is a true plug and play device, well suited for:

- Commercial, retail & high-end residential developments with <128 Innotech devices
- Education facilities
- Refrigerant leak detection & alarm monitoring

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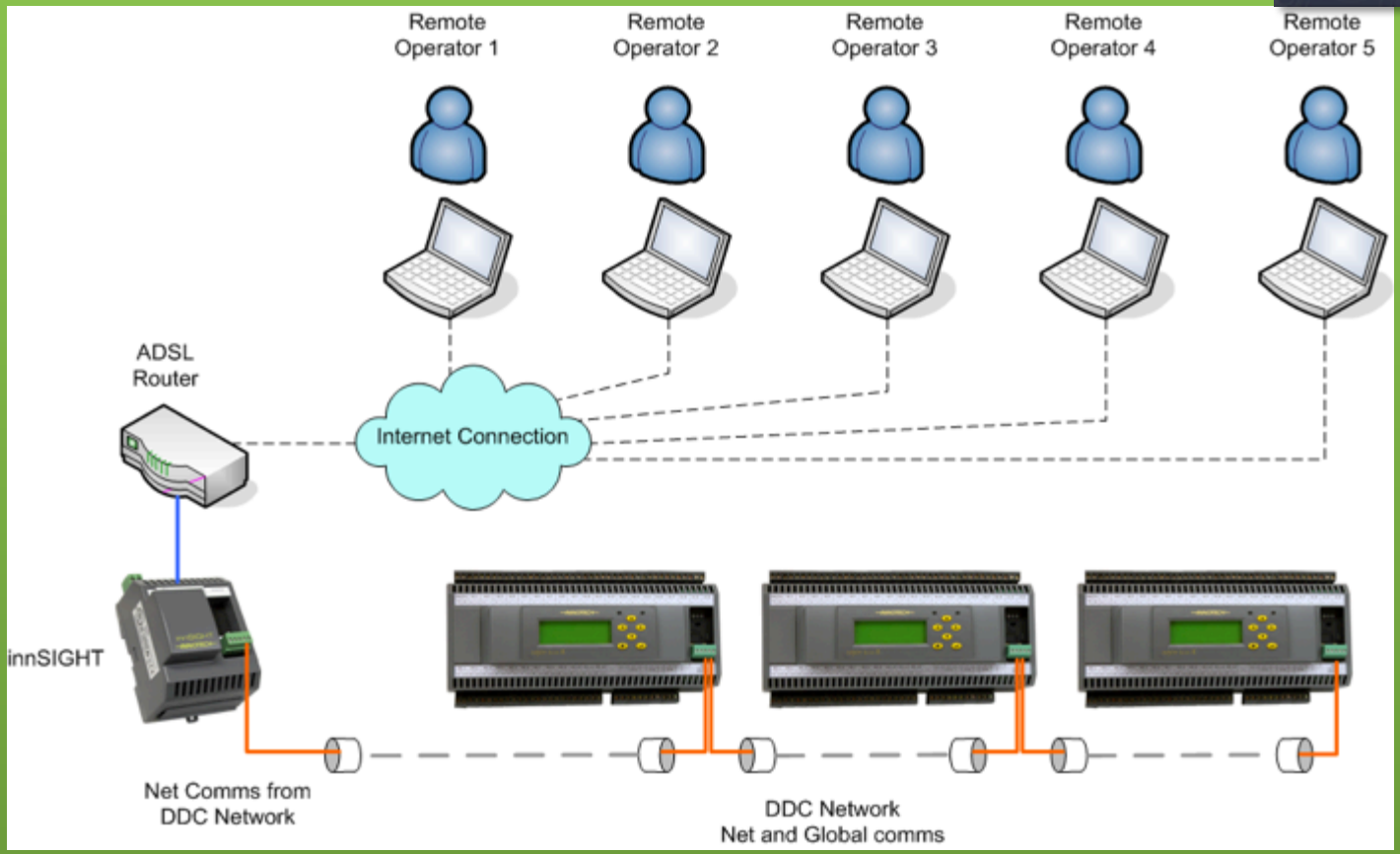
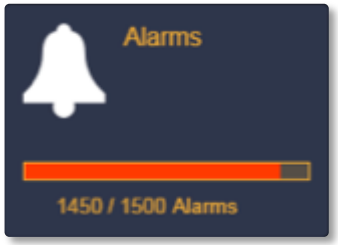
Innotech Control Systems

innSIGHT – Supervisor Web Server

Intranet or Internet connection. No dedicated computer is required!!

Connections





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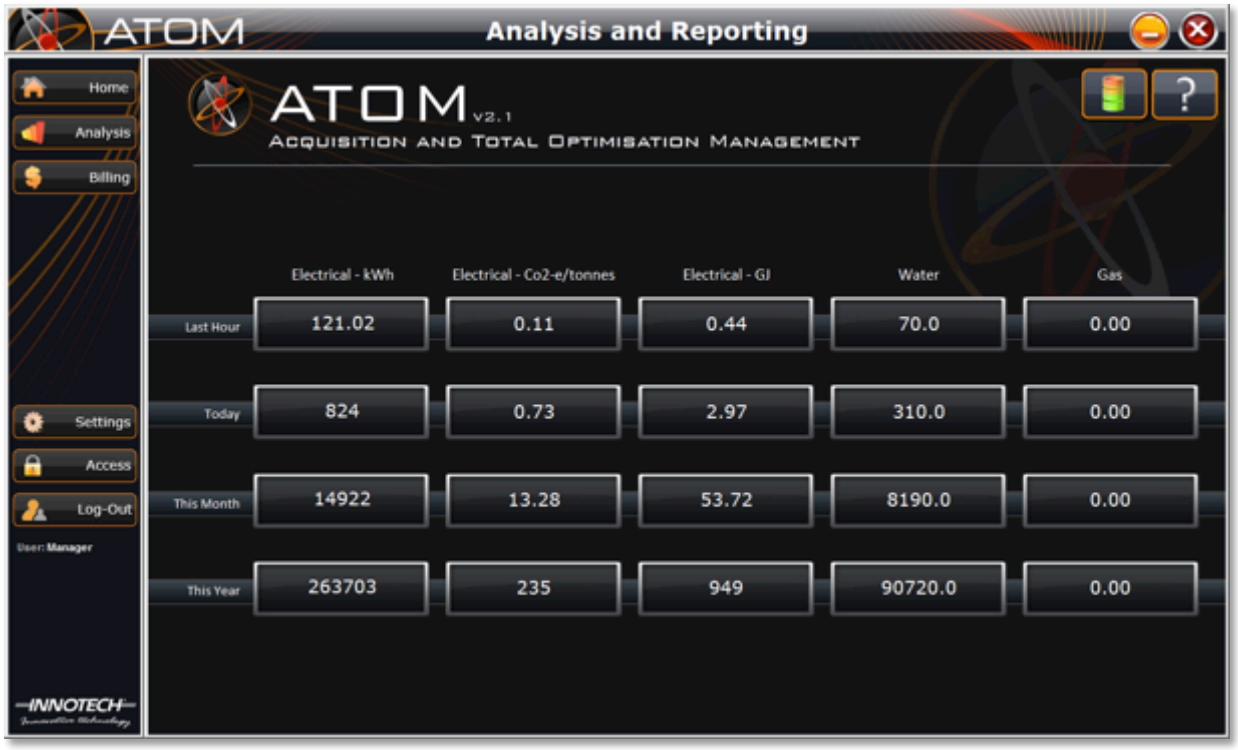
Energy Saving Ideas, ATOM.

ATOM is Innotech's data acquisition and management tool. It is not only an analysis tool, the software also includes a complete billing package as well. Used as a building monitoring tool, it provides the ability to monitor energy consumptions and the environmental impact. ATOM can be integrated into any new or existing buildings.



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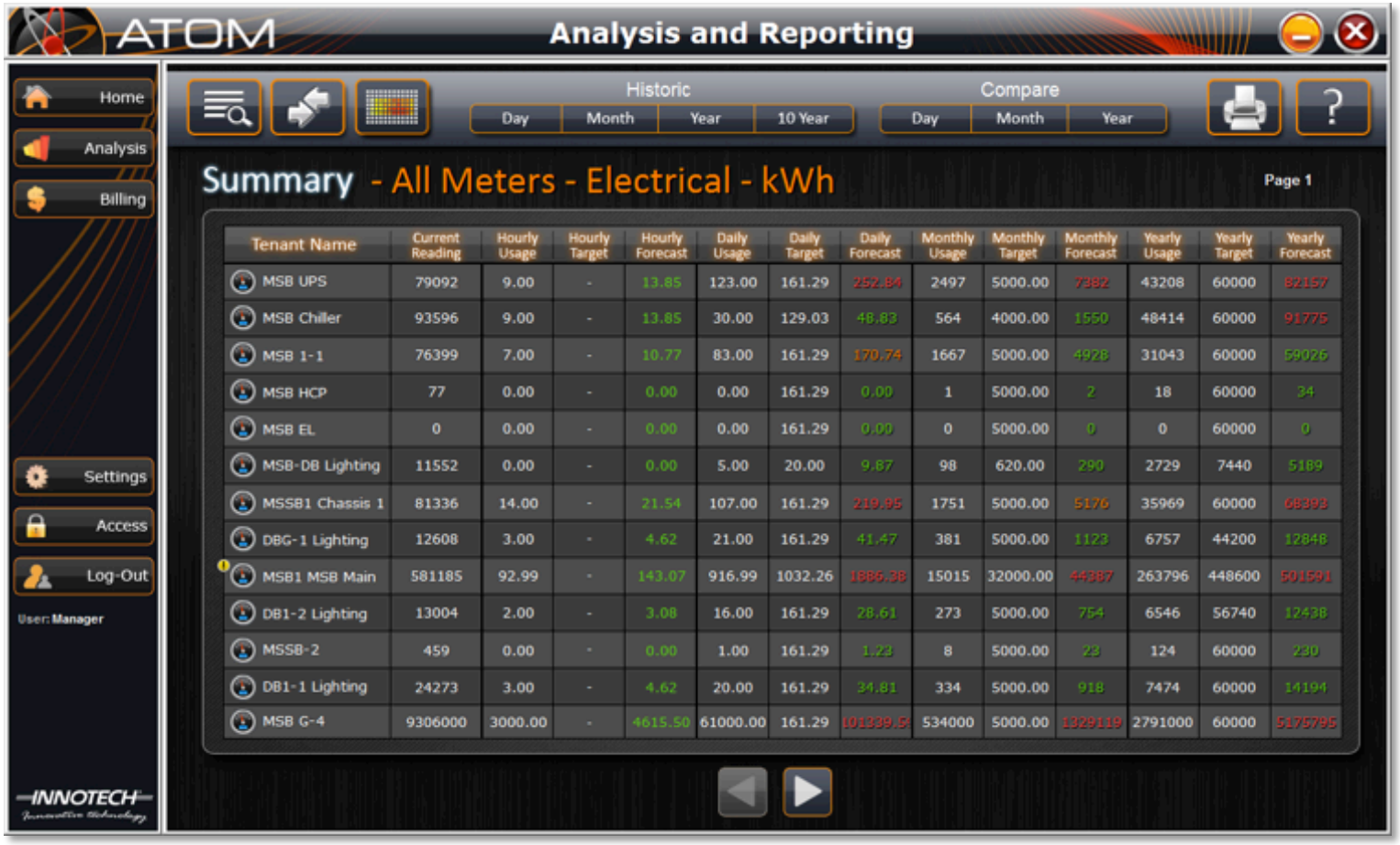
Energy Saving Ideas, ATOM – Summary Page.

The Summary page provides live and historical values for each Tenant/Meter. The operator can quickly see any meters performance including if the usage has been exceeded via configurable targets.



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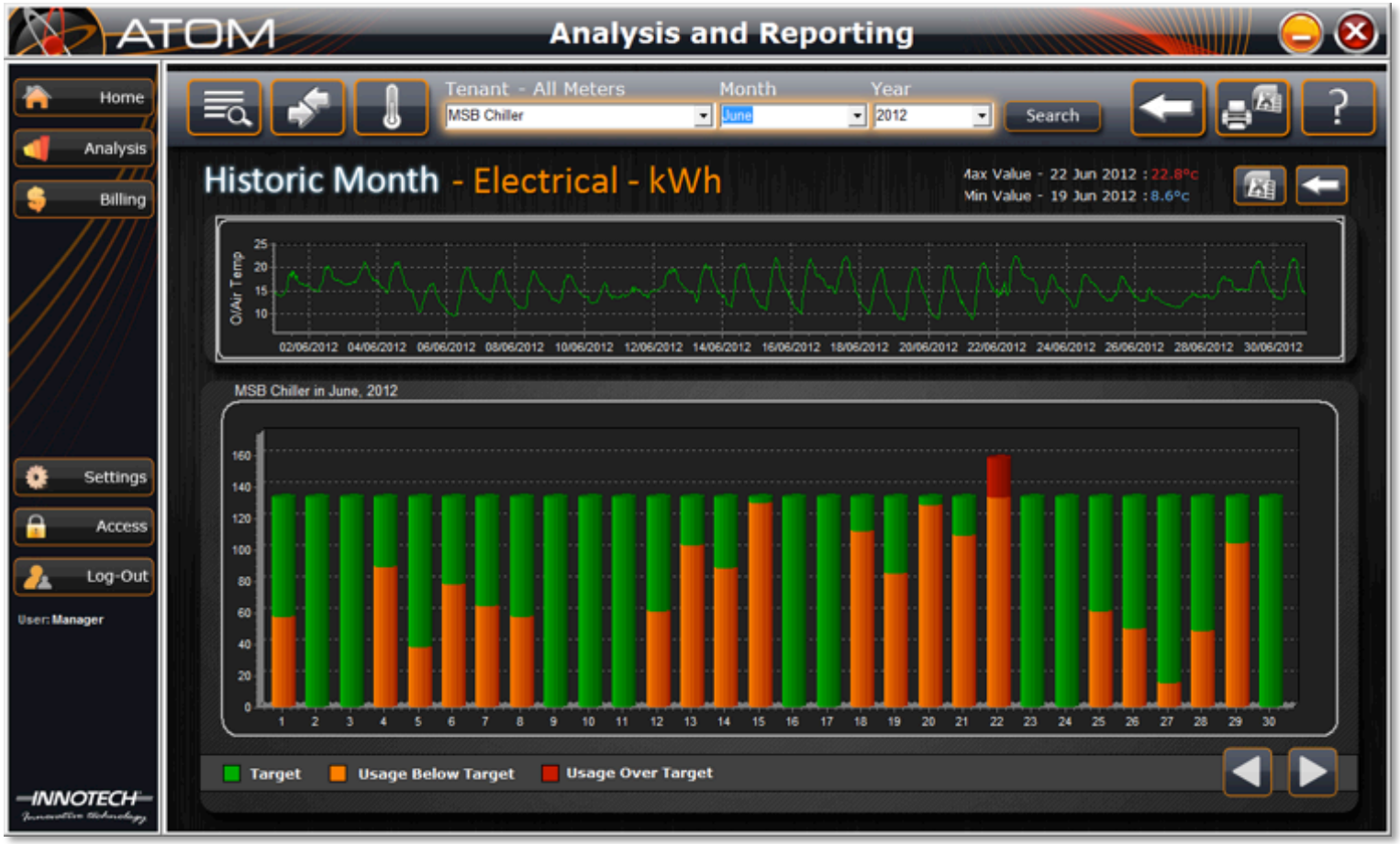
Energy Saving Ideas, ATOM - Analysis.

Detailed reporting and analysis is available for any configured Tenant connected and configured in ATOM. Daily, Monthly and Yearly historic reports can be generated. Data extraction to a CSV file is also easily Achieved.



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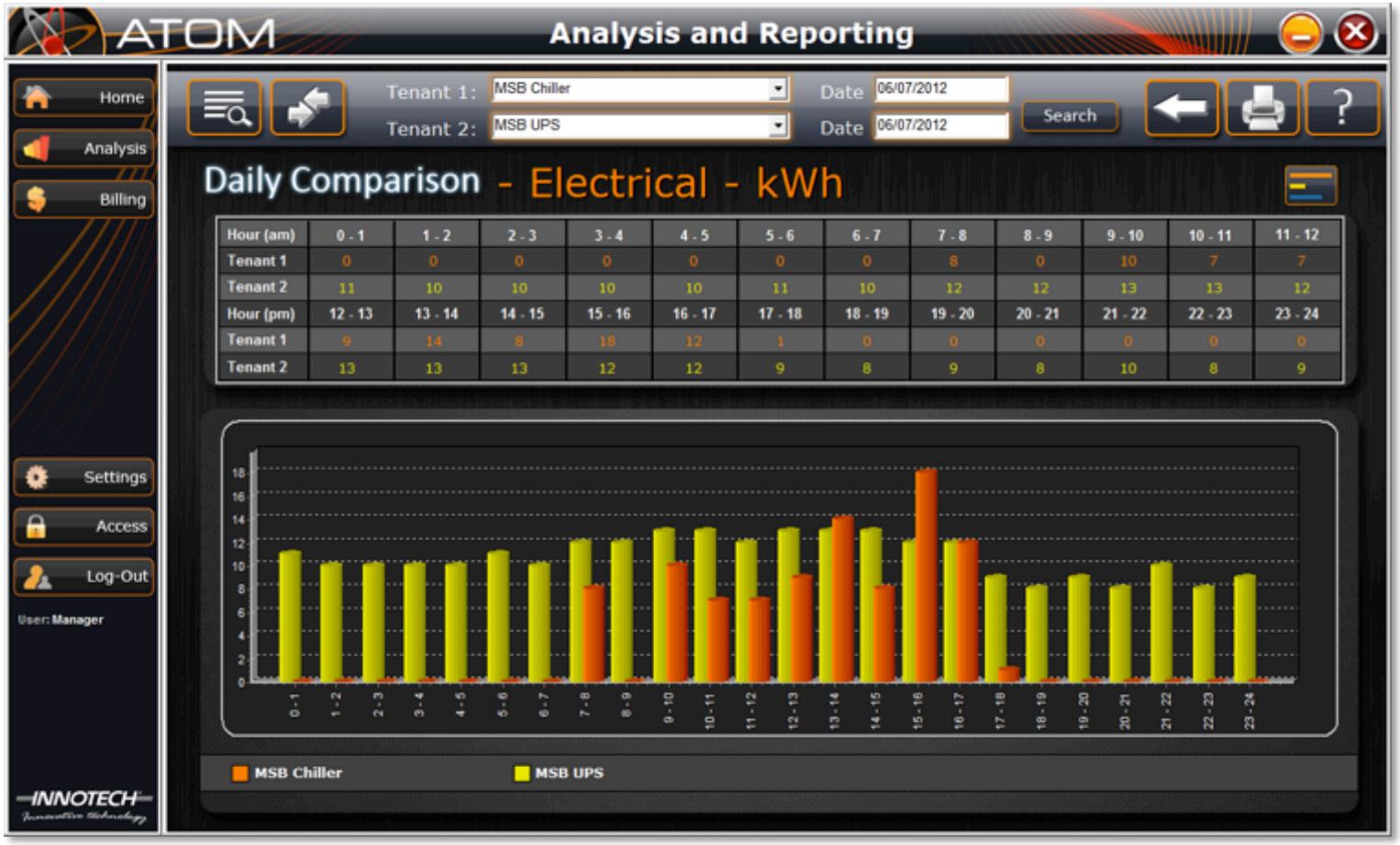
Energy Saving Ideas, ATOM - Compare.

The ability to compare any two Tenants/Meters is available. This can assist when comparing usage for separate building services/areas over time.



Hour (am)	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9 - 10	10 - 11	11 - 12
Tenant 1	0	0	0	0	0	0	0	8	0	10	7	7
Tenant 2	11	10	10	10	10	11	10	12	12	13	13	12
Hour (pm)	12 - 13	13 - 14	14 - 15	15 - 16	16 - 17	17 - 18	18 - 19	19 - 20	20 - 21	21 - 22	22 - 23	23 - 24
Tenant 1	9	14	8	18	12	1	0	0	0	0	0	0
Tenant 2	13	13	13	12	12	9	8	9	8	10	8	9

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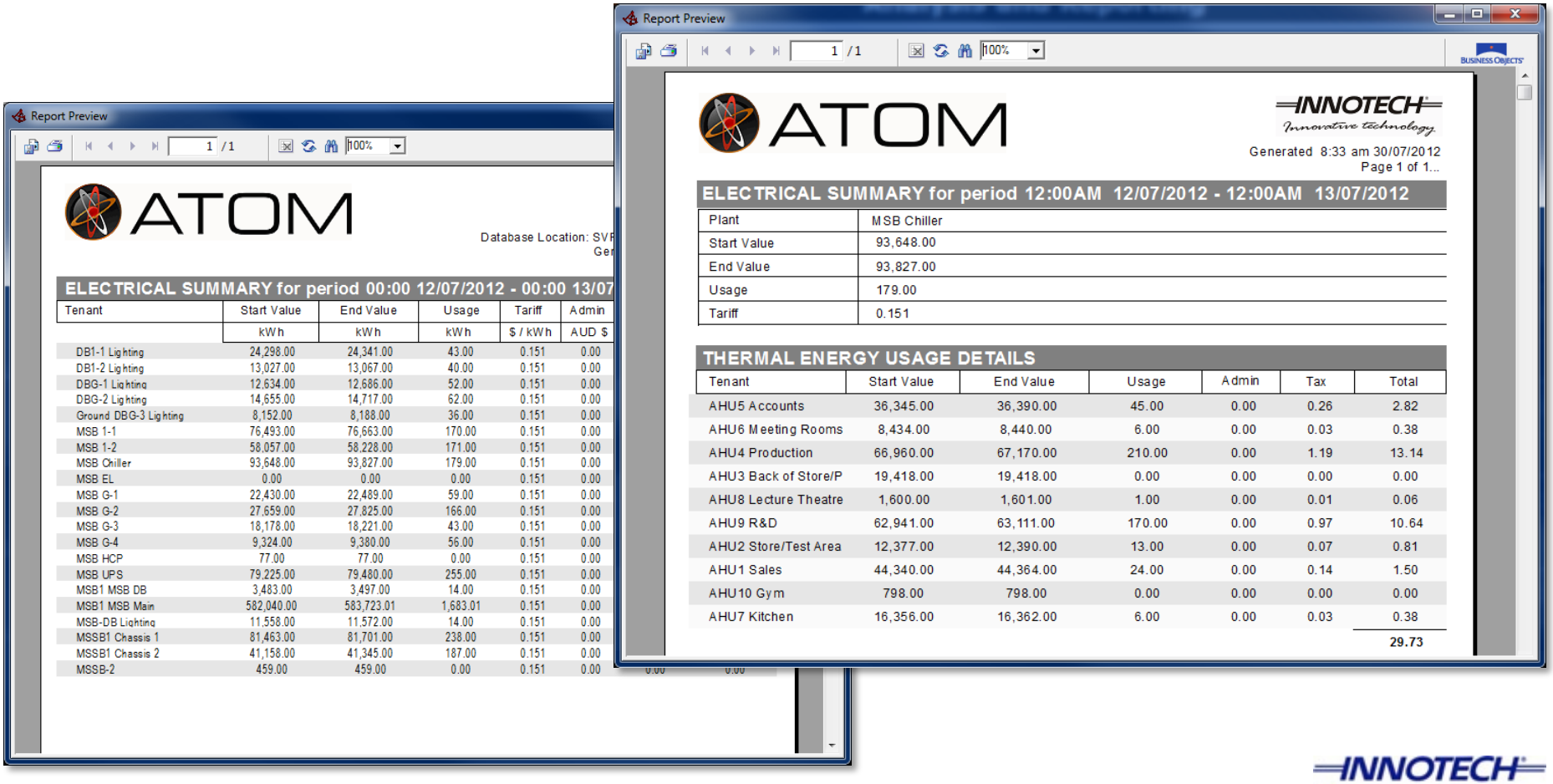
Energy Saving Ideas, ATOM – Service Billing.

Billing is possible for the configured services. The bills can be generated in total or individual tenants.



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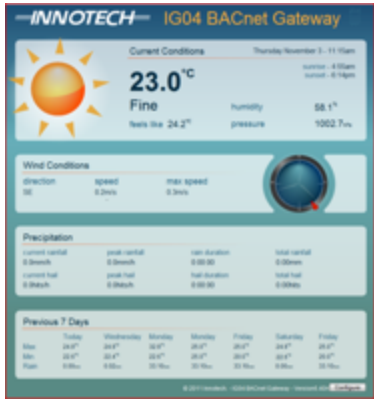
Visit Innotech on-line

For more information on Innotech and its award winning range of products, please visit the Innotech websites at: http://www.innotechamerica.com or http://www.innotech.com.au



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SIEMENS

Dwyer

Thank you.

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Economizers:

Where Do We go From Here?

Daniel Jones, Honeywell Environmental Combustion and Control

Daniel.jones@honeywell.com

831-251-5074

www.customer.honeywell.com/economizertools

What is an Economizer?

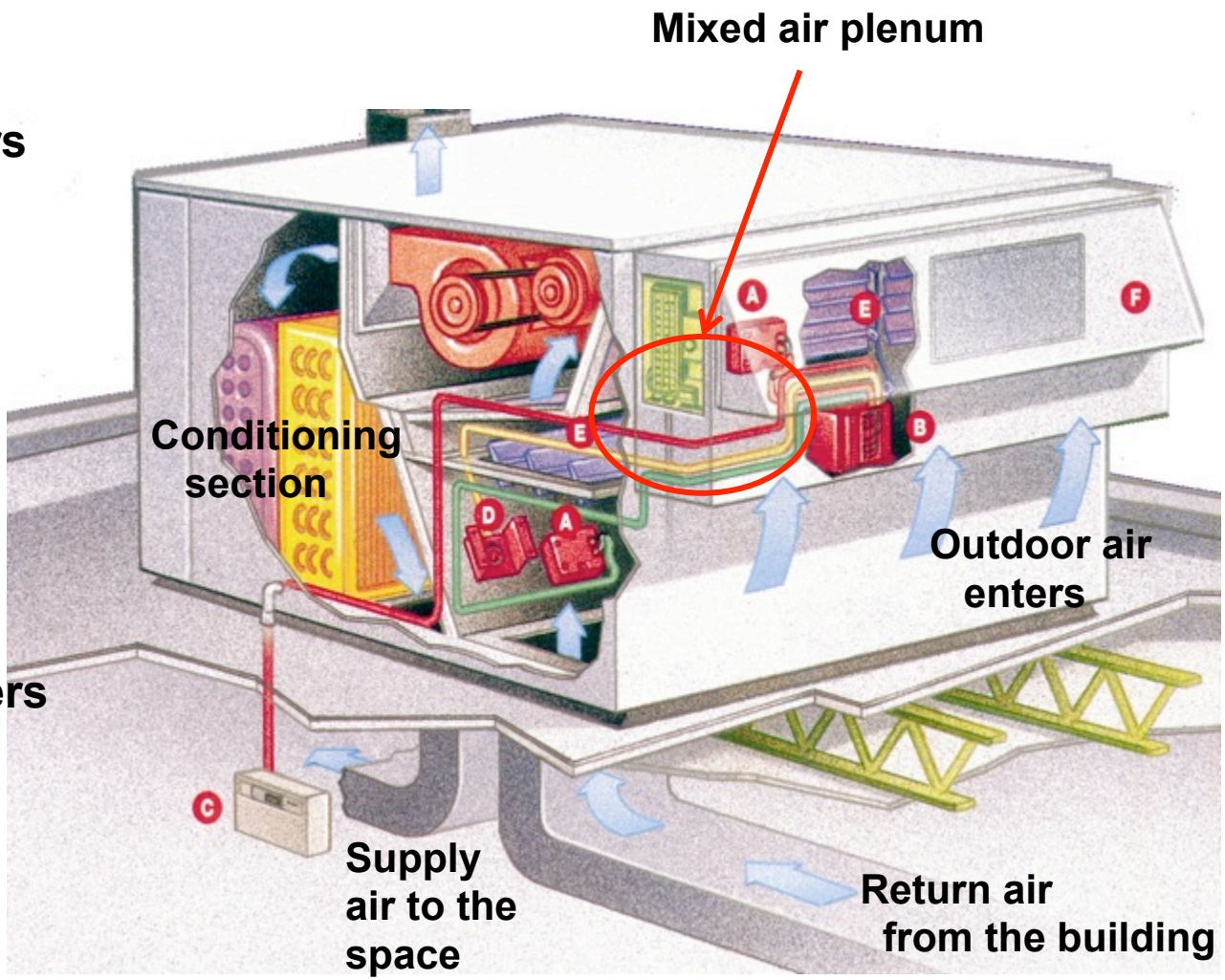
Economizers, or in British English "economisers" are mechanical devices intended to reduce energy consumption, or to perform another useful function like preheating a fluid used in

- Boilers
- Power plant
- HVAC

In simple terms, an economizer is a heat exchanger.

What is an Airside HVAC Economizer?

- **A** OA and RA Sensors
- **B** Damper Actuator
- **C** 2-stage Room Thermostat or controller
- **D** Mixed Air Sensor
- **E** Modulating Dampers OA and RA
- **F** OA Hood



Need 2-stage thermostat for integrated economizing

Impact of Energy Issues on Economizers

Economizers Yesterday

- Save money by utilizing free outside air instead of mechanical equipment
- Provide ventilation with demand control ventilation
- No direct feedback of operation or fault detection

Controllers of the future

- More complex control requirements for additional energy savings
- Simplified diagnostics and verifiable operation
- Traceable operation and maintenance
- More profit per unit of labor

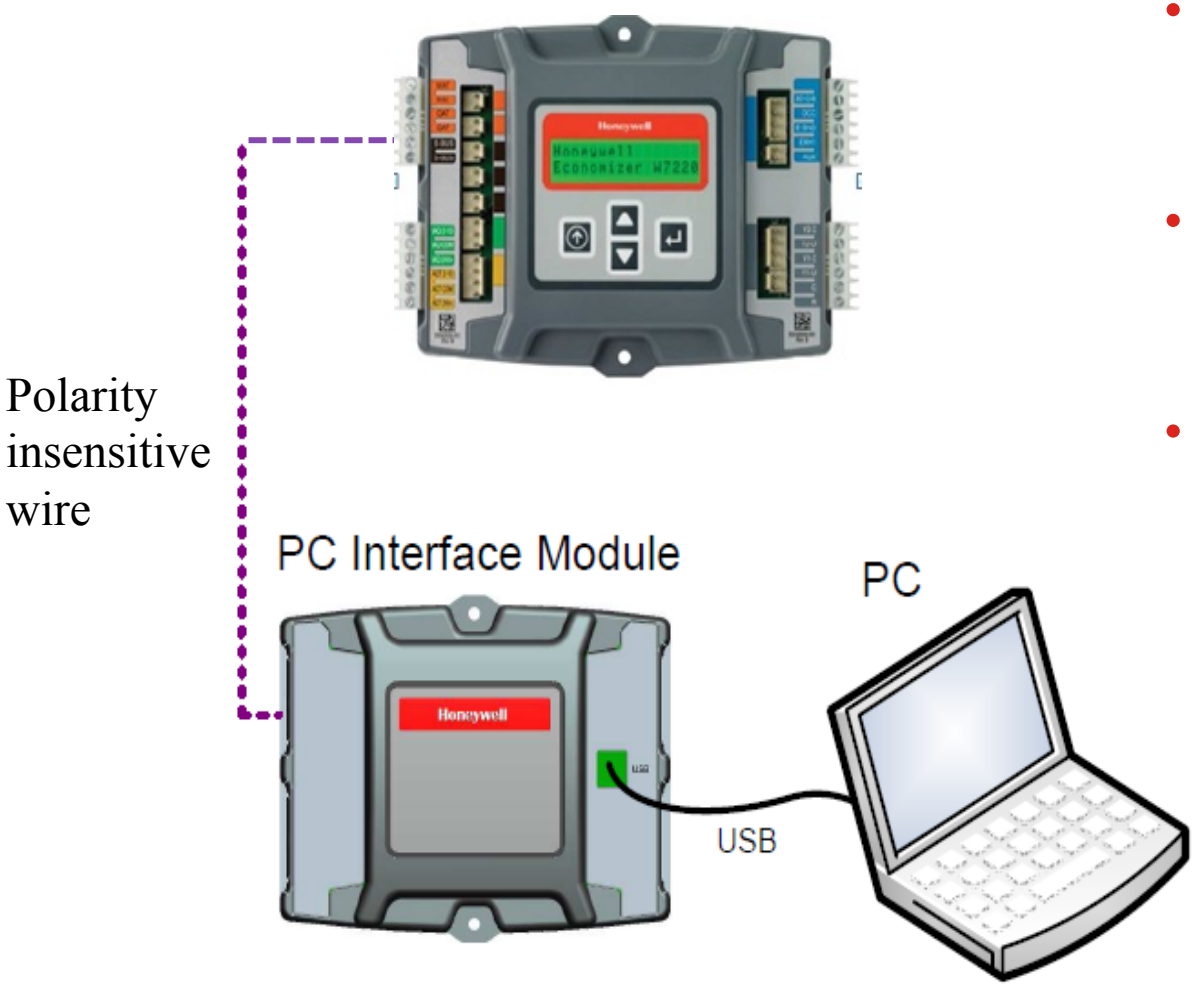
64% Installed Rooftop Economizers Do Not Work!

Fault Detection and Diagnostics

- LCD Display eliminates guessing
- Programmable setpoints
- System Checkout
- Demand Control Ventilation
- Rugged Push Buttons
- Correction Offset for Drifting Humidity Sensors
- Simplified Wiring
- Alarm(s) for Failed Component(s)
- Communicates with Sensors/ Actuator

File Number

PC Interface Tool



- **Download Configuration to Multi Controllers**
- **Read Status/Change Configuration from Mechanical Room**
- **Log Data and System Performance**

Awareness in Marketplace

- CPUC – Title 24, NZE Initiatives, LLNL Study
- ASHRAE, ACCA, CEC, Academia
- HVAC Manufacturers, Contractors, Distributors
- WHPA/Western HVAC Performance Alliance – QM180
- PG&E, SCE Adoption
- Nationwide focus - ComEd program

THANK YOU!

QUESTIONS

?

Break!

KMC CONTROLS

FlexStat with DCV

ET Open Forum

June 12th, Sacramento, CA

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Product Overview

- DDC Thermostat with Integral CO2 Sensor & DCV program.
- Commercial new construction and remodel market.
- Single easy to use thermostat provides CO2 based DCV and meets Title 24 requirements.
- Introduced in November 2011.

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Competitive Landscape

- FlexStat is the only single product solution.
- Other solutions require engineering or programming.
- The FlexStat is sold over the counter at HVAC Wholesale outlets - anyone can install it.

Product Impacts and Limits

- Savings of 10 to 20kWh/SF/YR can be obtained.
- Units sold in California for 2012 = 37.
- 2,000 are projected to be installed in California by 12/31/2013.
- DCV required by Title24 with OSA Economizer.

CONTACT INFORMATION

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www.kmccontrols.com

SELDERA

ET Open Forum

June 12th, Sacramento, CA

ETCC EMERGING TECHNOLOGIES COORDINATING COUNCIL

Product Overview

Online savings identification system supported by sensor integration, intelligent thermostat and control capabilities.

Industrial

- No digital controls
- Baseloads > 300kW

Commercial and Campus

- 30,000 – 100,000 sq. ft.
- Rapidly changing dynamics

Concepts developed from research at Yale since 2005, patent-pending IP, currently part of Ameresco Inc.

Identifying Efficiency Opportunities

- Information-driven approach to savings
  - Starts with web-only monitoring and can expand to measurement sensing and control
  - Initial opportunities identified using interval data processing
- Uses wireless sub-meters and sensors to identify savings
- Extracts savings from online occupant behavior analytics
- Separates building loads from process loads
- Supports IPMVP compliant Measurement & Verification using online feeds from sub-meters and sensors

Tiered Offering

1) BENCHMARKING, REMOTE AUDIT

- Identify and Prioritize Savings Projects
- Initial ECM Identification
- Online Measurement & Verification
- Online fault detection

2) CONSUMPTION PROFILING

- Continuous Building Level Optimization
- Occupancy and Consumption Pattern Analysis
- Easy-to-Install Wireless Sub-Meters and Sensors
- Identifies and Ranks ECMs

3) AUTOMATED SAVINGS

- Interfaces to existing EMS to read data points and adapt settings
- Intelligent thermostat integration
- Custom controls for buildings that do not have them

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Competitive Landscape

SCIenergy
MINING THE FIFTH FUEL™

Retroficiency

FIRSTFUEL
BUILDING ENERGY ANALYTICS

Market Share Strategy

Programmatic Delivery Aspects

1. Start with a study of interval data and features (utility pays for qualified customers)
2. Proposed deployment strategy
3. Measures proposal
4. Implementation and M&V

Connecticut Municipal cmeec Electric Energy Cooperative

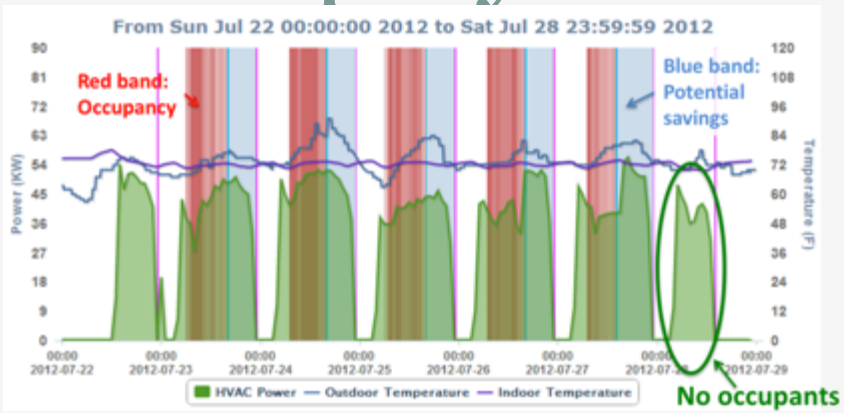
Connecticut Light & Power

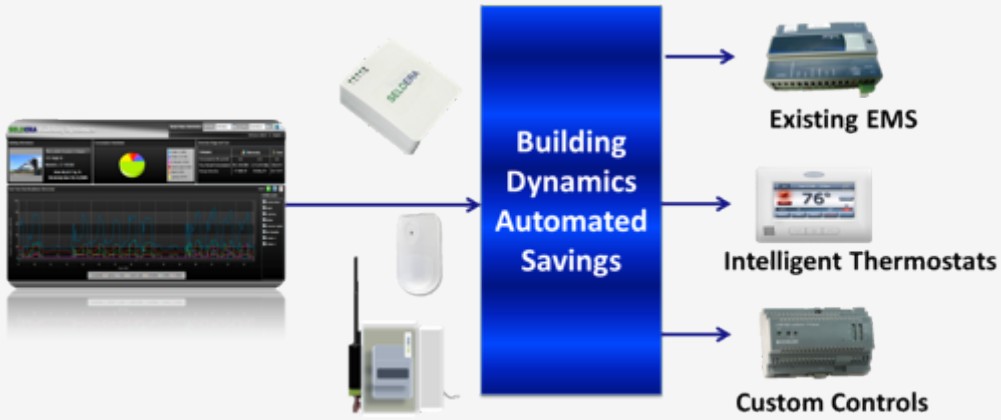
AEG Applied Energy Group

AMERESCO
Green • Clean • Sustainable

Information-Driven Deployment

- Behavior & Process Analytics
- Patent-Pending Electric Load Disaggregation
- Wireless Metering and Sensing
- Fast, single-day Installation
- Independent Overlay Network





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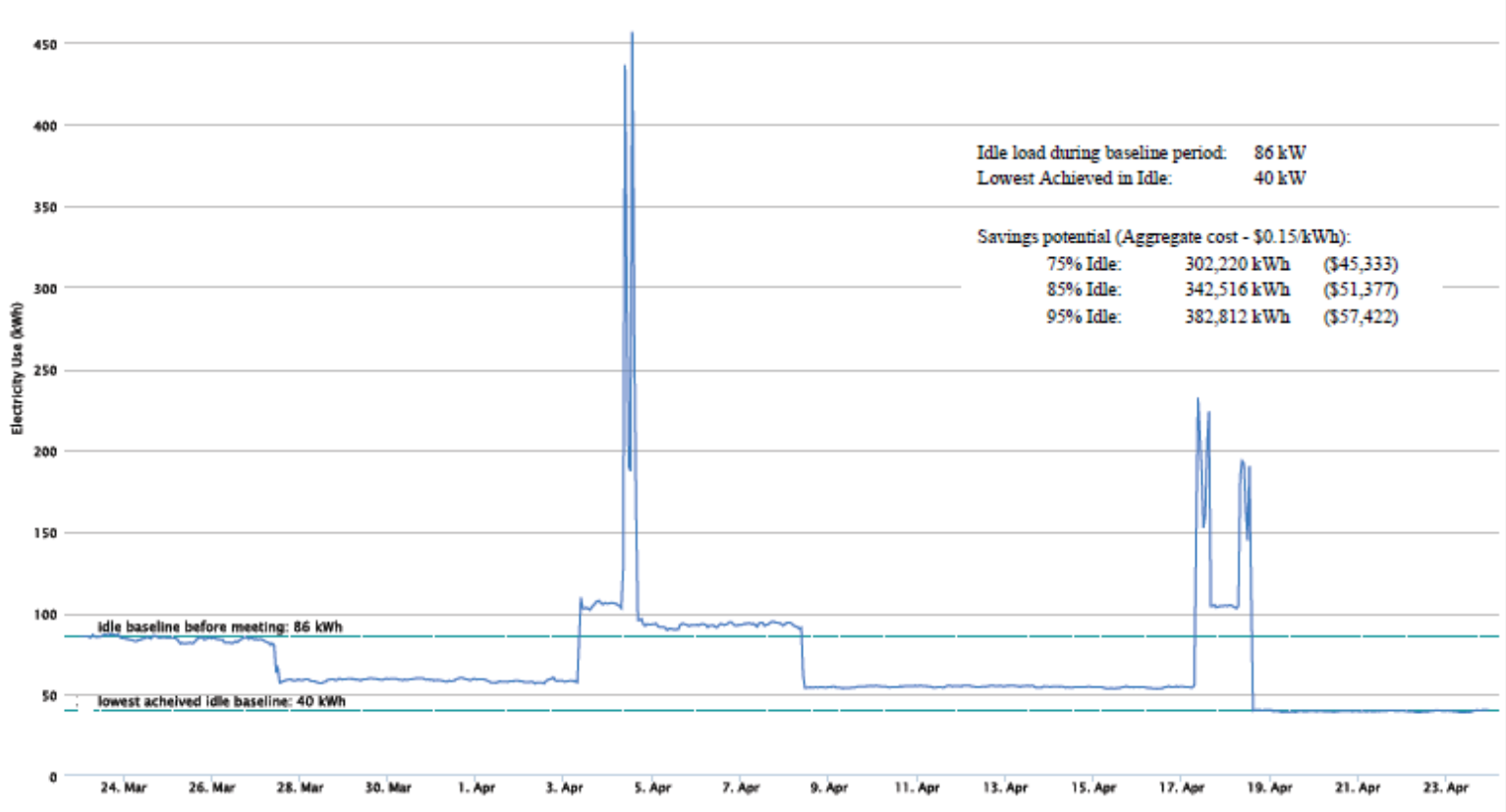
Case Study: Industrial Site



Med-size industrial customer 7.5M kWh/year, savings identified: 2.2M kWh/year

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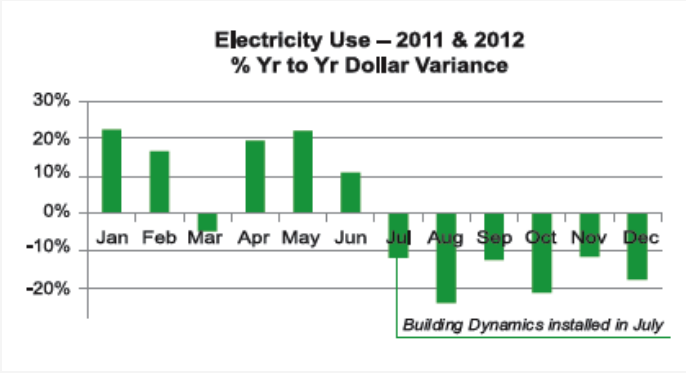
Case Study: Office Building

Location:	**Norwich, CT**
Building Size:	**46,612 sq. ft.**
Building Type:	**Office**
Occupants:	**100**
Cooling:	**Electric**
	1 Air Handler
	2 Chillers
Heating:	**Gas**
Existing EMS:	**Delta Controls**

Annual Electricity Consumption: 816,616 kWh

Annual Gas Consumption: 24,859 CCF



Project Expectations and Results (Weather Normalized)		
Annual Electricity Consumption	828,000 kWh	
Annual Savings Goal	15%	124,000 kWh
Actual 6 Month Consumption Savings*	94,000 kWh	18%
Extrapolated Electricity Annual Savings	18%	150,000 kWh
Additional ECMs Identified	117,000 kWh	
Total Expected Annual Electricity Savings	**267,000 kWh**	**32%**

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Customers and Partners

AEG
Applied Energy Group

Connecticut Light & Power

Norwich Public Utilities

Mohegan Sun
a world at play

Yale University

The United Illuminating Company

AMERESCO
Green • Clean • Sustainable

NSTAR

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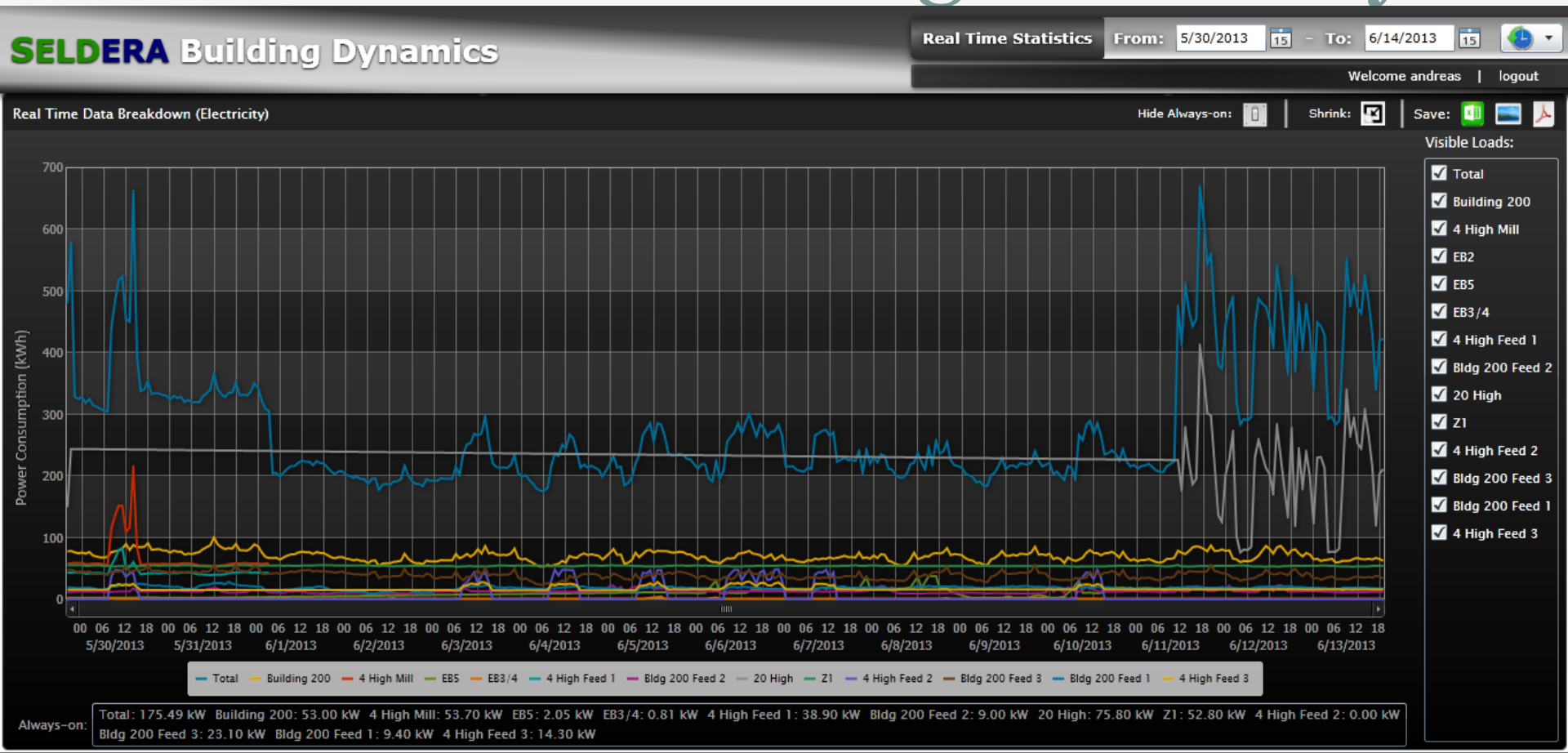
Real-time Monitoring and Analysis



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Commodity Tracking

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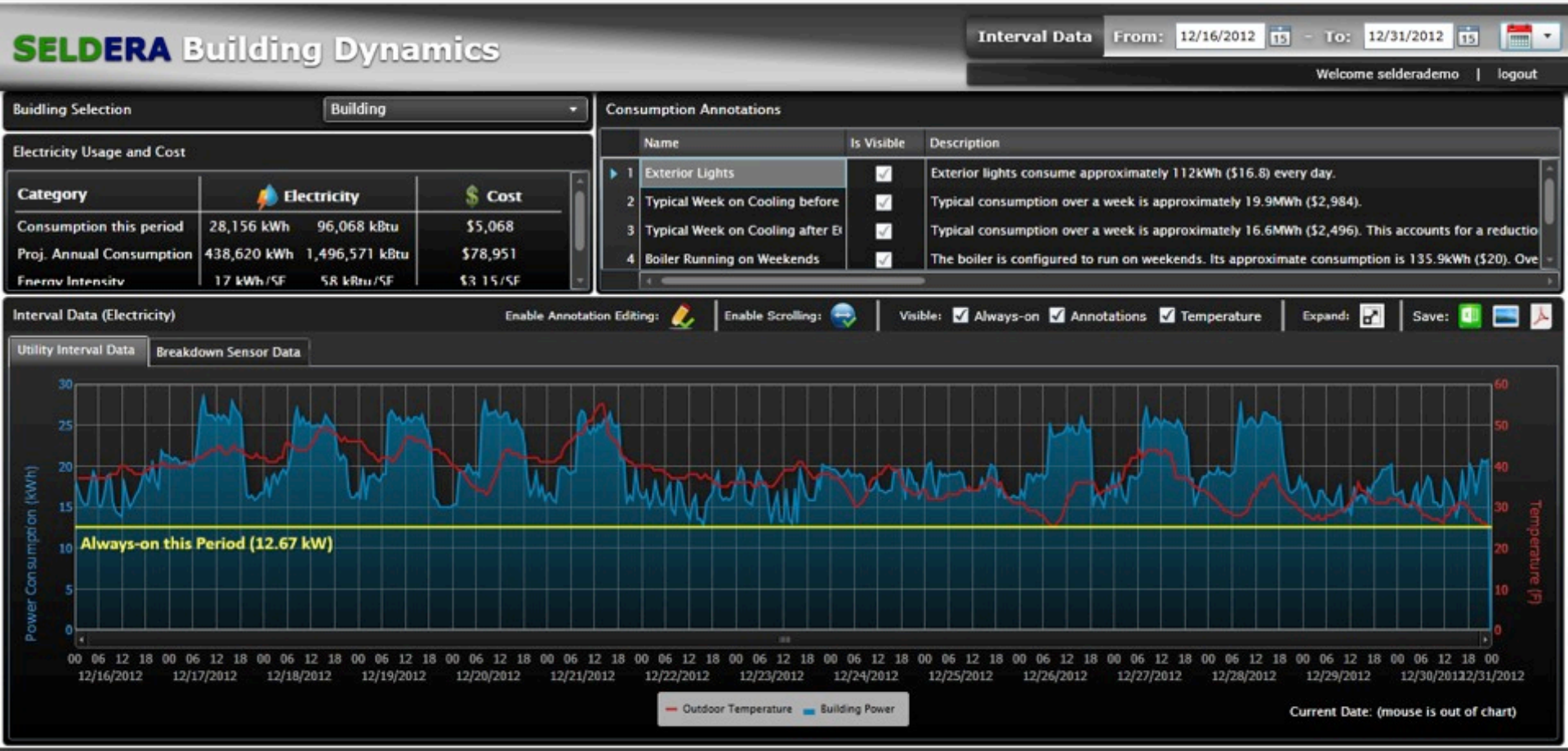
Interval Data Review



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Online M&V

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anyCOMM

A new way to save significant energy…

…for every environmentally responsible

municipality, company and individual

Technology Discussion

aC SMART Technology

Municipal / Commercial / Residential

empowered by anyCOMM

- Substantially reduces energy
- Embedded – *a processor & radio are in the light*
- No new wires are required – *just replace the bulb*
- Now you can – *manage, monitor & control*
- Cloud based architecture – *access from anywhere*
- Feature upgradable – *online updates*
- SMART port – *many add-on peripherals*
  – cameras / speakers / sensors

Proprietary and Confidential

aC SMART – *deployable to just about any kind of light / anywhere…*

- Saves Energy – *up to 95% over non-smart*
- Dimmable – *from 3% to 100%*
- Individually Addressable – *control one or many*
- Simple Retrofit – *installs in less than 15 minutes*

even fluorescents…

empowered by anyCOMM

Proprietary and Confidential

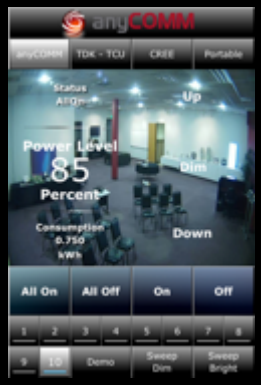
aC SMART provides substantial savings – *with dramatic results!*

275 watts each = $145 a year for energy

50 watts each but smart = $6 a year for energy

empowered by anyCOMM

aC SMART – *apps for control & monitoring on any device*



empowered by anyCOMM

Photo Gallery – *Stratford Canada, City Hall*

Proprietary and Confidential

Photo Gallery – *Concord California, Civic Executive Park*

Proprietary and Confidential

The anyCOMM team – *previous senior executives…*

…to some of the world's most successful companies and organizations!

Rob Praske
- Founder / CEO
- Chief Architect

Duncan Clendenin
- Senior Director
- Market / Bus Analyst

Grant Hardesty
- Senior Director
- Product Marketing

Dave Stubben
- Senior Technologist
- Intellectual Property

Steve Rumbaugh
- Senior VP
- Engineering

Michelle Dickey
- Exec VP
- Worldwide Sales

Al Hamilton
- Operations Officer
- Strategic Relations

Kotaro Yui
- Senior Rep
- Japan & Asia Pacific

Donald Ruan
- BOD & Advisors
- China Strategy

Peter Darbee
- BOD & Advisors
- Utility Co Strategy

Armando Castro
- BOD & Advisors
- Corporate Counsel

PARAMETRIC TECHNOLOGY CORPORATION

zilog

MCI WORLDCOM

PACIFIC BELL
A Pacific Telesis Company

TEMIC Semiconductors

PG&E Pacific Gas and Electric Company

Goldman Sachs

IBM Rational.

UNITED STATES NAVY

Home Director

ATARI

at&t

intel

MOTOROLA

AFC

DLA PIPER

SERENA

BIA BUILDING INDUSTRY ASSOCIATION

CHIPS

CALIBRE

FORTIFY An HP Company

CONTROL DATA

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Closing Remarks

Thank you for coming!

Please fill out evaluation survey

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