“Software Solutions For Improving The Bottom Line”

Building Energy NYC Conference
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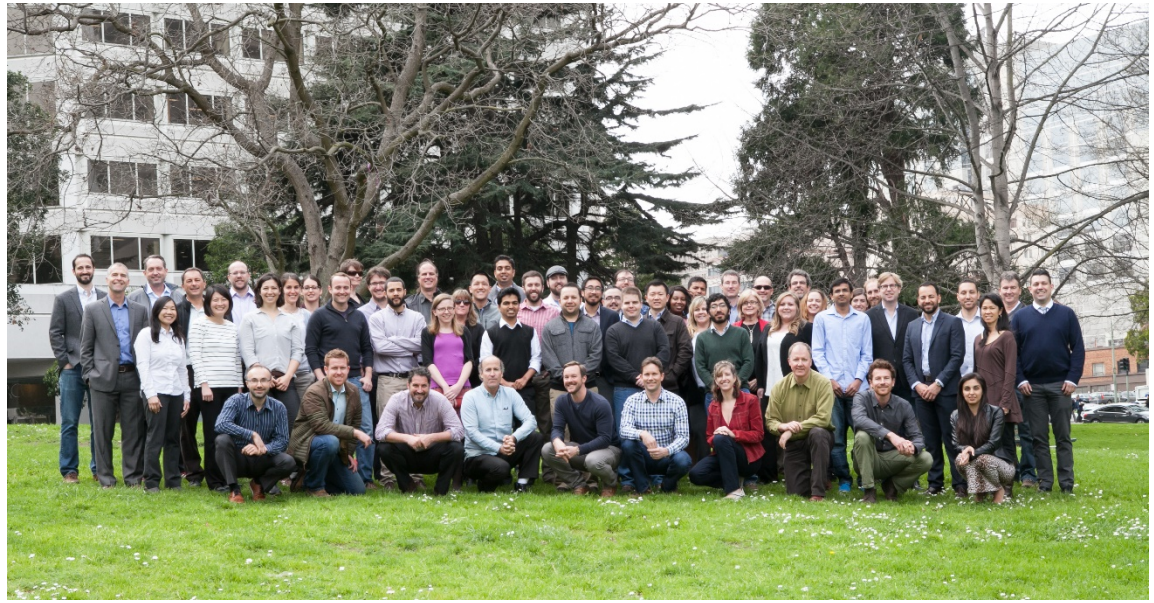
Director of East Coast Operations

A Highly-Technical Engineering Team Dedicated To Energy Efficiency



A total of 60 Employees

- 23 licensed Professional Engineers
- 23 engineers with graduate degrees

18 years in business

- Energy engineering and consulting
- Over 500 years of combined industry experience

Objective Decision-Making Tools

"Objective decision-making uses reality instead of potentially flawed perception of reality."

- Confucius.

Keeping Up With The “Softdashians”

Energy Management Information System (EMIS)

Energy Dashboard

Whole Building Approach

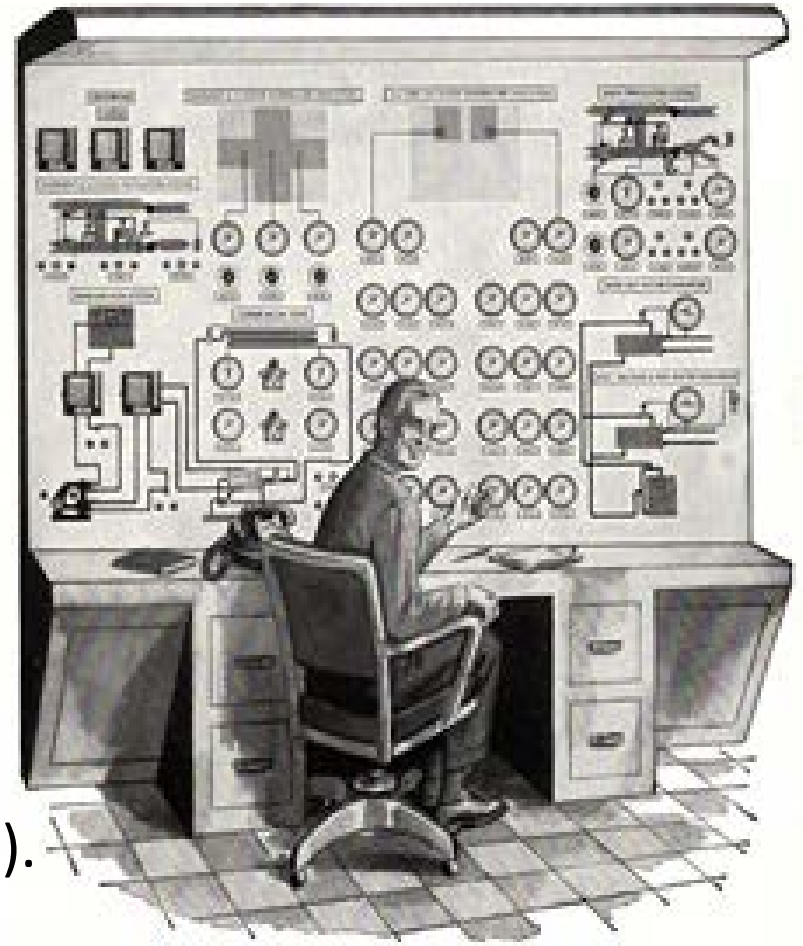
Building Automation System (BAS)

Automated Fault Detection & Diagnostic (AFDD)

Building Automation Systems (BAS)

What they are:

- A programmed, computerized network of electronic devices that monitor and control systems
- Generally apply to HVAC and lighting systems.



What they do:

- Allow operators to change settings
- Track events, cancellations, overrides
- Send alarms
- Trend data
- Access from mobile or web devices (Cloud-based models).

Automated Fault Detection & Diagnostic (AFDD)

What they are:

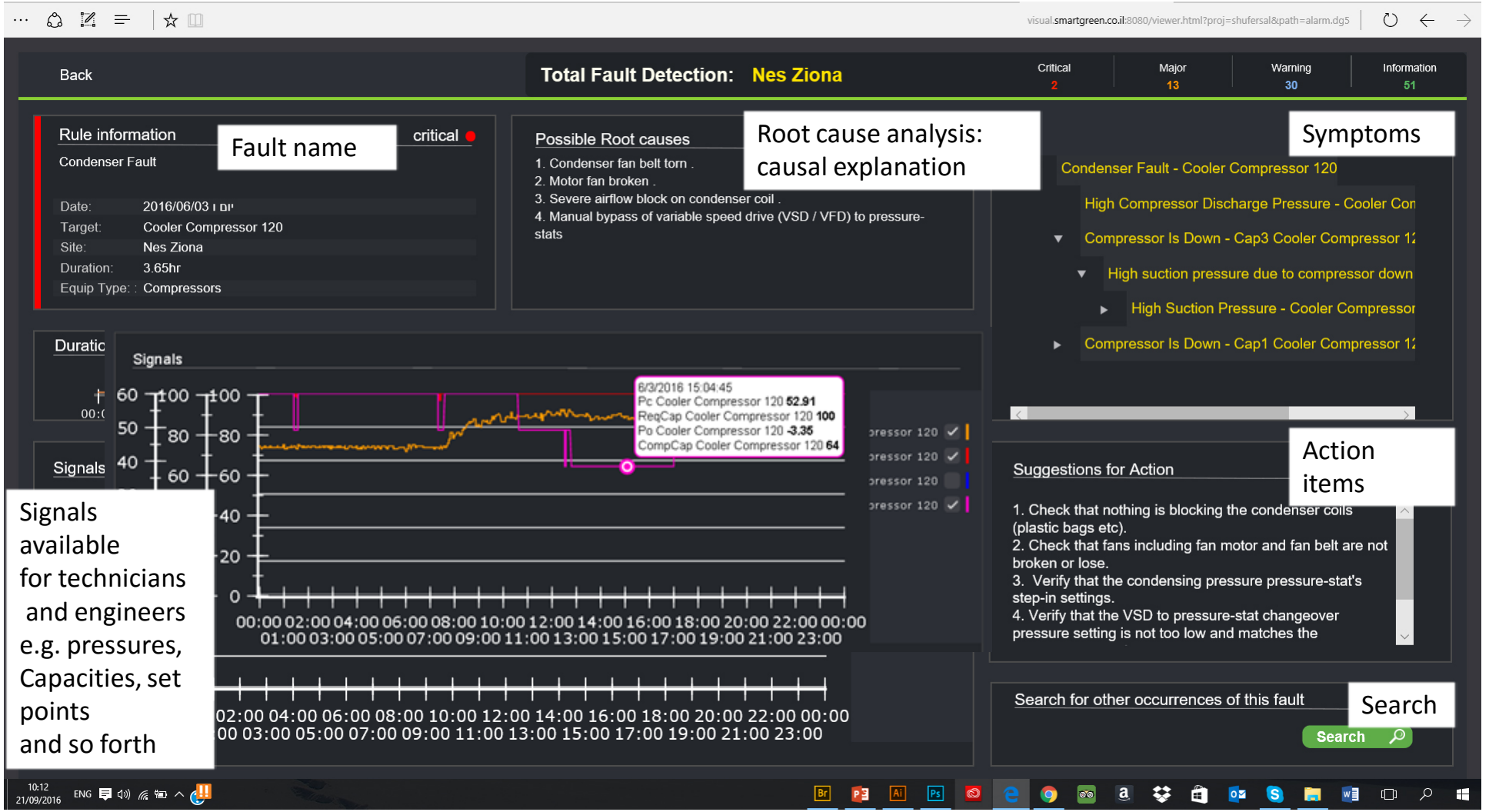
- Analytic software / mathematical model that works in conjunction with BAS
- Help with day-to-day operation
- An increased interest using them

What they do:

- Address systems performance degradation
- Identify sub-optimal conditions
- Save engineers time addressing issues
- Prioritize faults based on fault frequency or cost

Image Source: Shiftenergy

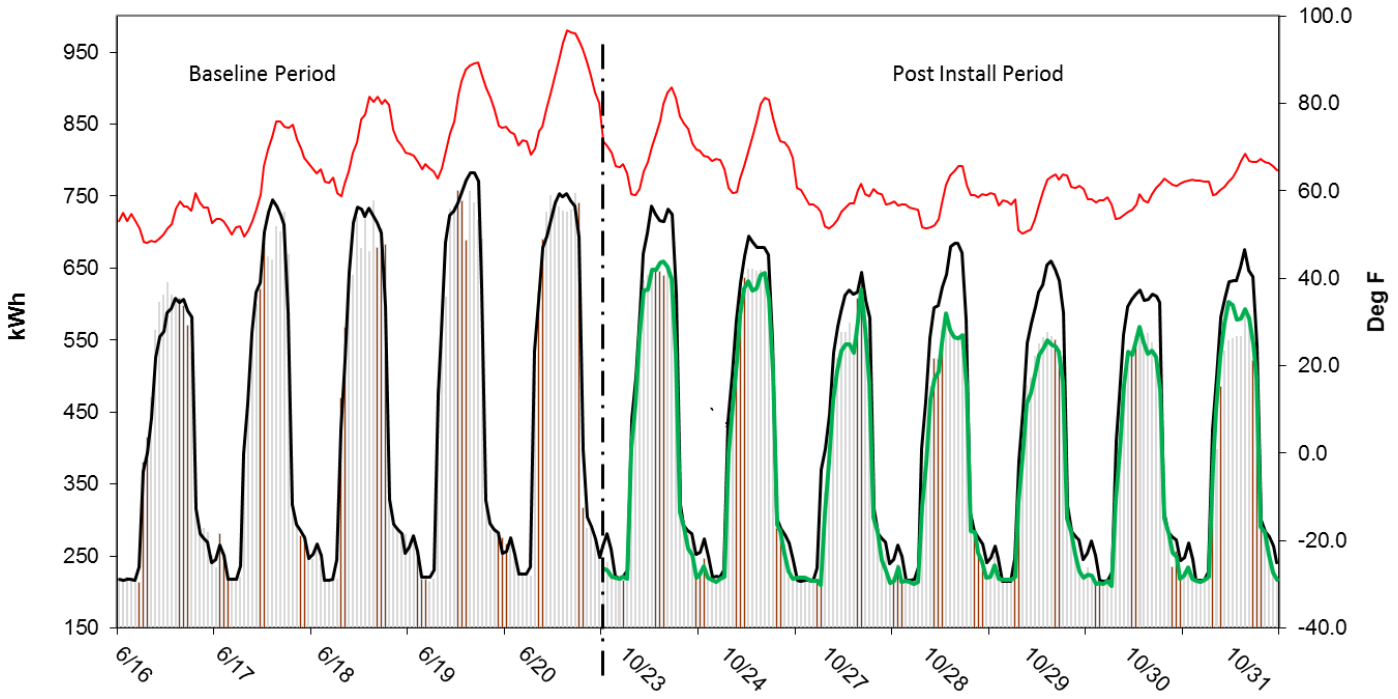
Automated Fault Detection & Diagnostic (AFDD)



Automated System Optimization (ASO)

- The ultimate automation system?
- Dynamically changes BAS settings to fine tune systems
- Technology is still maturing.

Whole-Building Meter-Based Approach



- Interval data is becoming widely available
- Inexpensive – high value, low cost
- Can be combined with onsite investigation and remote trend analysis

Circuit-Level Solutions

Electric loads monitoring: meters, Current Transducers (CTs), communication devices.

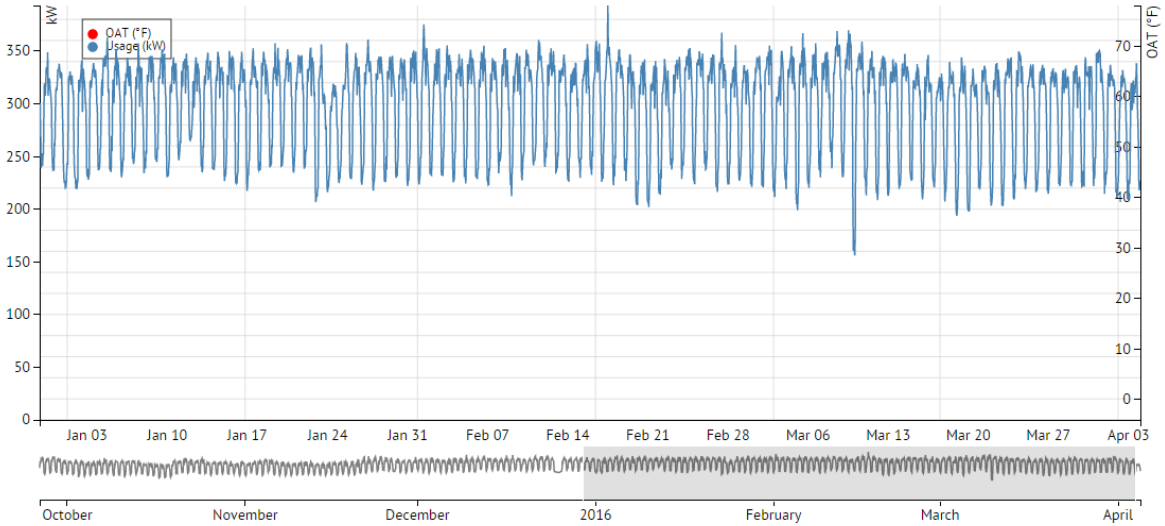


Image Source: Outsmart Inc.

Energy Dashboards

- **Visual representations** of energy use
- They are flooding the market
- Inexpensive

AFDD vs. RCx: A Case Study

- "**Artificial Neural Networks vs. Grey Matter**; A RCx case study at matching cloud-based fault detection with traditional human neural networks". By Jim Kelsey, P.E. and Arik Cohen, P.E.

- BMS data trend analysis at 2 high tech campus buildings
- Goal = develop sets of recommendations and associated costs savings

The Findings

Artificial Neural Networks vs. Grey Matter

	Auto FDD	RCx Team
Excessive boiler operation	$6,400	$6,400
Excessive relief fan operation	$17,600	
Economizer malfunction	$43,200	$43,200
Supply air temp and static pressure reset		$118,100
Zone level scheduling		$35,900
AHU scheduling		$9,800
Lighting controls		$16,300
Kitchen ventilation		$20,700
Total	**$67,200**	**$250,400**

Things AFDD Do Well

- A systematic approach on every connected component
- Prioritize faults and alarms based on frequency or cost
- Store and access fault history

Things That Human Brains Do Well

- Diagnose root cause: understand and correct design flaws at the system-level
- Design optimal control strategies
- Understand interaction between components
- Estimate energy savings and costs impacts accurately
- Clearly communicate the needed corrective action

What Does The Future Hold?

- More connected sensors
- More transfer of engineering knowledge into tools
- More computing to help make better decisions.

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Group photo made with a Solmetric Solar shading tool

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