



# *“Rapid Energy \$aving\$...A Case Study”*

*Dave Cone*

*Evergreen School District*

*2010 & 2011 ENERGY STAR Partner of the Year*

*2012, 2013, 2014 ENERGY STAR Sustained Excellence Award  
Winner*

October 2014









# Energy Achievements

- **\$9.1 million saved since November 2008**
- **23% less energy used now than in 2001**
  - Despite the addition of 720,000 SF
- **All of our** school facilities are ENERGY STAR certified
  - 75pts. or better
- EPS was designated a **Top Performer** by ENERGY STAR for having a Portfolio average of 75 or better (87).
  - In 2008 it was 36. At that time we had 2 facilities with a 1 rating.



# Energy Achievements

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- **Overall energy reduction = 43.7%** since 2008
- ENERGY STAR Partner of the Year - 2010 & 2011  
**Sustained Excellence Award** - 2012, 2013, 2014
- Gresham-Barlow >30% savings
  - Achieved a district-wide Portfolio rating of 75 or better
  - Currently ALL schools have achieved ENERGY STAR designation



# Our Strategy


## Guidelines for Energy Management Overview

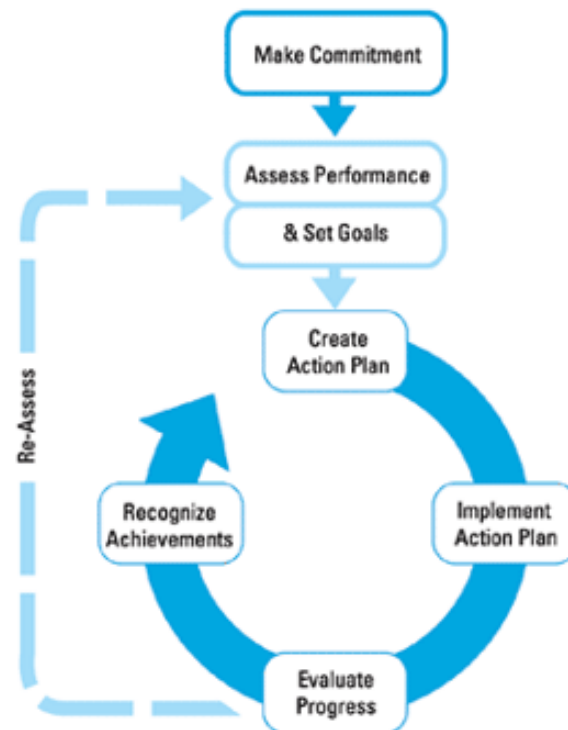
EPA offers a proven strategy for superior energy management with tools and resources to help each step of the way. Based on the successful practices of ENERGY STAR partners, these guidelines for energy management can assist your organization in improving its energy and financial performance while distinguishing your organization as an environmental leader.

### The steps:

- STEP 1: [Make Commitment](#)
- STEP 2: [Assess Performance](#)
- STEP 3: [Set Goals](#)
- STEP 4: [Create Action Plan](#)
- STEP 5: [Implement Action Plan](#)
- STEP 6: [Evaluate Progress](#)
- STEP 7: [Recognize Achievements](#)

### Need help getting started?

Use our [Energy Program Assessment Matrix](#)  which is designed to help organizations and energy managers compare their energy management practices to those outlined in the Guidelines.



# Our Commitment

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- 2008 District hired a Resource Conservation Manager
- This was a time when the economy was in a tailspin and the district was looking at layoffs.
  - Board, administration and staff support
- **Board Policy**





# Our Goal

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- **Reduce our energy consumption** by \$600,000 in the first year (actual...\$1.5 million)



# Create and Implement Action Plan

- **Task :** Develop Policy and Administrative Procedures for RCM Program
  - Purpose: To guide and support work of program
  
- **Task :** Review Operations and Maintenance Procedures and Protocols
  - Purpose: To Determine Extent to Which Control, Maintenance, Mechanical, and Electrical Issues Impact Ability to Reduce Energy Consumption.
  
- **Task :** Review Portable Classroom Energy Usage
  - Purpose: To Determine Extent to Which Lack of Central Control of Portable Thermostats Impacts Ability to Reduce Energy Consumption.



# Create and Implement Action Plan

- **Task :** Obtain and Install Demand Meters at All Sites
  - Purpose: To Obtain Data that Characterizes Building Electrical Energy Use on a Daily and Time Specific Basis
  
- **Task :** Develop and Implement Program for Seasonal, Holiday, and Other Non-Staff Days and Usages
  - Purpose: To Minimize Energy Use When Building is Substantially Unoccupied
  
- **Task :** Review Present Usage and Obtain Use Standards/Benchmarks for Each Site
  - Purpose: To Determine and Set Reasonable Goals for Each Site for Overall Energy Consumption and Demand



# Low Cost No Cost?

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## ■ Identified Projects

- Web-based thermostats
- HID to T-8 retrofits in gymnasiums
- Pneumatic to DDC retrofits
- Delamping
- Interval Meters
- Recommissioning
- Boiler replacements
- Computer controls
- Controls review
- Sequence review



# Web-based Thermostats for Portable Classrooms (400)

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- Existing system: residential thermostats
- Overall cost: \$320,000
  - Thermostat
  - Cabling
  - Switches
  - Installation and check out
- Utility Incentive (custom project): \$112,000
- Net paid by district: \$218,000
- Simple payback: 1.3 years



# HID to T-8 Retrofits

- 8 Schools...from 480w HID to 232w linear fluorescents fixtures with individual control
- Fixture costs: \$94,000
- Installation costs: \$30,000
- Utility Incentive: \$43,000
- Net cost to district: \$81,000
- Annual savings: \$46,000
- Reduced runtime
- Simple payback: 1.9 years
- Other benefits...less lumen depreciation, less noise
- Wy'east...



# Pneumatic to DDC Retrofit

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- Two schools
- Overall project cost: \$142,000
- Utility Incentive (electric units): \$49,000
- Net cost to district: \$93,000
- Savings...\$120,000 annually



# Delamping

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- Identified by light meter (\$134) and compared to IESNA standards
- Custodial time...already cleaning the fixtures
- Lamp disposal (thousands...e.g. Sunset ES)
- Annual savings: \$45,000
- Goal to make permanent



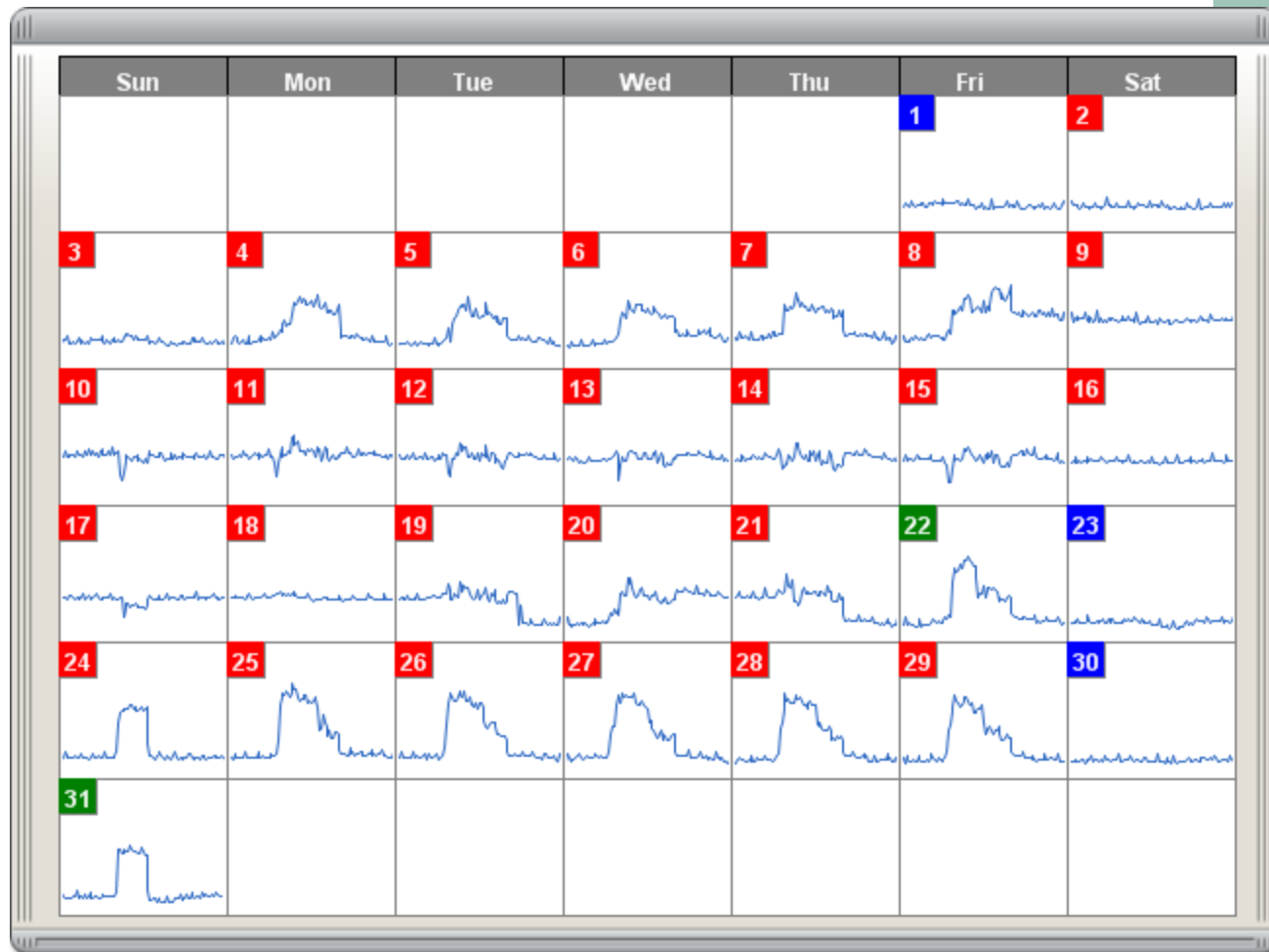


# Installation of Interval (Smart) Meters

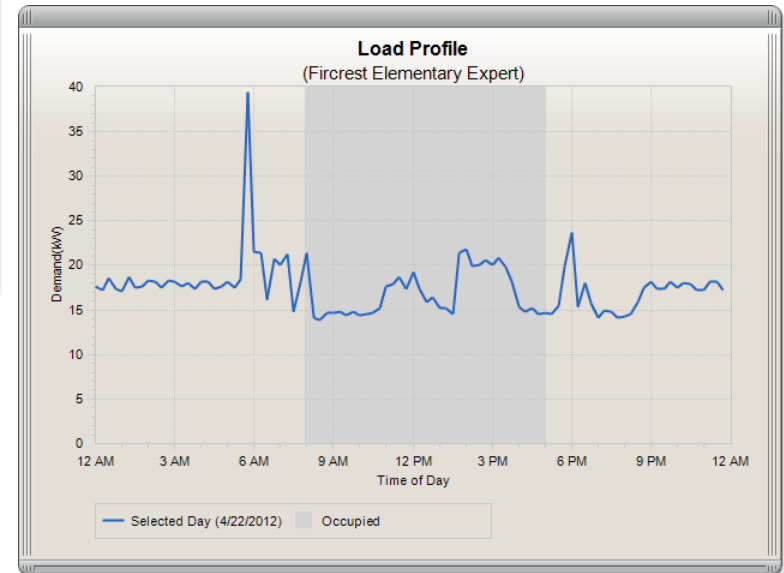
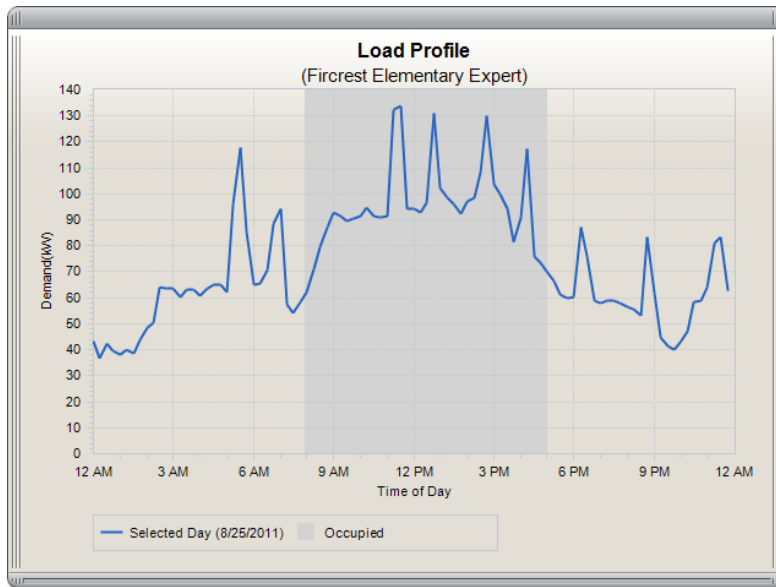
- Cost to district: One time cost of \$1500 each (free for PGE customers; you may already have them)
- Cost to district: \$50/mo. for data
- Savings...Thousands
  - Hearthwood ES \$15,000/yr
  - Fircrest ES \$20,000/yr
  - Marrion ES \$20,000/yr



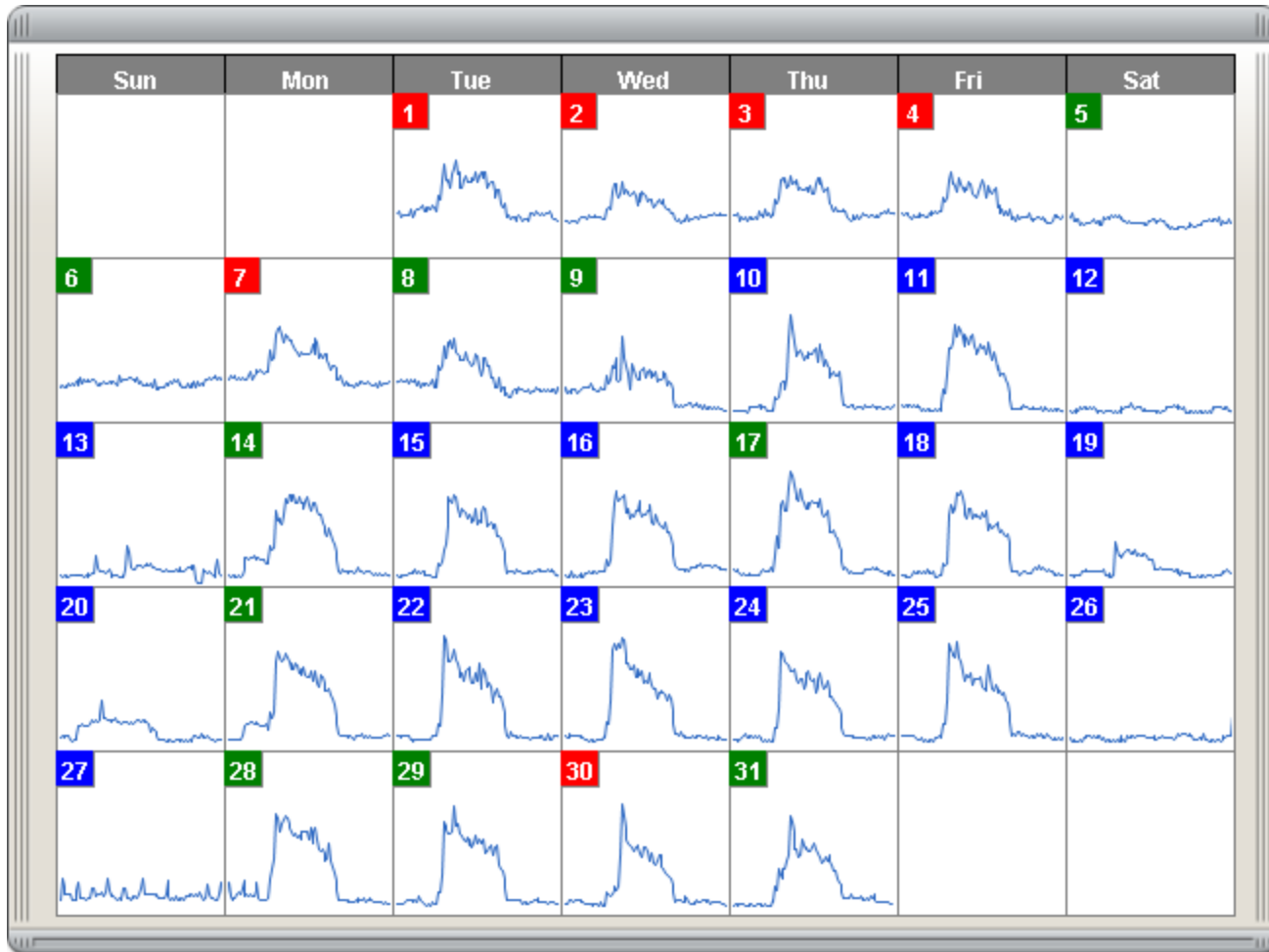
# Hearthwood Before and After



# Fircrest Before and After



# Marrion Before and After



# Recommissioning

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- Cost to district (single facility): \$66,000
- Annual cost before commissioning: \$240,000
- Annual cost after commissioning: \$120,000
- Incidental costs
  - Maintenance time
  - Contractor related issues: \$28,000
  - Control contractor costs: \$25,000



# Boiler replacement

- 6 copper fin tube boilers replaced with three high efficient condensing boilers
- Piping configuration correction included (originally identified by building technician)
- Originally identified as a maintenance issue with an energy component
- Cost to the district before utility incentive: \$160,000
- Utility incentive: \$25,000
- Maintenance savings: \$20,000/yr.
- Energy savings to date: \$37,000 in less than a year. Based on efficiencies alone, this was not anticipated.



# Computer Controls

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- Initial district cost: \$70,000
- Utility incentive: \$66,000
- Anticipated savings: up to \$200,000 annually



# Controls Review-Scheduling

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- Found our building HVAC schedules did not accurately reflect building usage.
- There was no strategy in place to address holidays and other vacancy periods.
- Found numerous optimum start issues
- Associated costs...programming labor





# Controls review

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- Brand new commissioned system...
  - 70°-55° reset for OAT above 70°
  - Outside air at 40% minimum
  - Boiler “always demanded”
  - Computer rooms driving entire zones
- Fircrest mixed air temp
- Fircrest demand spikes
- Fircrest equipment running 24/7
- Marrion fans



# Sequence review

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- Cost to district: \$7,000. Does not include time of maintenance staff
- Reviewed existing sequences and modified where appropriate. Many existing sequences of operation were not efficient.
- For example:
  - Economizer lockout based on return air instead of OAT
  - Boiler and chiller/DX lockout temps
  - Minimum OSA damper at 5% with calculated resets
  - Make sure economizer is first stage of cooling





*There's typically some cost involved with harvesting low-hanging fruit*



## Behavioral Change

Low hanging fruit is often associated with behavioral change. While in many cases that's true, looking to change behaviors in a school district is not just making sure teachers turn off their classroom lights and keep their doors and windows closed. Changing behaviors can also include assessing how maintenance issues are triaged and reviewing and changing how maintenance is performed.



# Other opportunities for savings

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- System tuning and maintenance
  - Checked operation of “command” vs “actual”
  - Checked system for overrides regularly
  - Considering demand limiting strategies



# Funding Sources

- Local Utility
- BPA
- NEEA
- Other?

DATE	DESCRIPTION	AMOUNT	ACCOUNT	AMOUNT
08/21/2009	CLIP REBATE	4,770.10	FRONTIER	4,770.10
08/21/2009	CLIP REBATE	8,157.20	HERITAGE	8,157.20

Clark  
Public  
Utilities

RECEIVED  
SEP 09 2009  
FACILITIES  
EVERGREEN PUBLIC SCHOOLS

508610 390560 09/03/2009  
508610

12,927.30  
AMOUNT OF  
WARRANT



Label  Performance



# References/Resources

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- ENERGY STAR [www.energystar.gov](http://www.energystar.gov)
- ECOVA (Utility Manager) [www.ecova.com](http://www.ecova.com)
- US Green Building Council [www.usgbc.org](http://www.usgbc.org)
- Northwest Energy Efficiency Alliance [www.nea.org](http://www.nea.org)
- BetterBricks [www.betterbricks.com](http://www.betterbricks.com)
- Northwest Energy Education Institute [www.nweei.org](http://www.nweei.org)
- Building Operators Certification [www.theboc.info](http://www.theboc.info)





*Thank You*

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Evergreen Public Schools