

# Strategic Energy Management:

A Roadmap for Achieving Continual  
Improvements in Energy Performance

**December 7<sup>th</sup>, 2010, NWECA in Portland, OR**



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Northwest Energy Efficiency Alliance

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Sustainable Environmental Services

# Strategic Energy Management

## Agenda:

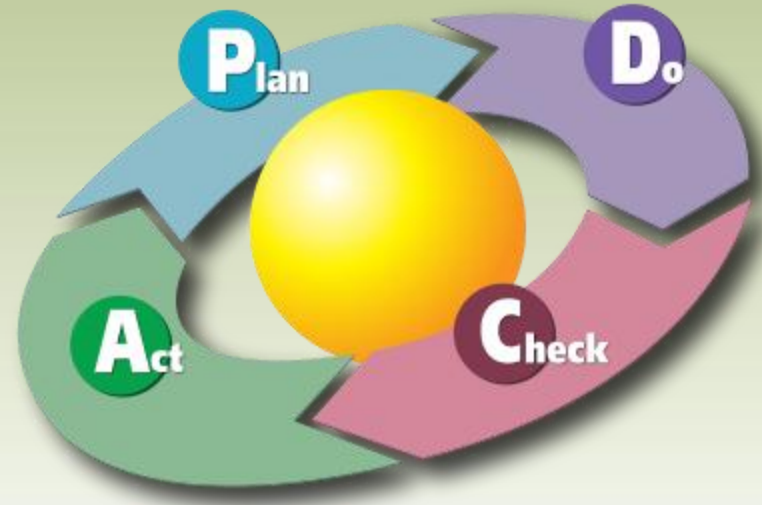
- Introductions
- Management Systems
- Introduction to Strategic Energy Management
- ISO 50001
- US DOE Programs
- Northwest Energy Management Demo Pilot
- Pilot-Specific Learnings
- Strategic Energy Management in Many Sizes
- Recap

# Presenter Introductions

- **JW** - NEEA Sr. Manager of Industrial and Agriculture Sector sponsoring NW Demonstration Project.
- **JW** - 28-year background in high tech manufacturing with experience in ISO management system implementations.
- **JW** - participated in the development of ISO 50001.
  
- **DSG**- Principal of Sustainable Environmental Services , project manager of NW Demonstration Project.
- **DSG**- 10 year background in high tech ISO 14001 capacities, 5 years in energy management.
- **DSG**- Certifications: EMS-Principal Auditor, Certified Energy Manager, Certified Demand-side Energy Manager, & LEED-AP BD+C

# The CI of Management Systems

- **PDCA Cycle** (aka DMAIC in Six Sigma)
  - **Plan** – Establish the policies, objectives, and processes necessary to deliver expected results
  - **Do** – implement projects, training
  - **Check** – Measure actuals against plans-KPI's, internal audits,
  - **Act** – management reviews, revised approaches & new goals



# Some Common Complaints That Management Systems Can Help Address

(Paraphrased from Deming's business's "Deadly Diseases" and common "Obstacles")



- Lack of constancy of purpose.
- Running a company on visible figures alone.
- Excuses, such as "Our problems are different".
- Relying on technology or experts to solve problems.
- Reactive management rather than improved performance to trigger action.

# What Is Strategic Energy Management?

- It's a **holistic, embedded framework** to:
  - understand,
  - control, and
  - continuously improve energy use.
- *Relatively new to utility industry*



# Why Strategic Energy Management?

- **Bolsters** a competitive advantage by cutting costs
- **Tackles** complex energy issues
- **Ensures** *continuing, persistent* focus on energy efficiency and cost control
- **Enables** consistent, organized, integrated, and embedded energy management



# ISO 50001 – Global Strategic Energy Management Standard

## Potential impacts:

- Could influence up to 60% of the world's energy use.
- May be first ISO Standard applicable to commercial, storage, transport, and assembly sectors.
- Establishes management processes on energy supply and consumption.
- Includes same key Management System elements as other Standards.
- Designed to be used independently, or integrated with other management systems.
- Does not prescribe specific energy goals.
- Doesn't address GHG's & Carbon, but could help.



## Status of ISO 50001

- Under development by United States and Brazil, with United Kingdom and China input
- Draft International Standard available in April 2010
- Final Draft Standard released early 2011
- Ready for Final publication by mid 2011

# DOE Strategic Energy Management Programs

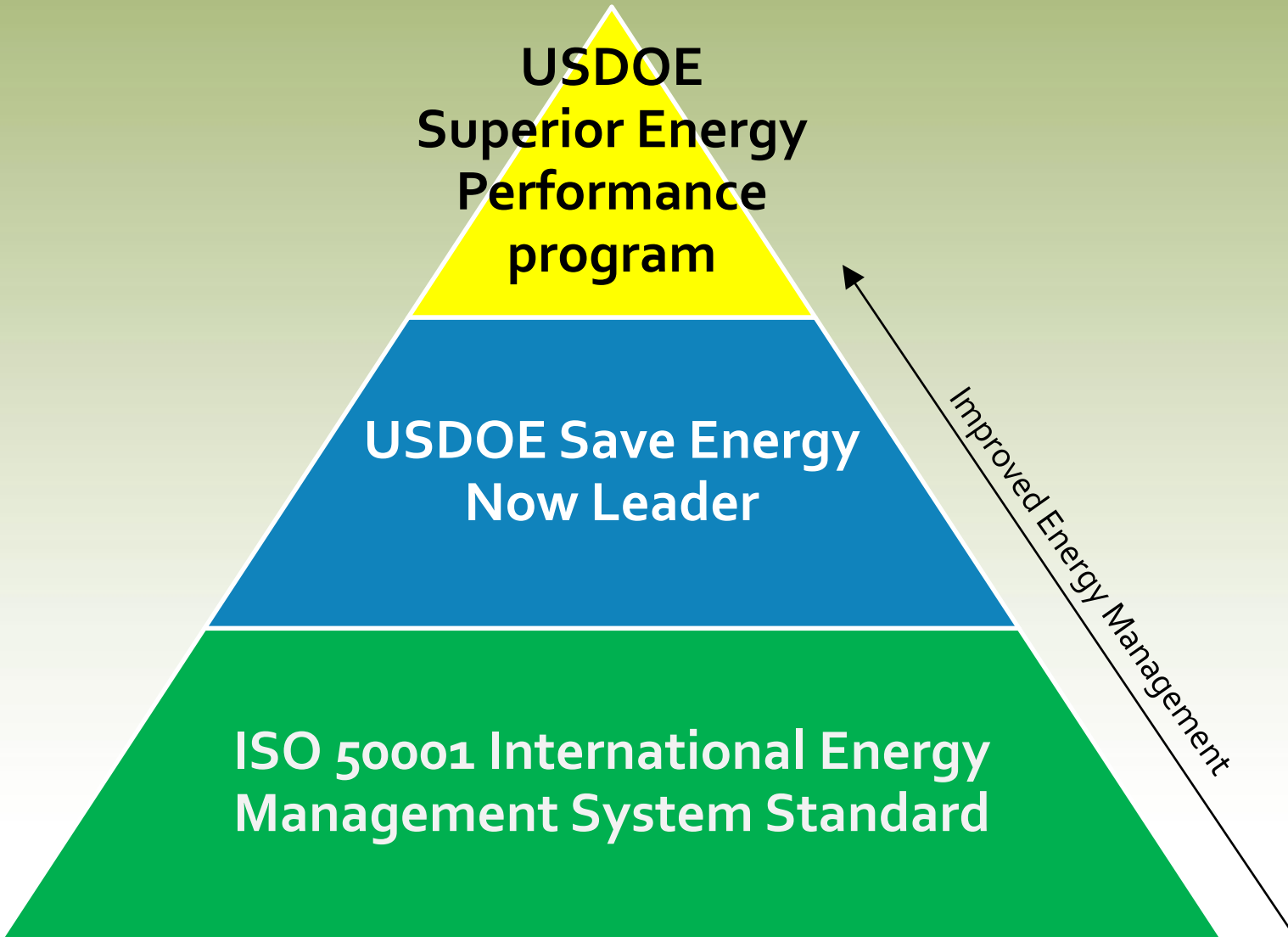


- Launched in 2009
- Goal: 25% reduction in 10 years.
- Top Management Commitment
- 10 year plan
- Report annually to USDOE
- <http://www1.eere.energy.gov/industry/saveenergynow/index.html>



- Launching in US at end of 2011
- Requires ISO certification
- Regression analysis
- Additional data validation
- Additional audits done by ANSI-accredited auditors
- [www.superiorenergyperformance.net](http://www.superiorenergyperformance.net)

# Layering Programs for Higher Energy Performance

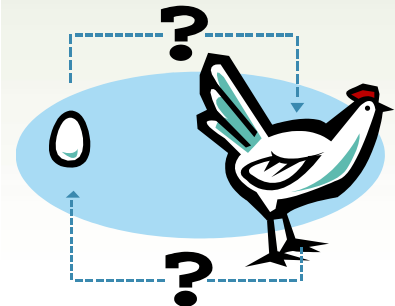


# Northwest Energy Management Demo Pilot

- **US Dept. of Energy (USDOE) and the non-profit Northwest Energy Efficiency Alliance (NEEA) are hosting a demonstration pilot.**
- **Pilot is testing:**
  - ISO 50001
  - USDOE's Save Energy Now LEADERS program
  - USDOE's Superior Energy Performance program
- **Program involves:**
  - Five companies from the region, multi-national to single sites.
  - Workshops and webinars by some of the authors of ISO 50001.
  - Assistance with implementation through energy management and technical consultants.
  - Assistance through to ISO 50001 and Superior Energy Performance certifications.
  - Training for energy management and technical consultants to learn to help companies succeed in these new programs.
- [www.nwemdemo.org](http://www.nwemdemo.org)

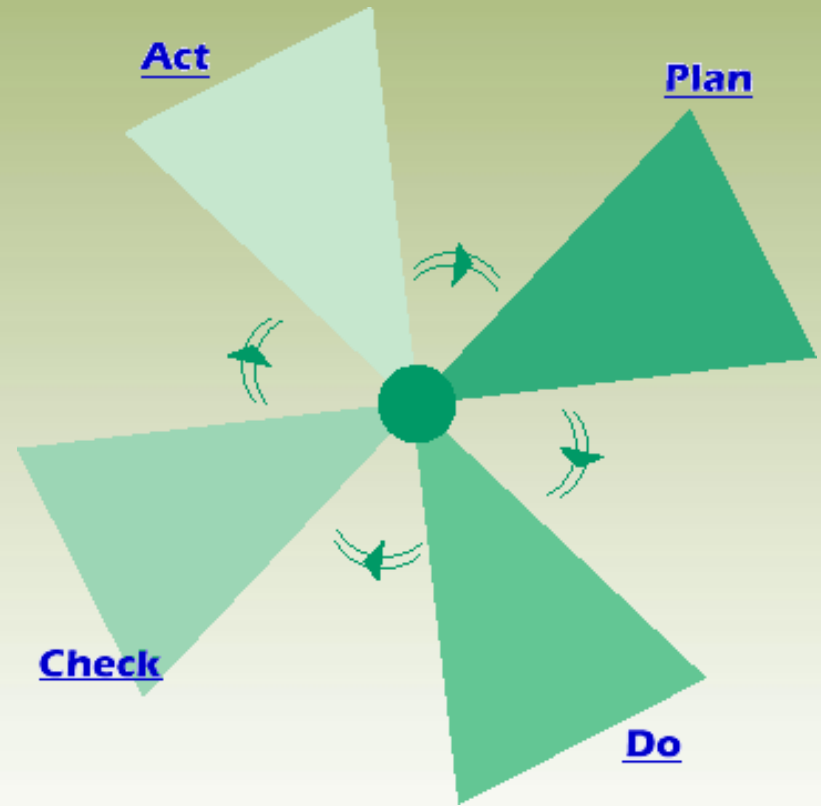
# NW Demo Pilot-Specific Learnings to Date

- Show me the money
- A saving grace
- Chicken, or egg?
- Is it a street light?
- As the World Turns
- The slow avalanche
- K.I.S.S.
- The elephant in the room



# SEM's in all sizes

- Can pick just certain processes to implement
- Can stay simple or go deeper on processes you do pick
- You can expand or contract processes and depth over time
- Threshold of a management system – Need some form of PDCA



# Recap of Major Dates

- **Oct. 2009:** USDOE and NEEA host Northwest pilot of ISO 50001, Save Energy Now and Superior Energy Performance programs.
- **Summer 2011:** ISO 50001 Strategic Energy Management Standard published globally; replaces U.S.'s ANSI standard.
- **Summer/Fall 2011:** Northwest pilot companies apply for ISO certification and Superior Energy Performance recognition.
- **Fall 2011:** USDOE initiates national launch of Superior Energy Performance program.

# For More Information:

Sustainable Environmental Services Corp.:  
[www.nwsustainable.net](http://www.nwsustainable.net)

Northwest Energy Management Demo Pilot:  
[www.nwemdemo.org](http://www.nwemdemo.org)

Northwest Energy Efficiency Alliance (NEEA) Industrial Programs:  
<http://www.nwalliance.org/ourwork/industrial.aspx>

ISO 50001:  
[http://www.iso.org/iso/energy\\_management\\_system\\_standard](http://www.iso.org/iso/energy_management_system_standard)

Save Energy Now program:  
<http://www1.eere.energy.gov/industry/saveenergynow/index.html>

Superior Energy Performance program:  
[www.superiorenergyperformance.net](http://www.superiorenergyperformance.net)

USDOE Energy Management Demonstration Pilots:  
<http://www1.eere.energy.gov/industry/energymanagementdemonstrations/>



# Topics

- Background
- Energy Team Members and Responsibilities
- Energy Tracking and Goals
- Energy Opportunities
  - Baseload vs. Production load
  - Employee Engagement
  - Energy Management
- Lessons Learned
- To Do List
- Resources

## *A Little About Blount, Inc.*



- Blount International, Inc. is a leading manufacturer of equipment, for the global forestry, garden and construction industries with 1,500 employees in Oregon, 2,500 in the U.S., and 3,800 worldwide
- Seven manufacturing facilities located in Portland, Kansas City, Golden, Canada, Brazil, and China.
- The Portland facility manufactures chainsaw chain, bars, and sprockets under our own Oregon® brand, as well as other brands and OEMs.
- Processes include blanking, mechanical tumbling, heat treatment, electroplating, grinding, powder-coating, silk-screening, plastic injection molding, foundry, assembly, and packaging.



# *Blount's Energy Story*

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- Early 2009 and the recession was hitting Blount hard
- Searching for cost saving opportunities
- Lot of production downtime
- Several people picking at energy projects, lot of overlap, but no coordination
- These people came together to form an energy team to focus conservation efforts
- Early successes, inspired the company to take Energy Management worldwide

## *Team Members*

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- Manufacturing Operations Manager
- Facilities Supervisor/Engineer
- Facilities Maintenance Lead
- Electrical Supervisor
- Heat Treat Engineer
- Purchasing Manger
- Corporate Environmental Engineer

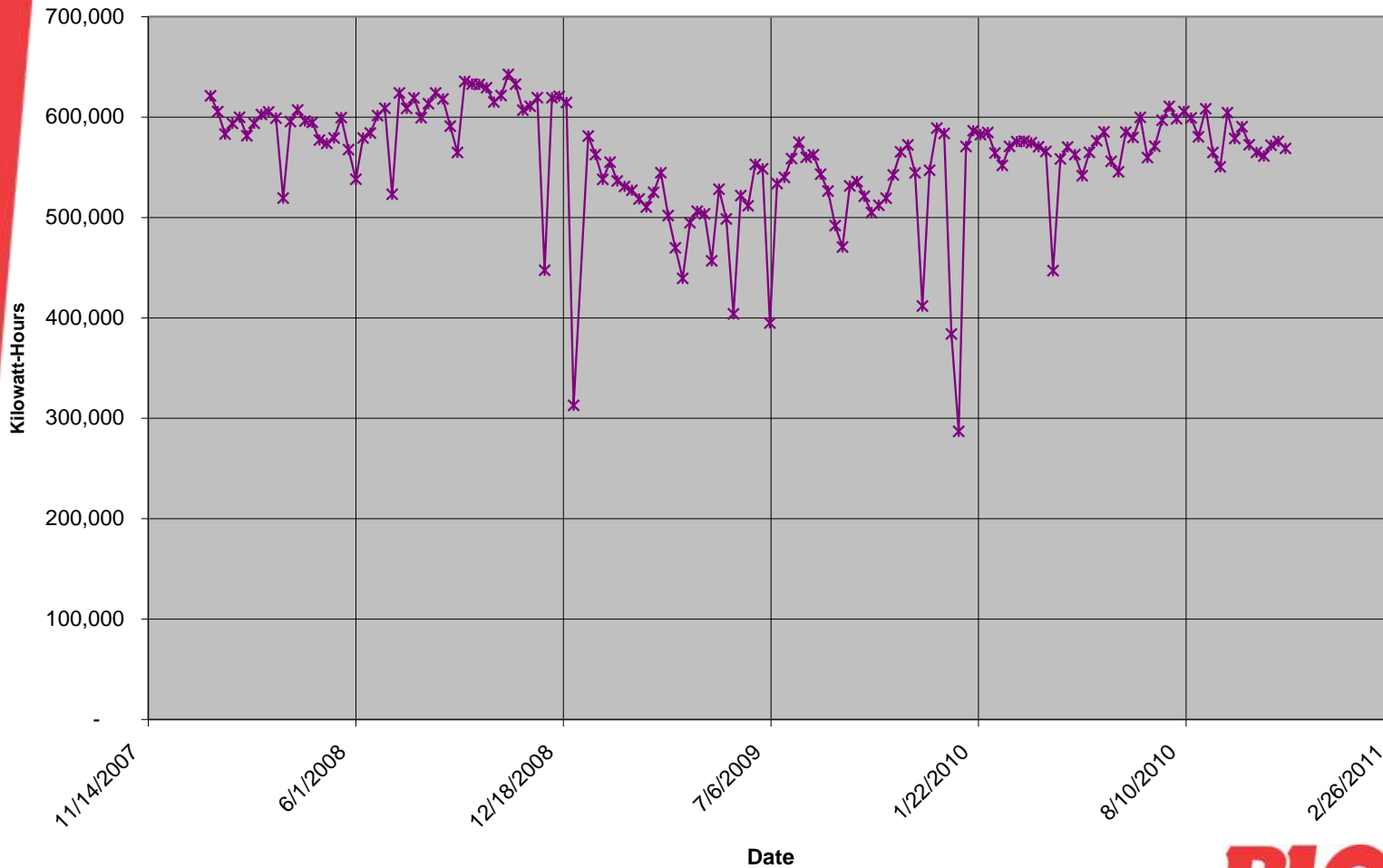
## *Team Responsibilities*

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- Clearinghouse for energy conservation ideas
- Clearinghouse for vendor contacts and presentations
- Coordination of training for team members and general employees
- Coordination of incentives, tax credits, grants, etc.
- Capture and report results and savings
- Communication conduit

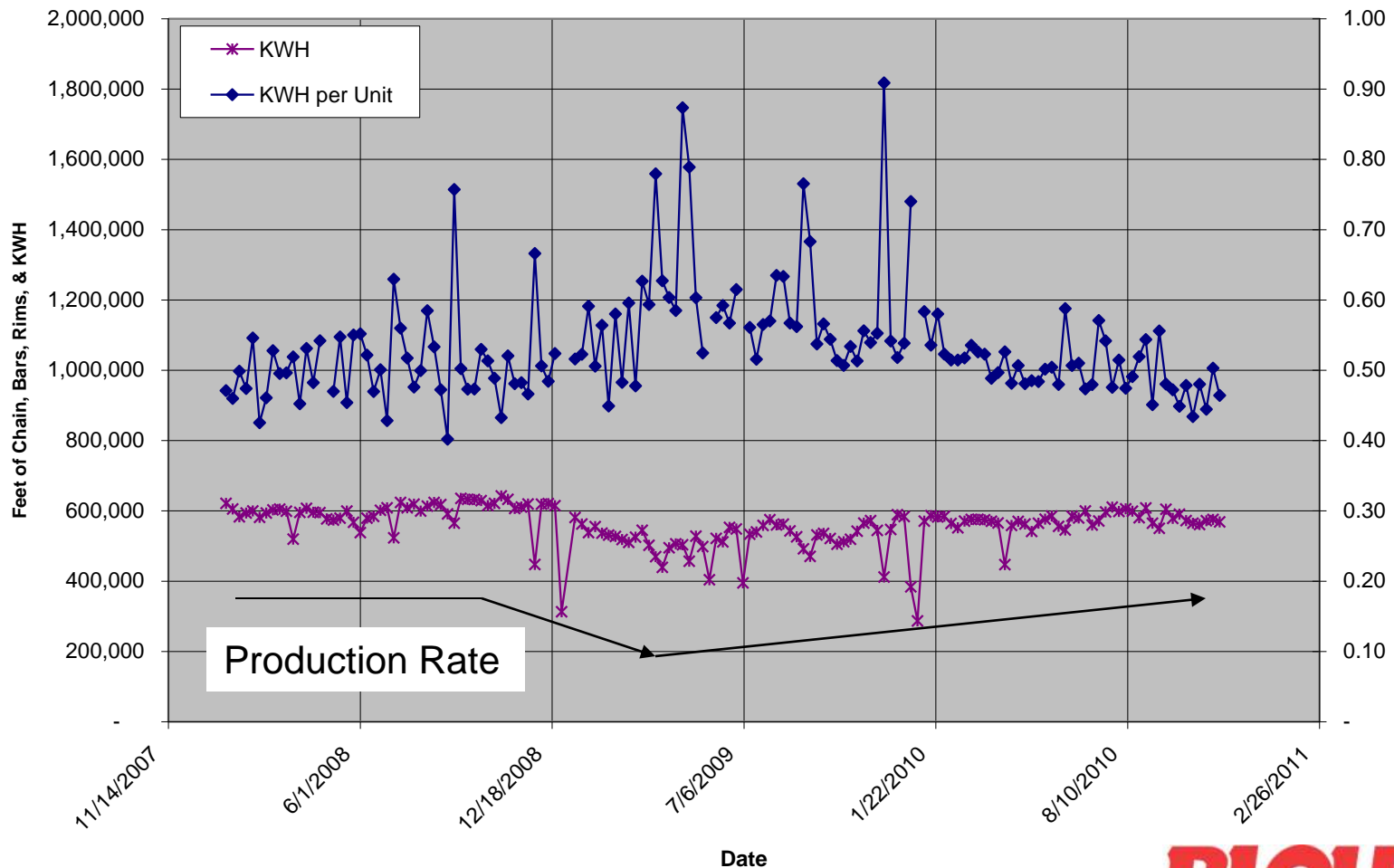
# Energy Tracking

KWH per Week



# Energy Tracking

## Production, CDD, & KWH per Week



# CUSUM

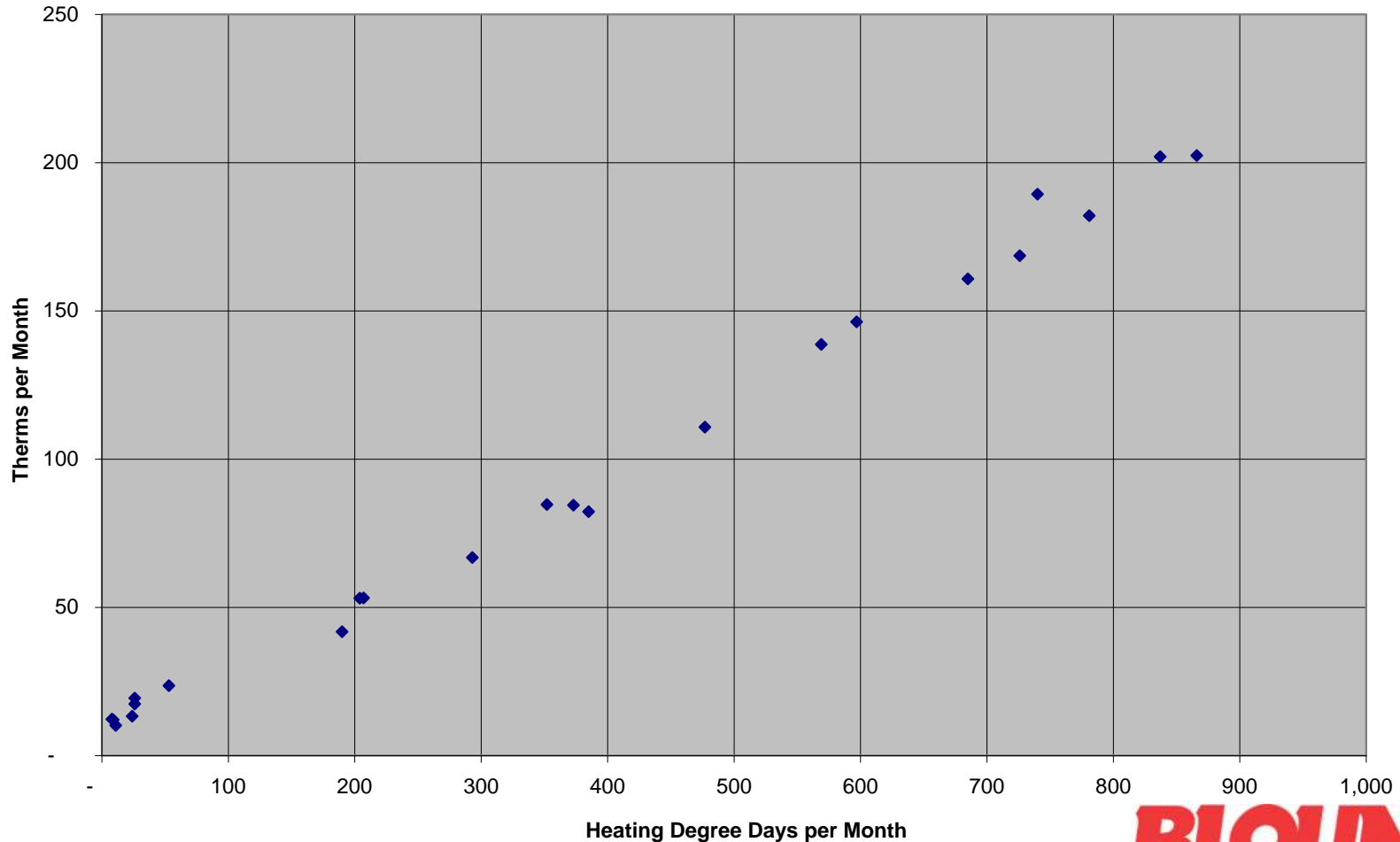
- CUSUM = Cumulative Sum of differences between actual energy usage vs. predicted usage from some baseline
- Establish a energy equation from baseline data
- Predict energy use by inputting current energy data into the baseline equation
- Subtract predicted energy use from the actual energy used. A negative number will mean energy was saved.
- Keep a running total of the differences.
  - Captures big projects
  - Captures small projects and improvements over time
  - Filters out noise (somewhat)

# Simple CUSUM Example – Baseline Data

Date	HDD	Therms
1/17/2008	837	202
2/14/2008	740	189
3/17/2008	597	146
4/16/2008	569	139
5/15/2008	385	82
6/16/2008	207	53
7/17/2008	26	17
8/15/2008	8	12
9/16/2008	26	19
10/16/2008	204	53
11/13/2008	352	85
12/15/2008	685	161
1/15/2009	866	202
2/13/2009	781	182
3/18/2009	726	169
4/17/2009	477	111
5/15/2009	293	67
6/16/2009	53	24
7/16/2009	24	13
8/18/2009	9	12
9/17/2009	11	10
10/13/2009	190	42
11/13/2009	373	85

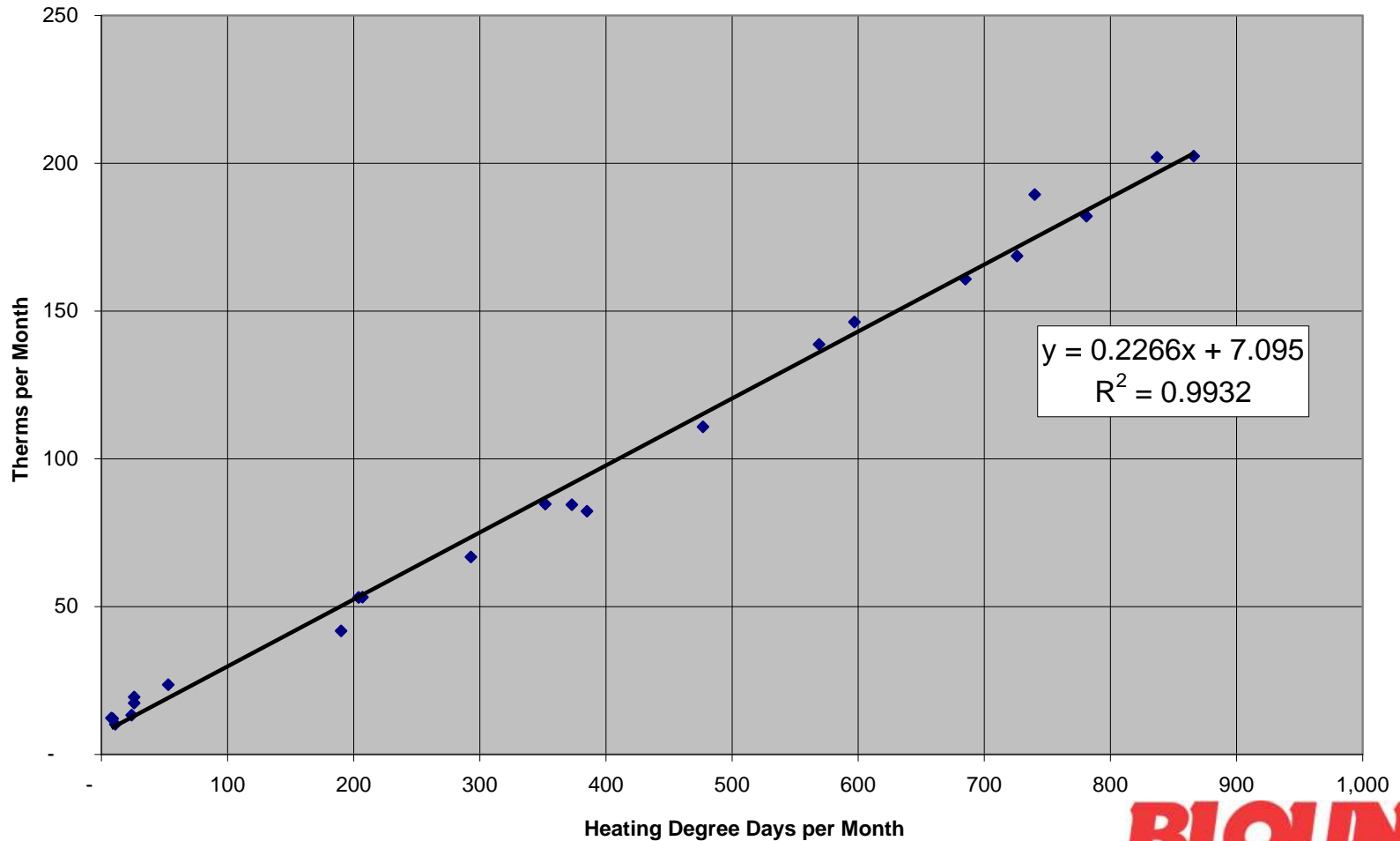
# Simple CUSUM Example – Baseline Data Graphed

Therms vs. Heating Degree Days



# Simple CUSUM Example – Energy Equation

Therms vs. Heating Degree Days

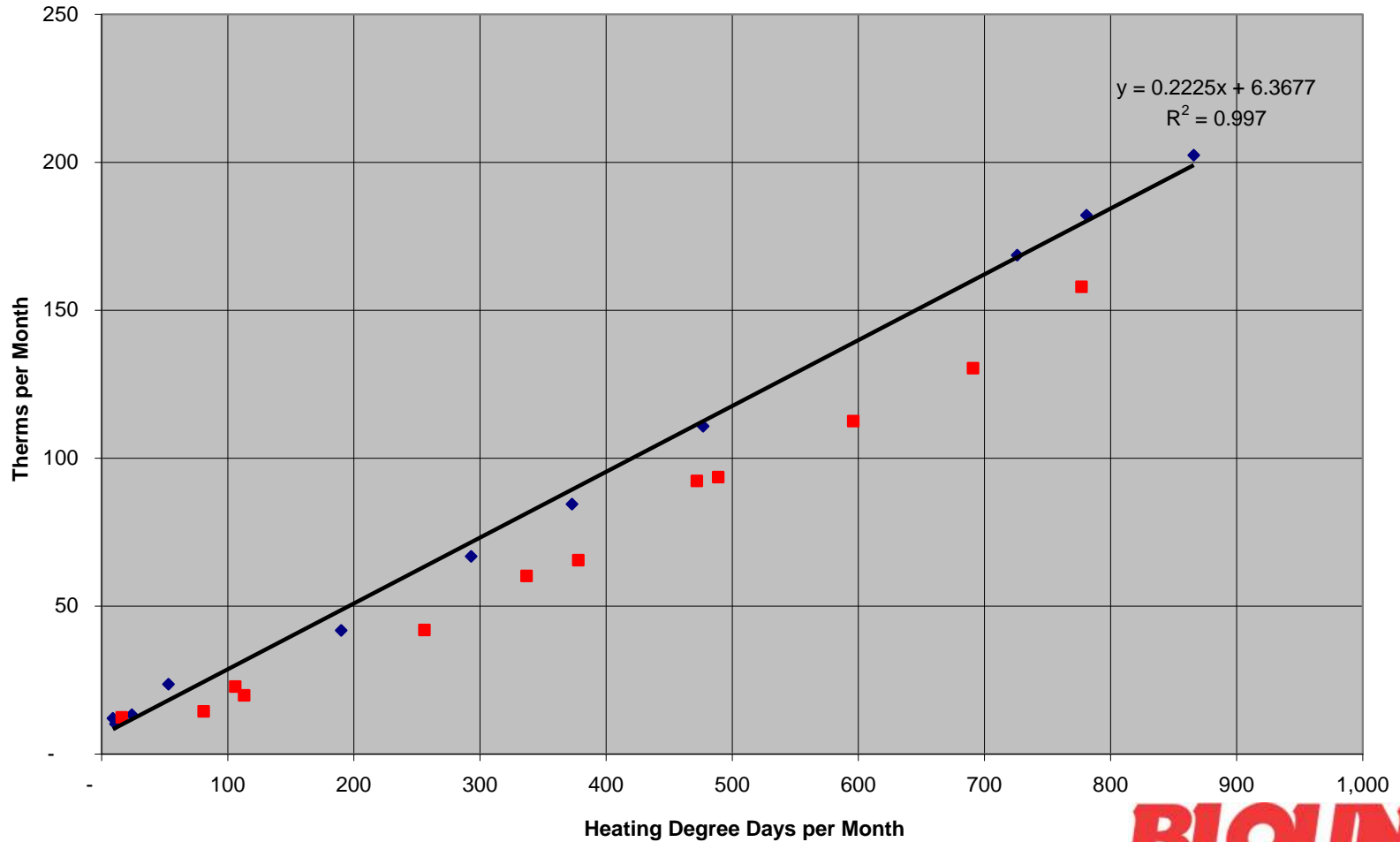


# Simple CUSUM Example – Energy Use Predicted from Energy Equation

Date	HDD	Therms	Therms Pred.
1/15/2009	866	202	
2/13/2009	781	182	
3/18/2009	726	169	
4/17/2009	477	111	
5/15/2009	293	67	
6/16/2009	53	24	
7/16/2009	24	13	
8/18/2009	9	12	
9/17/2009	11	10	
10/13/2009	190	42	
11/13/2009	373	85	
12/14/2009	777	158	183
1/14/2010	691	130	164
2/15/2010	596	113	142
3/16/2010	489	94	118
4/14/2010	472	92	114
5/13/2010	337	60	83
6/15/2010	256	42	65
7/15/2010	113	20	33
8/13/2010	16	12	11
9/13/2010	81	14	25
10/13/2010	106	23	31
11/11/2010	378	66	93

# Simple CUSUM Example

Therms vs. Heating Degree Days

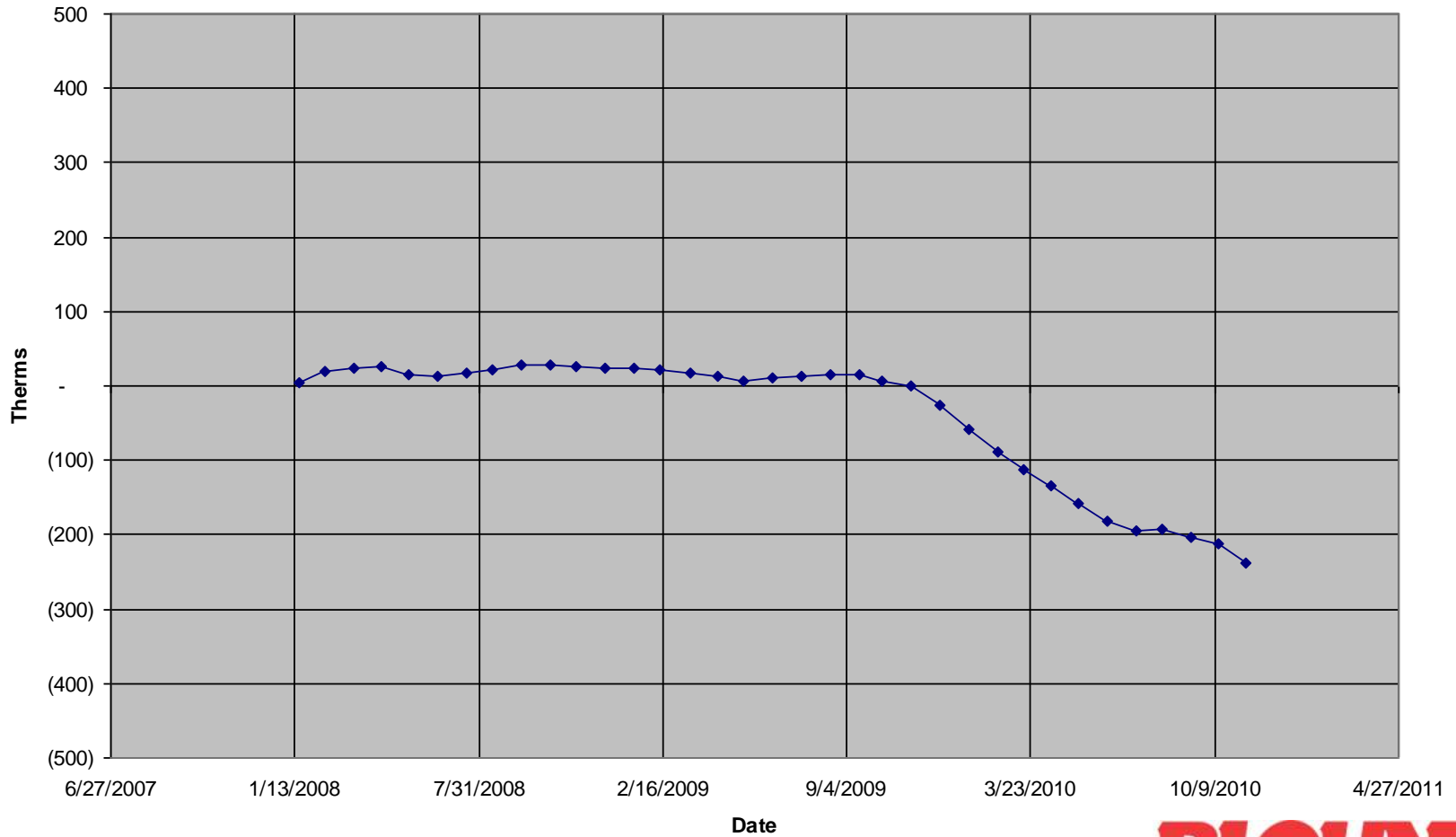


# Simple CUSUM Example

Date	HDD	Therms	Therms Pred.	Variance	CUSUM
1/15/2009	866	202			
2/13/2009	781	182			
3/18/2009	726	169			
4/17/2009	477	111			
5/15/2009	293	67			
6/16/2009	53	24			
7/16/2009	24	13			
8/18/2009	9	12			
9/17/2009	11	10			
10/13/2009	190	42			
11/13/2009	373	85			
12/14/2009	777	158	183	(25.3)	(25)
1/14/2010	691	130	164	(33.3)	(59)
2/15/2010	596	113	142	(29.7)	(88)
3/16/2010	489	94	118	(24.3)	(113)
4/14/2010	472	92	114	(21.8)	(134)
5/13/2010	337	60	83	(23.3)	(158)
6/15/2010	256	42	65	(23.2)	(181)
7/15/2010	113	20	33	(12.9)	(194)
8/13/2010	16	12	11	1.7	(192)
9/13/2010	81	14	25	(11.1)	(203)
10/13/2010	106	23	31	(8.3)	(211)
11/11/2010	378	66	93	(27.3)	(239)

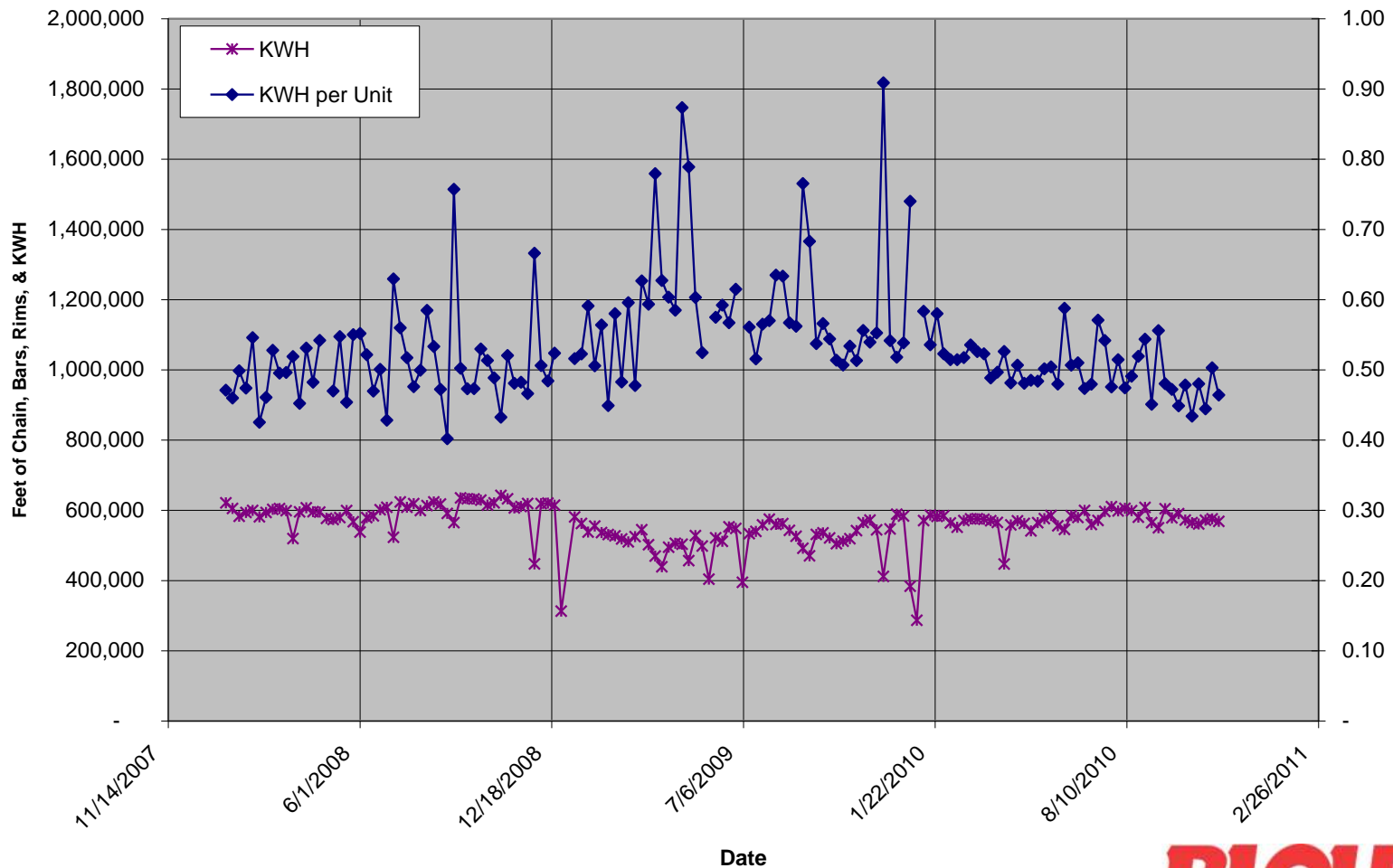
# Simple CUSUM Example

CUSUM



# Energy Tracking

## Production, CDD, & KWH per Week



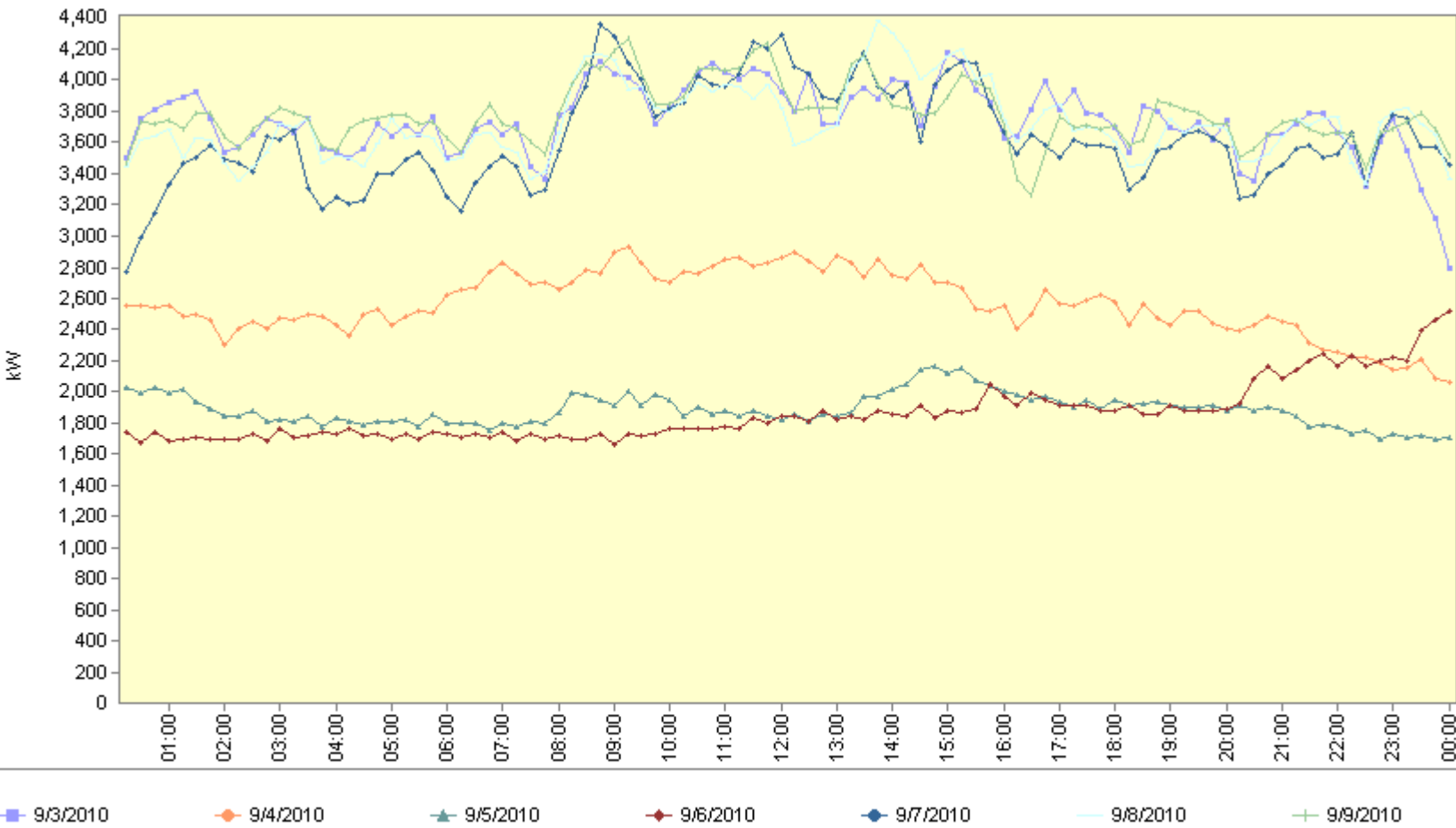
# Energy Tracking

- Weekly production data from three different product lines
- Weekly weather data (cooling degree days)
- Weekly electricity consumption
- Crunched by MS Excel's regression program



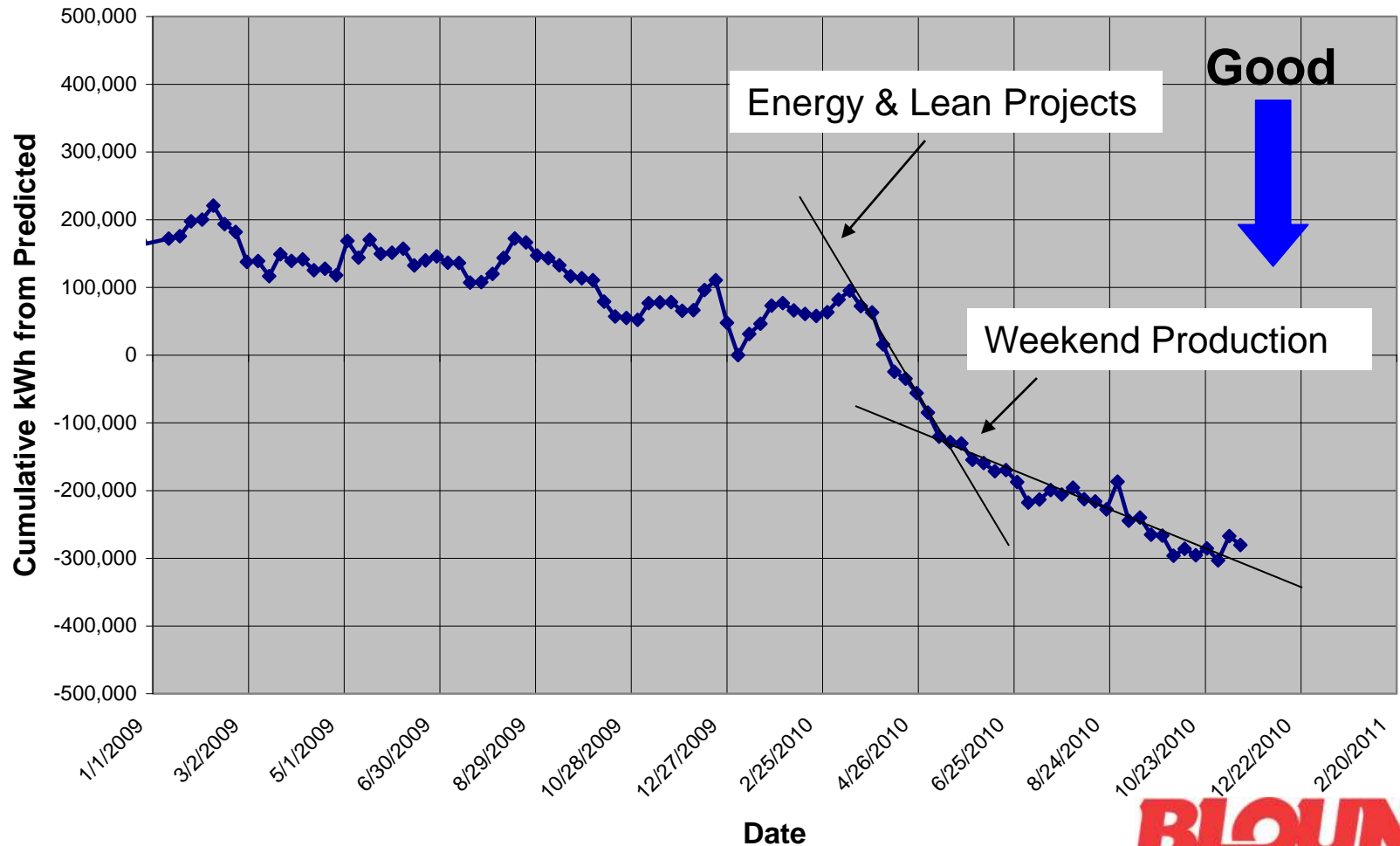
<i>Coefficients</i>		
Intercept	334663	Baseload in KWH per week
X Variable 1	X1	KWH per foot of chain produced
X Variable 2	X2	KWH per guide bar produced
X Variable 3	X3	KWH per drive sprocket produced
X Variable 4	X4	KWH per cooling degree day

# E-Manager – Labor Day



# Energy Tracking

## 2010 Cumulative Difference Between Actual Energy Used vs. Predicted



# *Energy Opportunities*

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- **Baseload!**
  - Compressed Air
  - Lighting
  - HVAC (chilled water)
  - Benefits both production and non-production energy use
- **Employee Engagement**
- **Energy Management System (ISO50000)**

# *Energy Opportunities*

- All done in partnership with the Energy Trust
- Compressed Air Study – ETO, Compression Engineering
  - Controls, leaks, pressure drops, inappropriate uses
- New Air Compressor with VFD
- Manufacturing Lighting Upgrade Project
  - T8's to higher efficiency T8 lamps and ballasts
- Chilled Water Temperatures Reset
- HVAC Re-Tuning
- Industrial Energy Improvement – 2<sup>nd</sup> Cohort
  - 12-month Energy Management focus

# *Employee Engagement*

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- Idea Recognition
- Balanced Scorecard
- ComLink – Blount’s Monthly Newsletter
- Intranet
- Production updates
- Energy Star Partnership
- Energy Star Challenge for Industry
- Environment/Energy Fair

# Environment and Energy Management System (E<sub>2</sub>MS)

## ISO 14001

## ISO 50001

### DOCUMENTATION

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Scope</li> <li>• Environmental baseline</li> <li>• Environmental Key Performance Indicators (KPI)</li> <li>• Environmental Policy</li> <li>• Environmental Goals &amp; Targets</li> <li>• Environmental Manual</li> <li>• Document Control System</li> <li>• Record Control System</li> </ul> | <ul style="list-style-type: none"> <li>• Scope</li> <li>• <i>Energy baseline</i></li> <li>• <i>Energy KPI</i></li> <li>• Energy Policy</li> <li>• <i>Energy Goals &amp; Targets</i></li> <li>• Energy Manual</li> <li>• Document Control System</li> <li>• Record Control System</li> </ul> |
|--|---|

### MANAGEMENT

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Environmental management representative</li> <li>• Environmental management team</li> </ul> | <ul style="list-style-type: none"> <li>• <i>Energy management representative</i></li> <li>• <i>Energy management team</i></li> </ul> |
|--|--|

### MANAGEMENT PLANNING

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Environmental data management</li> <li>• Environmental impact profile</li> <li>• Legal &amp; Other Requirements</li> <li>• Environmental Goals, Targets, Project Planning</li> </ul> | <ul style="list-style-type: none"> <li>• <i>Energy data management</i></li> <li>• <i>Energy Profile</i></li> <li>• Legal &amp; Other Requirements</li> <li>• <i>Energy Goals, Targets, Project Planning</i></li> </ul> |
|---|--|

### OPERATIONS

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Materials/Equipment Purchasing</li> <li>• Systems design &amp; selection</li> <li>• Systems &amp; Process Control</li> <li>• Project implementation</li> <li>• Communications, training, awareness</li> </ul> | <ul style="list-style-type: none"> <li>• <i>Energy Purchasing</i></li> <li>• Systems design &amp; selection</li> <li>• Systems &amp; Process Control</li> <li>• Project Implementation</li> <li>• Communications, training, awareness</li> </ul> |
|--|--|

### EVALUATION & REVIEW

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Monitoring</li> <li>• Internal audits</li> <li>• Corrective &amp; preventive action</li> <li>• Management reviews</li> </ul> | <ul style="list-style-type: none"> <li>• <i>Monitoring</i></li> <li>• Internal audits</li> <li>• Corrective &amp; preventive action</li> <li>• Management reviews</li> </ul> |
|---|--|

## *Lessons Learned*

- Take time to understand where your energy is going.
- Start with low cost projects that have good payback or are visible. Build some buzz.
- “Energy Efficient” should not mean “worse”. Don’t give your energy efficiency program a bad name.
- Energy efficiency products are different. Understand how they work before purchasing and installing.
- Make efficiency or conservation easy.
- Piggyback efficiency onto other projects or into other business processes.

# TO DO LIST

- **Form an Energy Team**
  - Choose members that can influence energy use and make energy projects successful
- **Track and understand your energy use**
  - How much are you using and where are the electrons going
- **Find low-hanging fruit**
  - No or low cost, but big impact
- **Super-Size Me!**
  - Capital projects, employee engagement, energy management

- **Our utility**
  - John Malowney, Industrial Energy Specialist, [John.Malowney@pgn.com](mailto:John.Malowney@pgn.com)
- **Energy Trust**
  - Kim Crossman, Sr. Industrial Sector Manager,  
[Kim.Crossman@energytrust.org](mailto:Kim.Crossman@energytrust.org)
- **Energy Star – Buildings and Plants**
  - [www.energystar.gov](http://www.energystar.gov), then click on “Buildings and Plants”
- **Consultants, contractors, suppliers**
  - They are up-to-speed with the latest, and are eager to help