



# Energy Management Conservation

PerkinElmer Salem

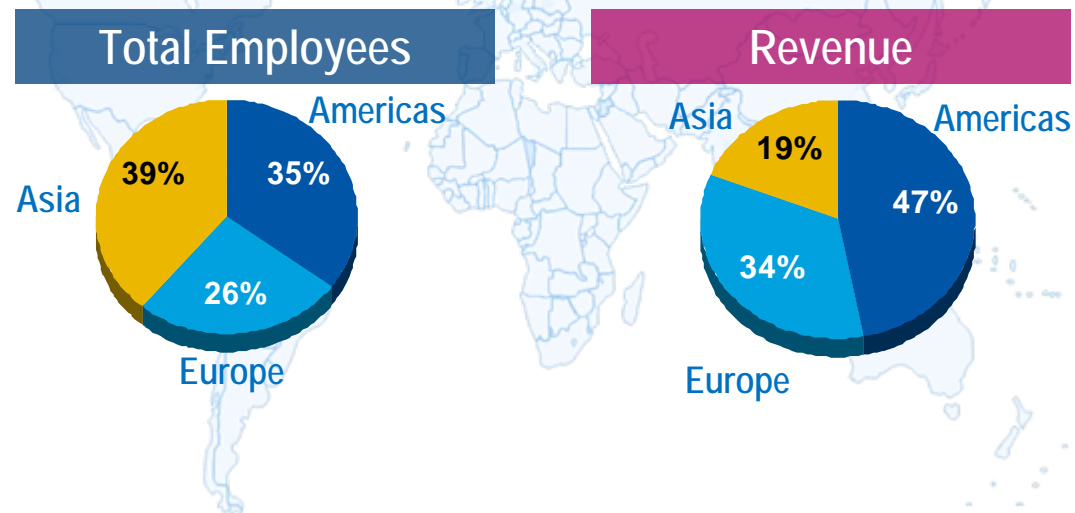
Nov 3, 2010



\$1.8B in Revenue

8,500 employees

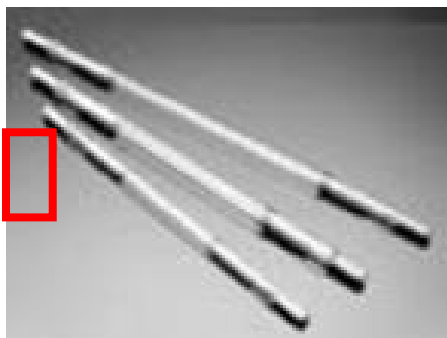
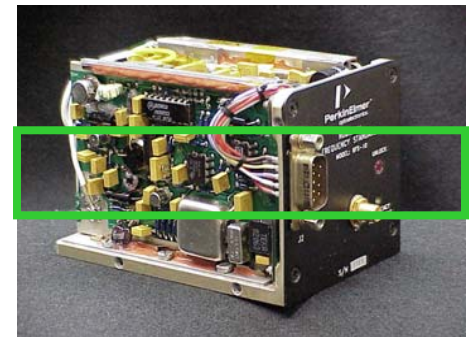
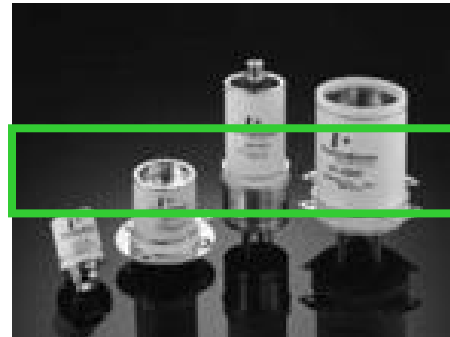
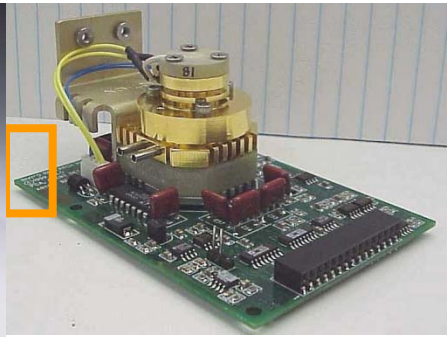
Operations in 150 Countries



- Originally known as EG&G
- Facility established in 1961
- 1999 changed name to PerkinElmer
- Facility approx. 112,000 ft<sup>2</sup>
- 160 Employees
  - Operations, Design Engineering
  - Sales/Marketing and Product Mgmt
  - Finance, HR, IT
- Certifications
  - ISO 14001:2004
  - ISO 9001:2008
  - OHSAS 18001:2007
- EPA Green Power Partner
- Energy Demand Response Participant



# Diverse portfolio of 12 product lines

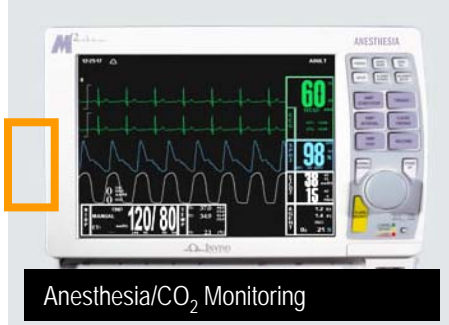


- Orange line: Biotech
- Green line: Mil/Aero
- Red line: Industrial Flash

# Each product supports various applications ...



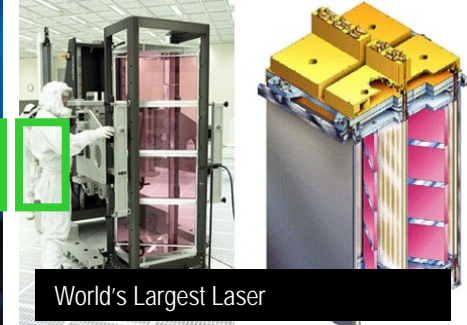
Clinical Diagnostics



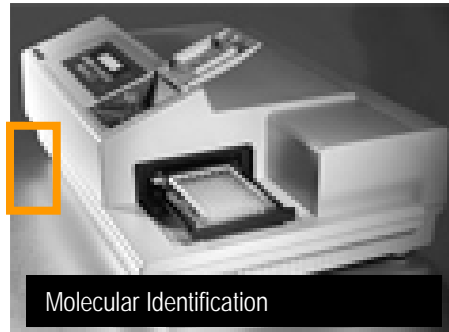
Anesthesia/CO<sub>2</sub> Monitoring



Laser Vision Correction



World's Largest Laser



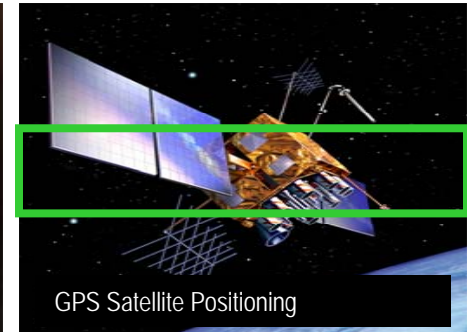
Molecular Identification



Industrial Gas Detection



Rocket Stage Separation



GPS Satellite Positioning



Power Grid Protection



Laser Designation/Targeting



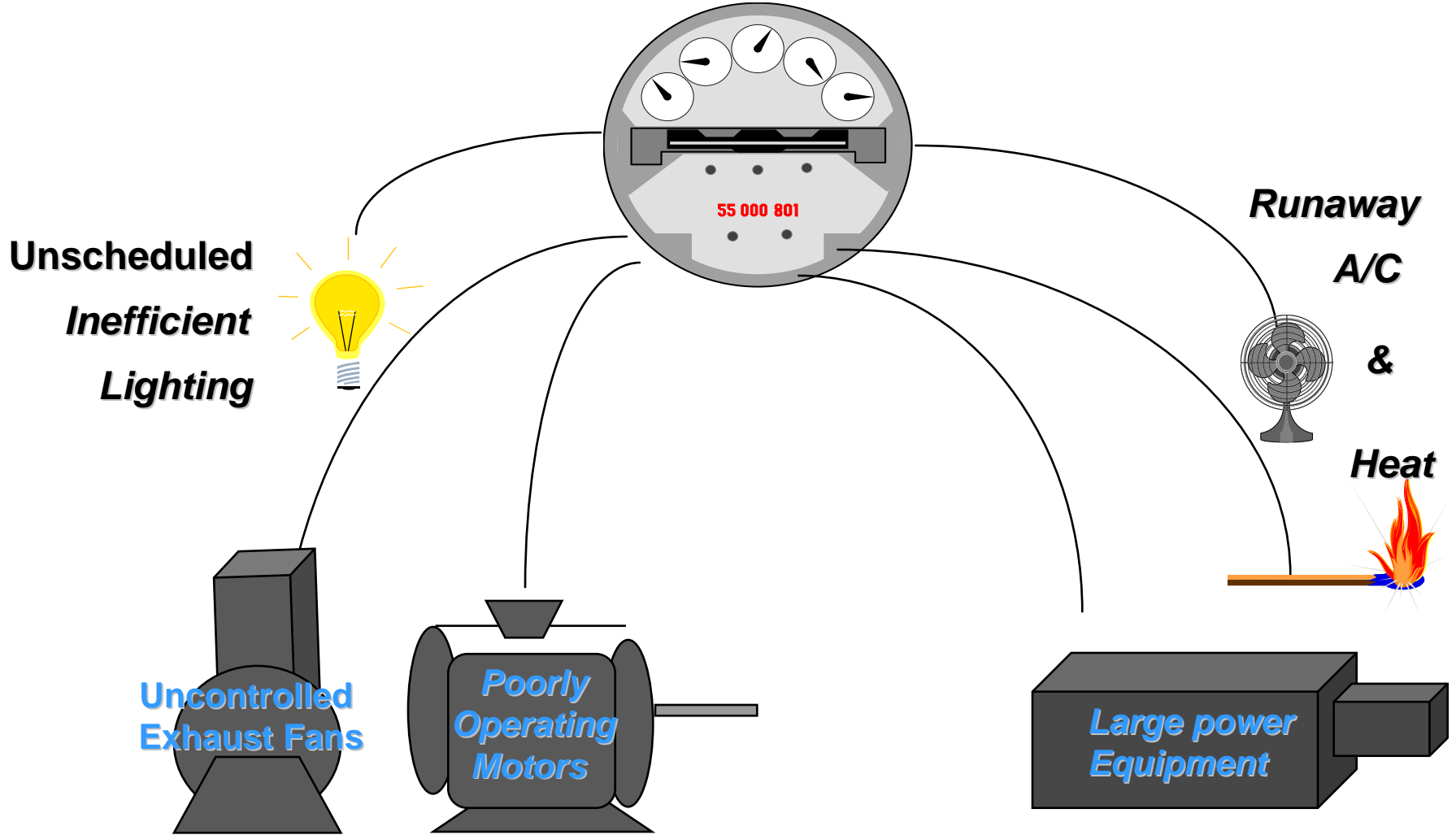
Weapon Detonation



Hi-Speed On-line Inspection

- Orange line: Biotech
- Green line: Mil/Aero
- Red line: Industrial Flash

Defined, measured and analyzed data



# Electrical conservation – low hanging fruit

## ▶ Lighting

- Installed motion sensing light switches
- Replaced/retrofitted 1500 light fixtures
  - Replaced T12 fixtures with T8 fixtures
  - Improved lighting quality

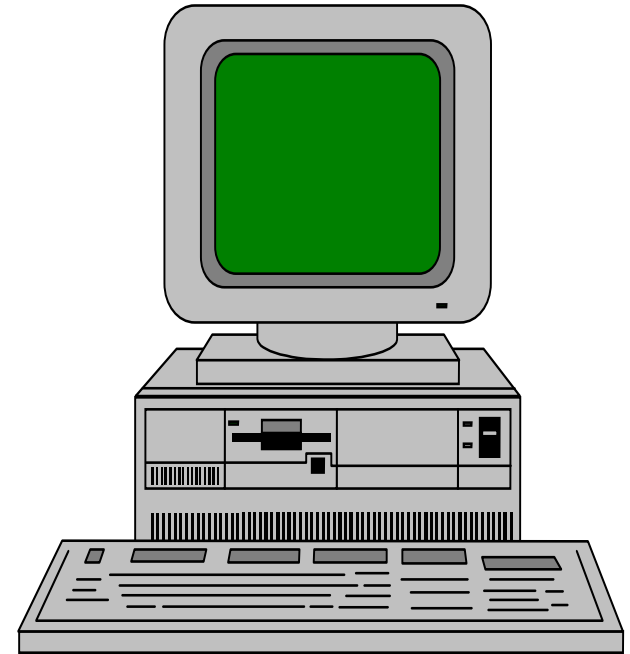
## ▶ Motors and drives

- Replaced 31 motors (220 hp) with premium efficiency motors throughout the building
- Installed variable frequency drives in chem. lab exhaust and make-up air systems
- Installed 16 test kits with premium efficiency exhaust fans - which were interlocked with tube under test control circuit
  - Replaced 36 inefficient motors
  - Pulled 100,000 cfm 24 hrs/day, 365 days a year
  - Reduced consumption 235, 995 kWh

## ▶ Converted to electric baseboard heat

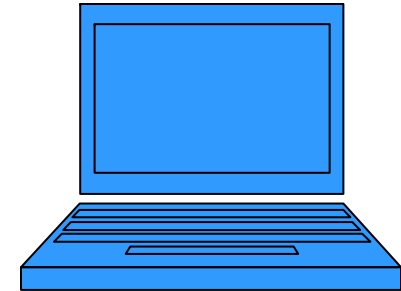
- Original fan forced electric duct heaters
  - Improved safety, comfort and noise level
  - Reduced consumption 140,000 kWh

- ▶ Researched lighting control system
- ▶ Reduced lighting loads allowed for the installation of G.E. lighting control system
  - 3 lighting control panels
  - 60 scheduled lighting zones
  - Reduced electrical consumption 258,000kWh
- ▶ Developed and scheduled lighting
- ▶ Remote operation
- ▶ Savings: \$23,000 per year





- ▶ Energy Management System (EMS)
  - Installed initial system 1993 , upgraded to state of the art system 2009
  - Can't manage what isn't measured
- ▶ Enables real-time overview and complete control of facility and processes from anywhere (on-site or remotely)
  - Diagnostic and trend log analysis
  - In-situ continuous system monitoring
  - Parameters setting and individual points scheduling
  - Program alarm parameters with notification
  - Electrical peak demand control and monitoring
  - Free and nocturnal cooling
- ▶ Capable of expanding to a building monitoring system
  - Lighting control
  - Calibration
  - Security systems
  - Fire



# Electrical conservation – EMS main screen view

Envision for BACTalk - ABSYST/PEOPTSAL

BACTalk Edit View Tools Help

**PerkinElmer**  
Salem, MA.

- X Main
- System Devices
- Heating / Cooling Units
- Baseboard Radiation
- Building Alarm Summary
- Door Contacts
- Exhaust Fan Summary
- Wastewater Treatment
- Ultrasonic Baths
- Nickel Plating
- Medical Gas
- Furnace Room Chiller
- Thyatron Chiller
- Sandia Chiller
- Thyatron Lower System
- Gas Water Heater

DEMAND LIMITING

DEMAND LIMITING PROCEDURE HELP

TRENDLOGS

LOGIN / LOGOUT

Login/Logout

Current Alarms

**ALERTON**

Friday, 10/22/2010 8:53:23AM

MODEM TEL NO. 978-741-4172

N E Tower Water Heater  
Inactive

TEST

LARGE

Energy Logs

OUTSIDE AIR

TEMP 43.0 °F

RH 68.8 %

ENTPY 14.7 Btu/Lbs

MAIN

4 WEST

4 EAST

FLOOR 3

WWT

Building Energy 5400158.5

5400158.5

start Envision for BACTalk -... 8:53 AM

# Electrical conservation – trunk overview screen

Envision for BACtalk - ABSYST/PEOPTSAL

BACtalk Edit View Tools Help

**PerkinElmer**  
Salem, MA.

**ALERTON**

Friday, 10/22/2010 8:54:55AM  
 Outside Air 43.0 °F  
 Conditions 68.8 %Rh  
 14.7 Btu/lbs.

Main	Description	Space Temperature	Use Global Setpoint	Schedule Point	Current CtgSP HtgSP		Fan Command	Supply Air Temperature		Signals Ctg Htg	
					CtgSP	HtgSP		Ctg	Htg		
X (2A) BCM-203 NET.3	Sandia Cell A53	72.0 °F	No	Occupied	72 *	70 *	Stopped	79.0 °F	10 %	0 %	
(2B) BCM-203 NET.3	Chem Lab A/C & Heat (A14)	67.0 °F	No	Occupied	74 *	72 *	Running	68.0 °F	0 %	100 %	
	MASER Control Room	70.0 °F	No	Occupied	74 *	72 *	Running	42.0 °F	0 %	100 %	
	Chem Lab Copper M/U (M5)	NR	NR	NR	NR	NR	NR	NR	NR	NR	
	Chem Lab Nickel M/U (M3)	68.0 °F	No	Occupied	69 *	67 *	Running	58.0 °F	0 %	10 %	
	Gap Test (A38)	71.0 °F	No	Occupied	74 *	72 *	Running	73.0 °F	0 %	98 %	
	Frequency Assembly	73.0 °F	No	Occupied	73 *	71 *	Running	68.0 °F	20 %	0 %	
	Frequency Office	68.0 °F	No	Occupied	68 *	66 *	Running	73.0 °F	0 %	0 %	
	Frequency Aging II	73.0 °F	No	Occupied	70 *	68 *	Stopped	89.0 °F	0 %	0 %	
	Sandia Test Section (A52)	73.0 °F	No	Occupied	74 *	72 *	Running	65.0 °F	0 %	10 %	
	GPS Test Chamber	71.0 °F	No	Occupied	70 *	68 *	Running	75.0 °F	37 %	0 %	
	M/U Air Potting Lab (M6)	NR	NR	NR	NR	NR	NR	NR	NR	NR	
	Thyratron Pump Room	71.0 °F	No	Occupied	69 *	67 *	Stopped	71.0 °F	100 %	0 %	
	Bulb Line Middle	72.0 °F	No	Occupied	75 *	73 *	Running	121.0 °F	0 %	88 %	
	Bulb Line West	74.0 °F	No	Occupied	75 *	73 *	Stopped	79.0 °F	10 %	0 %	
	P I D II	73.0 °F	No	Occupied	73 *	72 *	Stopped	75.0 °F	20 %	0 %	
	Telecommunications	73.0 °F	No	Occupied	73 *	71 *	Running	78.0 °F	20 %	0 %	
	GPS Assembly	76.0 °F *HIGH*	No	Occupied	69 *	67 *	Running	75.0 °F	100 %	0 %	
	GPS Test Sanyo Unit	74.0 °F	No	Occupied	67 *	65 *	Running	81.0 °F	100 %	0 %	
	ESAF LAB	73.0 °F	No	Occupied	72 *	70 *	Stopped	86.0 °F	98 %	0 %	
	Frequency Aging Room I	NR	NR	NR	NR	NR	NR	NR	NR	NR	

**Global Heating/Cooling Equipment Settings**

Occ Space SP 70 °F

Max Space SP 74 °F

Min Space SP 68 °F

Htg Offset 1 °F

Ctg Offset 1 °F

Unocc Heat SP 60 °F

Unocc Cool SP 80 °F

Afterhours Limit 2.0 hrs.

Econo OA-T Lock 75 °F

Econo Minimum 0 %

Heat OA-T Lock 55 °F

Cool OA-T Lock 60 °F

start Envision for BACtalk ... 8:54 AM

# Electrical conservation – bulb operations

Device 3015 (Bulb Line West (A-13C))

BACtalk Edit View Tools Help

**PerkinElmer**  
Salem, MA.

**ALERTON**

Friday, 10/22/2010 8:55:58AM  
Outside Air Temp 43.0 °F  
Outside Air Humidity 69.3 %Rh  
Outside Air Enthalpy 14.7 Btu/lbs.

**Bulb Line West (B-13C)**

**Heating Signal**  
0 %

Stage-1 ■

Stage-2 ■

**Cooling Signal**  
10 %

Stage-1 ■

Stage-2 ■

**Supply Fan**  
Stopped

**Supply Air Temp**  
79.0 °F

**Zone Status**

- Occupied
- Afterhours
- Warmup
- Cooldown
- Bad Sensor
- High Temp
- Low Temp

**Space Conditions**

74.0 °F

**Outside Air Temp**  
43.0 °F

Previous

Previous

**LOGIN / LOGOUT**

**Unit Status**

Unit Lockout:  Allowed

Field Service:  Allowed

Schedule Mode:  Scheduled

Schedule Point: Occupied

Command Mode: Occupied

Mode Of Operation: AC Unit

**Alarm Settings**

Low Supply Alarm Enable:  No

Low Supply Reset Type:  Automatic

Low Supply Manual Reset:  Off

Low Supply Temp Alarm: Normal

Heat Attained Alarm SP: 10.0 °F

Heating Attained Temp: 108.0 °F

Cool Attained Alarm SP: 65.0 °F

Cooling Attained Temp: 53.0 °F

Heat/Cool Attained Alarm: Alarm

**Fan Control**

Fan Mode:  Cycle On Demand

Fan Cycling:  Heating & Cooling

Fan Runtime Hours: 158 Hrs.

**Heating Control**

Outside Air Lockout SP: 50.0 °F

Outside Air Lockout:  No

Heating Runtime Hours: 6 Hrs.

Heating Ramp Time: 12 Min.

**Cooling Control**

Outside Air Lockout SP: 50.0 °F

Outside Air Lockout:  Yes

Cooling Runtime Hours: 90 Hrs.

Cooling Ramp Time: 12 Min.

AC/2-Htg/1-Clg  
Controller Model: TUX:SA-651

**OUTSIDE AIR**

TEMP 43.0 °F

RH 67.8 %

MAIN

4 WEST

4 EAST

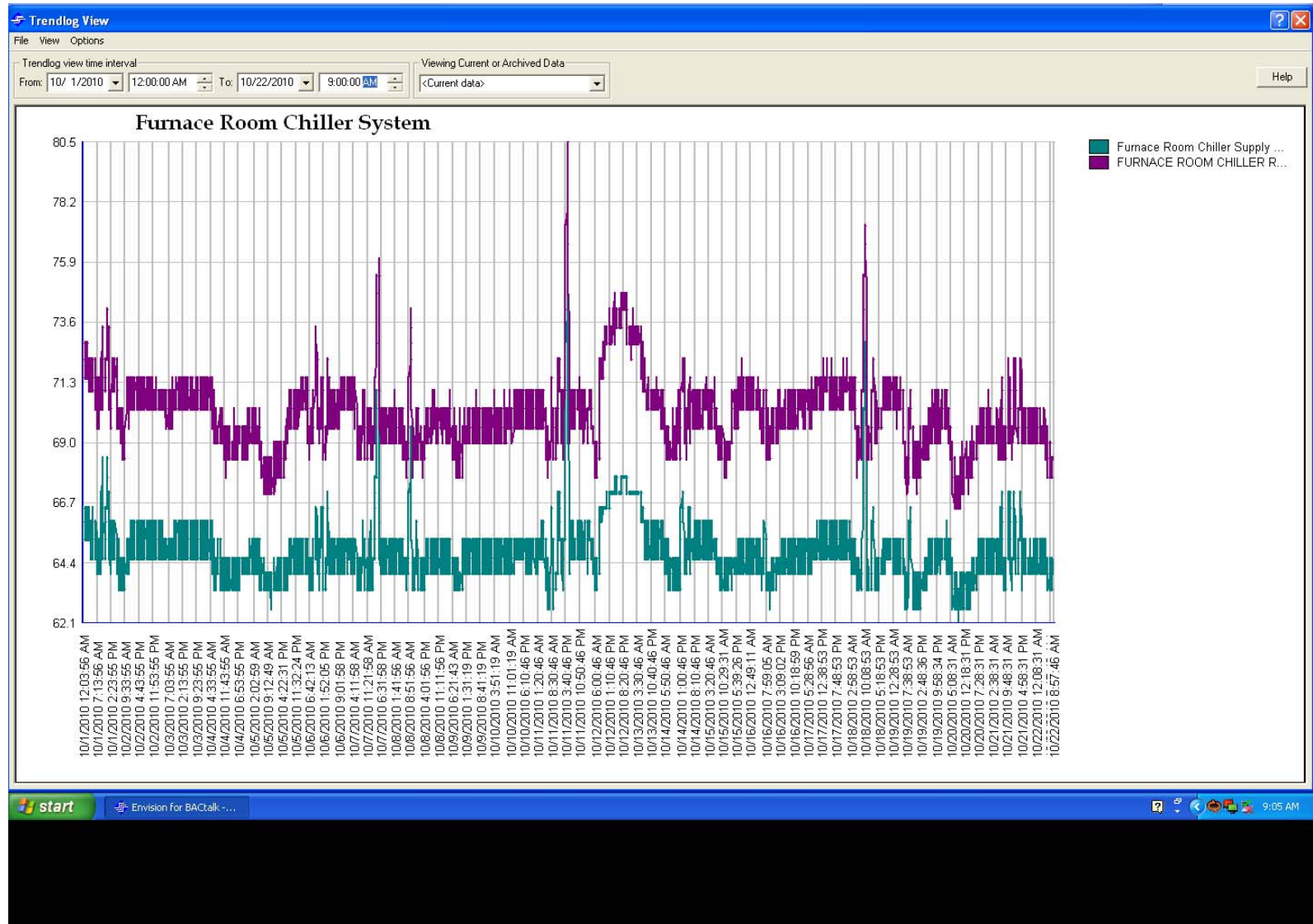
FLOOR 3

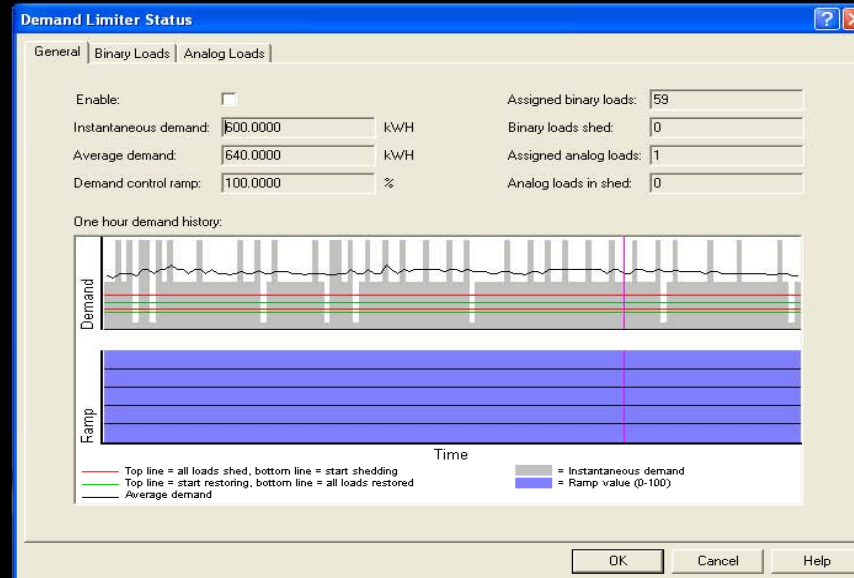
WWT

Previous

start Device 3015 (Bulb Lin... 8:55 AM

# Electrical conservation – trend log





- ▶ Enables easy participation in ISO New England Demand Response Program
  - Generates quarterly payments
  - Reduces stress on grid during times of increased demand
  
- ▶ Improves energy efficiency through a structured approach
  - Opportunities are identified
  - Objectives and targets can be tracked and trended
  - If an output is generated it can be measured
  
- ▶ Reduces environmental impact
  - Greenhouse gases reduced 47K metric tonnes
  
- ▶ Results in significant cost savings
  - Energy and natural resources
  - Rebate incentives
  - Cost effective plant operation

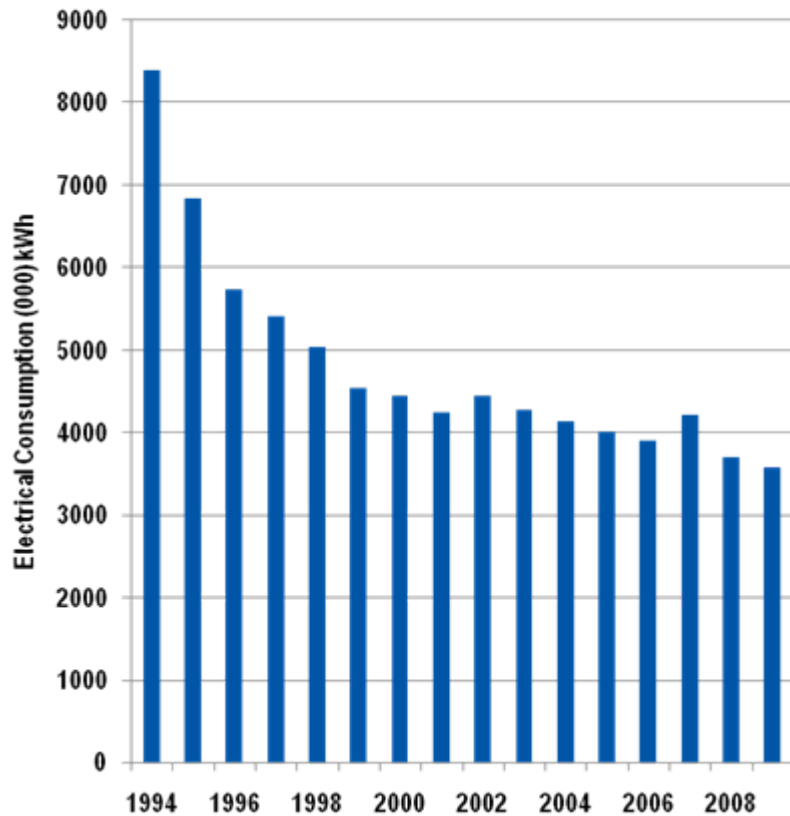


## Electrical conservation – house air and humidifier systems

- ▶ Removed 55 HP continuously running reciprocating air compressors
  - Compressors dirty, noisy and operationally inefficient
  
- ▶ Installed (3) new 15 HP screw type compressors and sequencer
  - Compressors clean, quiet, energy efficient
  - Savings \$11,000 per year
  
- ▶ Replaced 11KW steam generating unit with (1) 1KW ultrasonic humidifier
  - Savings \$2000 per year
  
- ▶ Continuously monitor cycle time usage (operational hours vs. off-hours)
  - Perform periodic line inspections
  - Scheduled preventive maintenance programs

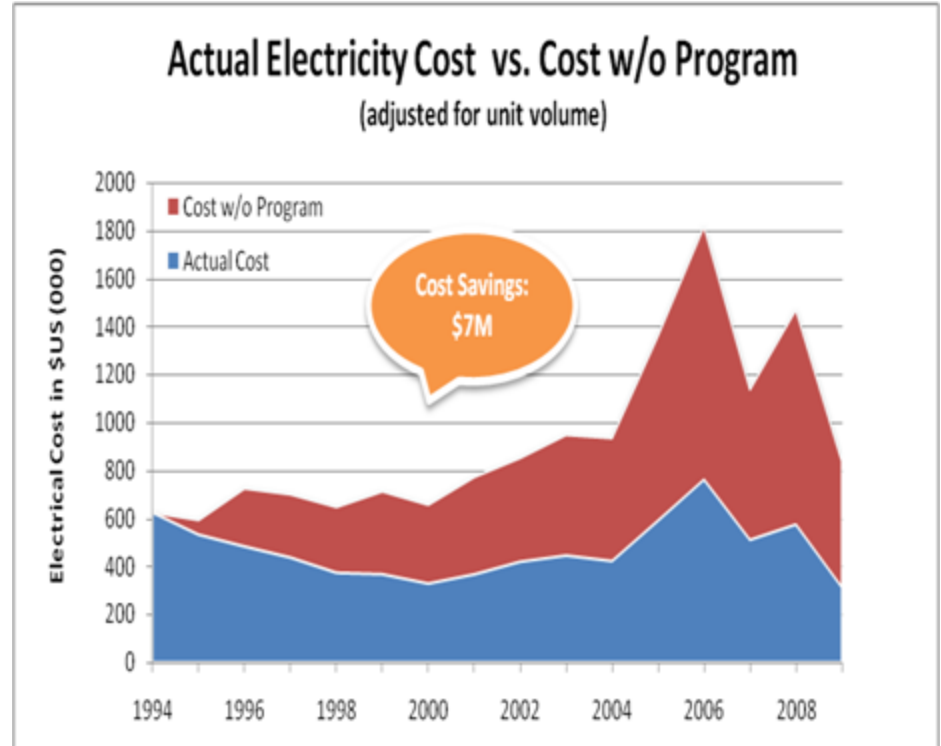


## Electrical Consumption (1994 - 2009)



## Actual Electricity Cost vs. Cost w/o Program

(adjusted for unit volume)



# Electrical conservation – next steps

- ▶ Proceed with LED installations
  - Produces consistent light output
    - Currently quite costly – approx. \$60 per T8 LED lamp
    - May qualify for custom lighting rebate incentives
  - Requires no ballasts
  - Reduces maintenance costs
  - Universal waste regulations do not apply
  
- ▶ Install new security system
  - Tie security system into EMS to control lighting and HVAC
    - ID badge swiping will activate
  
- ▶ Purchase new advanced lighting control system
  - Light harvesting capabilities

## Program benefits – final conclusion

- ▶ Program has resulted in operations:
  - That have increased physical output with the use of fewer resources
  - Less impact on the environment
  - Provided safer environment for employees and community
  - Improved employee comfort level which improved productivity
  - Increased financial success of the business
  
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- ▶ Jerry Goulart
  - Email: [jerry.goulart@perkinelmer.com](mailto:jerry.goulart@perkinelmer.com)