

Top Ten Steps to Cut Your Residential Energy Costs in Half

Bill Neukranz

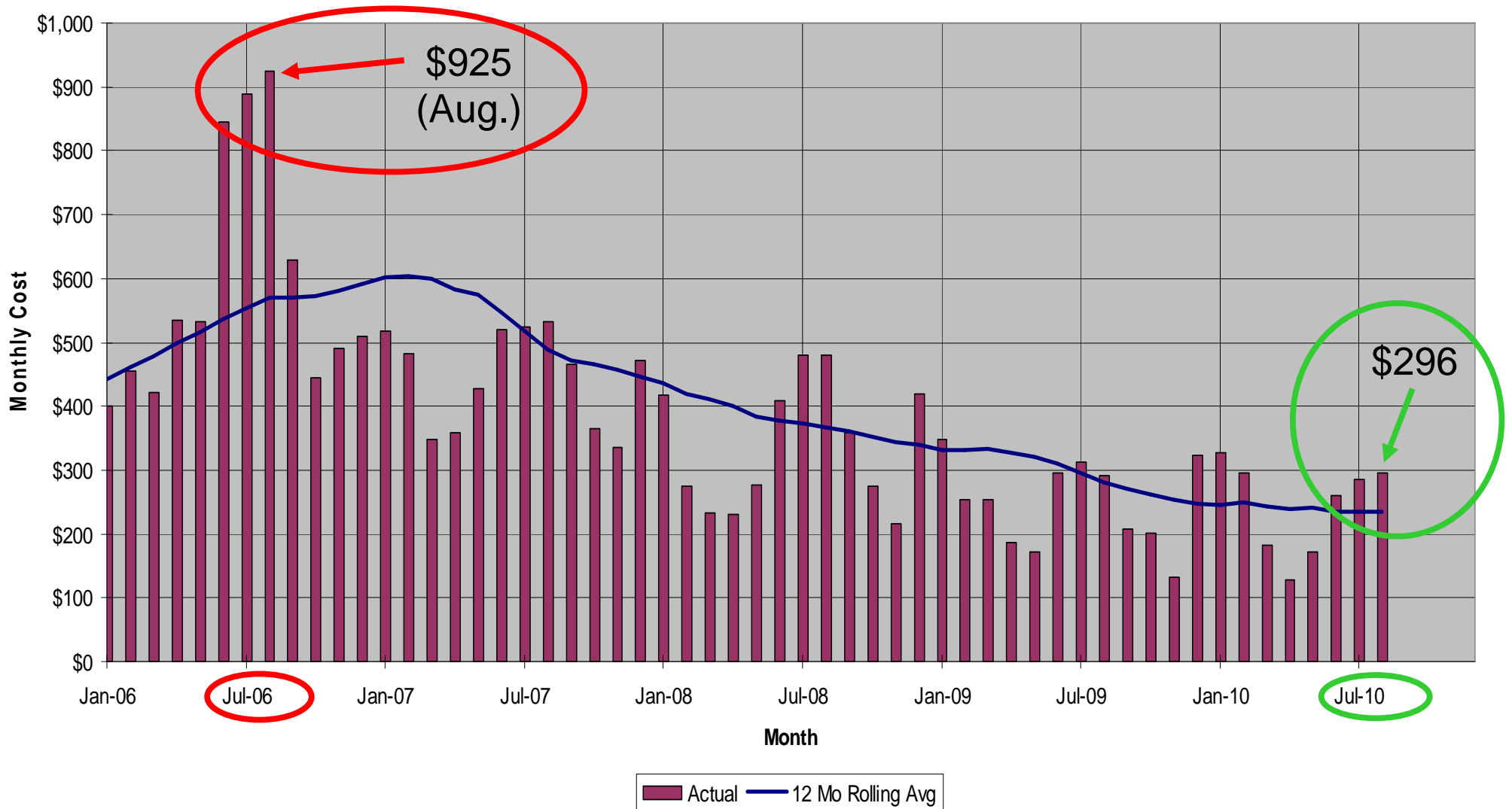
bneukranz@verizon.net

972-516-0909

Ten Steps to Cut Your Energy Costs in Half

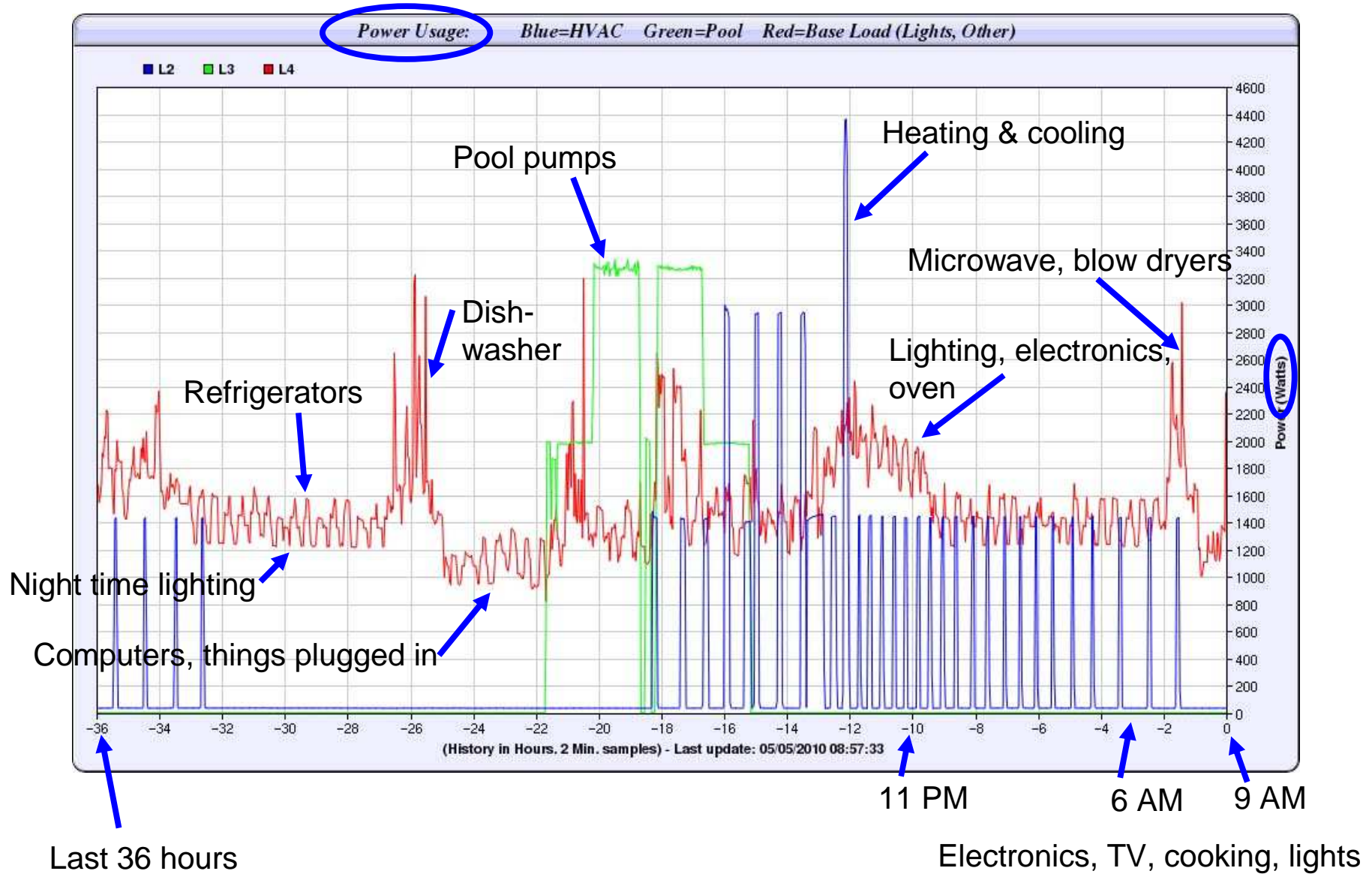
What Happened?

Monthly Electricity Costs Since Year 2006



Ten Steps to Cut Your Energy Costs in Half

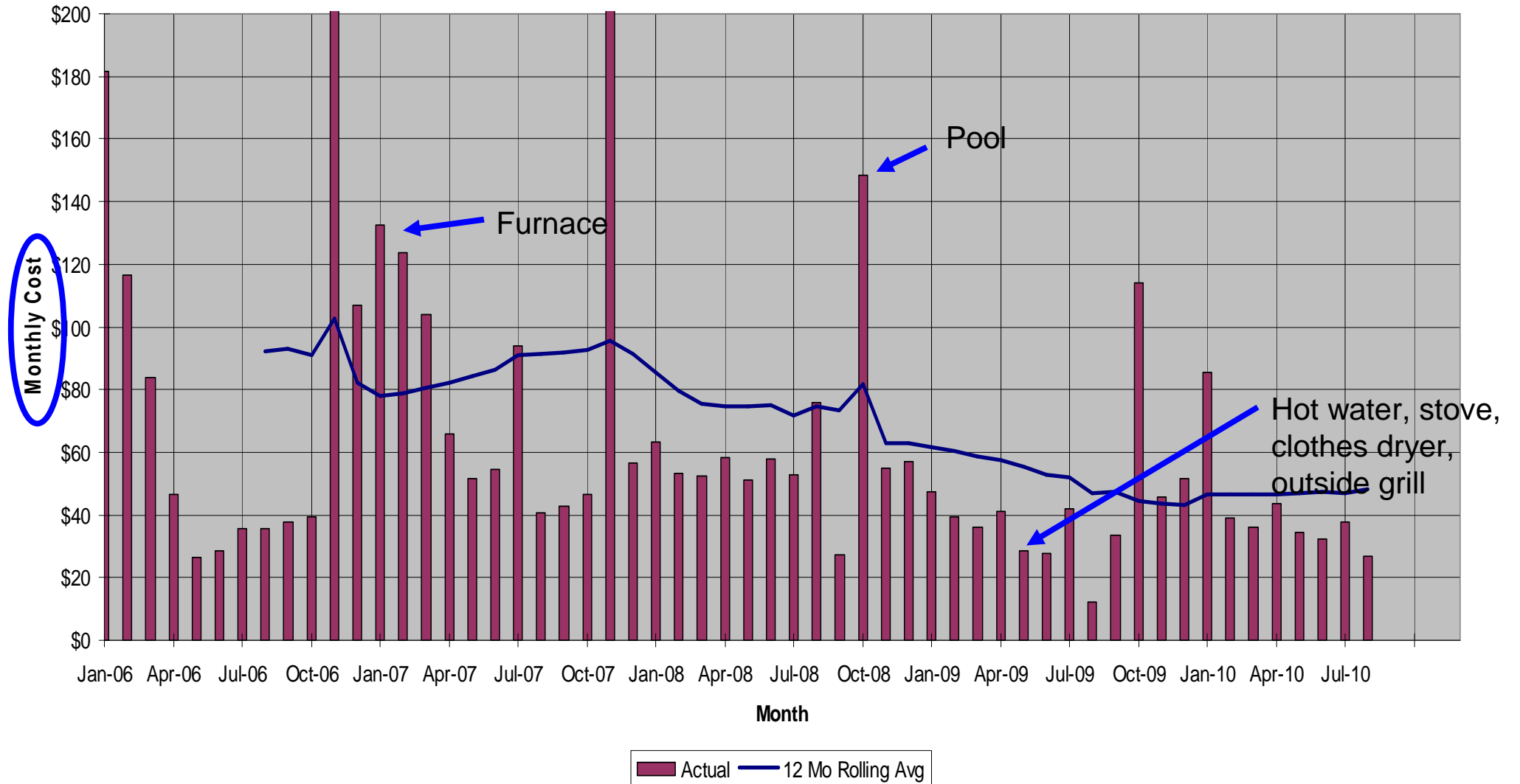
Opportunity Space: Electricity



Ten Steps to Cut Your Energy Costs in Half

Opportunity Space: Natural Gas

Monthly Natural Gas Cost Since Year 2006

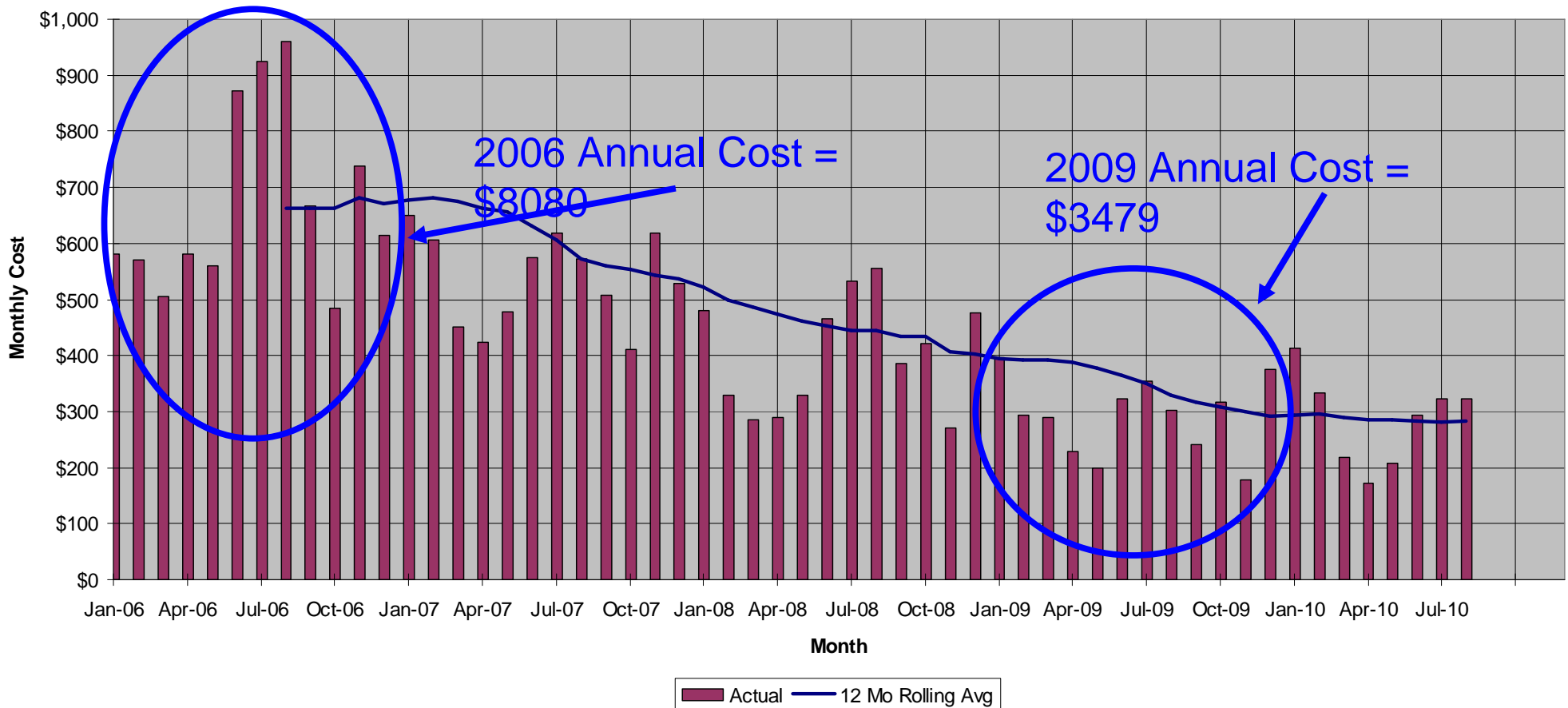


Ten Steps to Cut Your Energy Costs in Half

Summary of Mission: Continuously Reduce Costs

Bottom Line So Far = 57% reduction in 3 years

Monthly Electricity & Natural Gas Costs Total Since Year 2006



Ten Steps to Cut Your Energy Costs in Half

1. **Aggressively manage your electric utility rate**
 - ✓ Get comfortable with variable rate plans – no mess, no fuss
2. **Replace every incandescent light bulb with CFL**
 - ✓ Get it down to everything except oven, refrig, microwave
 - ✓ Say 'no' to ugly CFL bulbs
 - ✓ Be careful what you buy – use amalgam technology bulbs for reliability
3. **Change your living style**
 - ✓ Install programmable thermostats – set reasonable temperatures
 - ✓ Turn on / install ceiling fans
 - ✓ Turn off dishwasher 'heated dry' function
 - ✓ Set hot water heater at Normal or cooler setting
 - ✓ Use only detergents for 'cold' or 'warm' water for clothes washing
4. **Turn stuff off**
 - ✓ Turn off workstations (use off-site backup service – Mozy, use laptops)
 - ✓ Unplug stuff rarely used
 - ✓ Implement power strips for rest of stuff plugged in
 - ✓ Install switch timers and plug-in timers
5. **Understand actual energy consumptions**
 - ✓ Purchase / borrow a [Kill-A-Watt Meter](#)
 - ✓ Put in whole house energy monitoring capability: [The Energy Detective \(TED\)](#) (electricity only), or [Web Energy Logger \(WEL\)](#) (a lot more than electricity)

Step 1: Aggressively Manage Your Electric Utility Rate

Power to Choose - Microsoft Internet Explorer

Address <http://www.powertochoose.org/>

HOME / ESPAÑOL

Texas Electric Choice
EDUCATION PROGRAM

SHOP. SWITCH. SAVE.

ABOUT ELECTRIC CHOICE REASONS TO CONSIDER SWITCHING COMPARE YOUR CHOICES

Reasons to Consider Switching

The Official Electric Choice Web site of the Public Utility Commission of Texas

Welcome to the Texas Electric Choice Web site, where you can learn about electric competition in Texas and obtain information to help you make informed decisions about your electricity service and Retail Electric Provider. Select from the categories above to learn about electric choice and the options available for you in the marketplace.

- Retail Electric Provider Information
- What To Do If Your REP Goes Out Of Business
- Customer Complaint Statistics
- LITE-UP Texas Discount Application

Go Directly To Offers

PDF files require the use of the Adobe Acrobat Reader. [Download a free copy of Acrobat here.](#)

[Site Map](#) / [Contact Us](#) / [Glossary](#) / [FAQs](#) / [Publications](#) / [Your Rights](#) / [Low Income](#) / [Information for Businesses](#)

© 2003–2009 PUC / All rights reserved. This information is provided by the Public Utility Commission of Texas.

Start | Internet | 5:44 PM

Step 1: Aggressively Manage Your Electric Utility Rate

Account Detail

Service Address: 3303 RAMPART DR, PLANO, TX 750742850

ESI ID Detail: 10443720006932036

The average price you paid for electric service this month was 10.2 cents per kWh excluding taxes and non-recurring charges or credits.

Meter ID	Days in Reading	Read Type	Previous Read Date	Previous Meter Read	Current Read Date	Current Meter Read	Usage	Multiplier	Billed Usage
102437906LG	31	Actual	02/25/2010	508	03/28/2010	1861	1353	1.00000	1353
102437906LG	7	Actual	02/19/2010	0	02/25/2010	508	508	1.00000	508
35823743GE	20	Actual	01/28/2010	1836	02/16/2010	3967	2131	1.00000	2131

Previous Balance \$ 325.19

Credits/Payments

Payment 03/18/2010 \$ 281.86 CR
 Payment 02/11/2010 \$ 325.19 CR
Subtotal \$ 607.05 CR

Balance Forward \$ 281.86 CR

Debits/Charges \$ 0.00

TXU Energy MarketEdgeSM - Current Period

Service Period: 02/26/2010 to 03/28/2010

Monthly NYMEX Gas Adjustment* \$
 $\$1.81600000 \times \$0.00890000 = \$0.04286240$
 Natural Gas Factor Charge** \$ 57.99
 Energy Charge \$ 75.23
Subtotal \$ 133.22

TXU Energy MarketEdgeSM - Corrected From 02/25/2010 Invoice

Service Period: 01/28/2010 to 02/25/2010

Monthly NYMEX Gas Adjustment* \$
 $\$5.27400000 \times \$0.00890000 = \$0.04693860$
 Natural Gas Factor Charge** \$ 123.87
 Energy Charge \$ 146.73
Subtotal \$ 270.60

Other Fees and TDU Surcharges - Current Period

Service Period: 02/26/2010 to 03/28/2010

Advanced Meter Charge \$ 2.19

Additional Information

Our goal is to provide outstanding customer service to you and resolve all customer issues through our (800) 242-9113 customer service number. For direct executive compliments, comments or complaints, please email our executives at txuexec@txu.com. Letters can be mailed to TXU Energy Executive Feedback, PO Box 650764, Dallas, TX 75265-0764. We will make every effort to respond to all inquiries within 24 hours of receiving them.

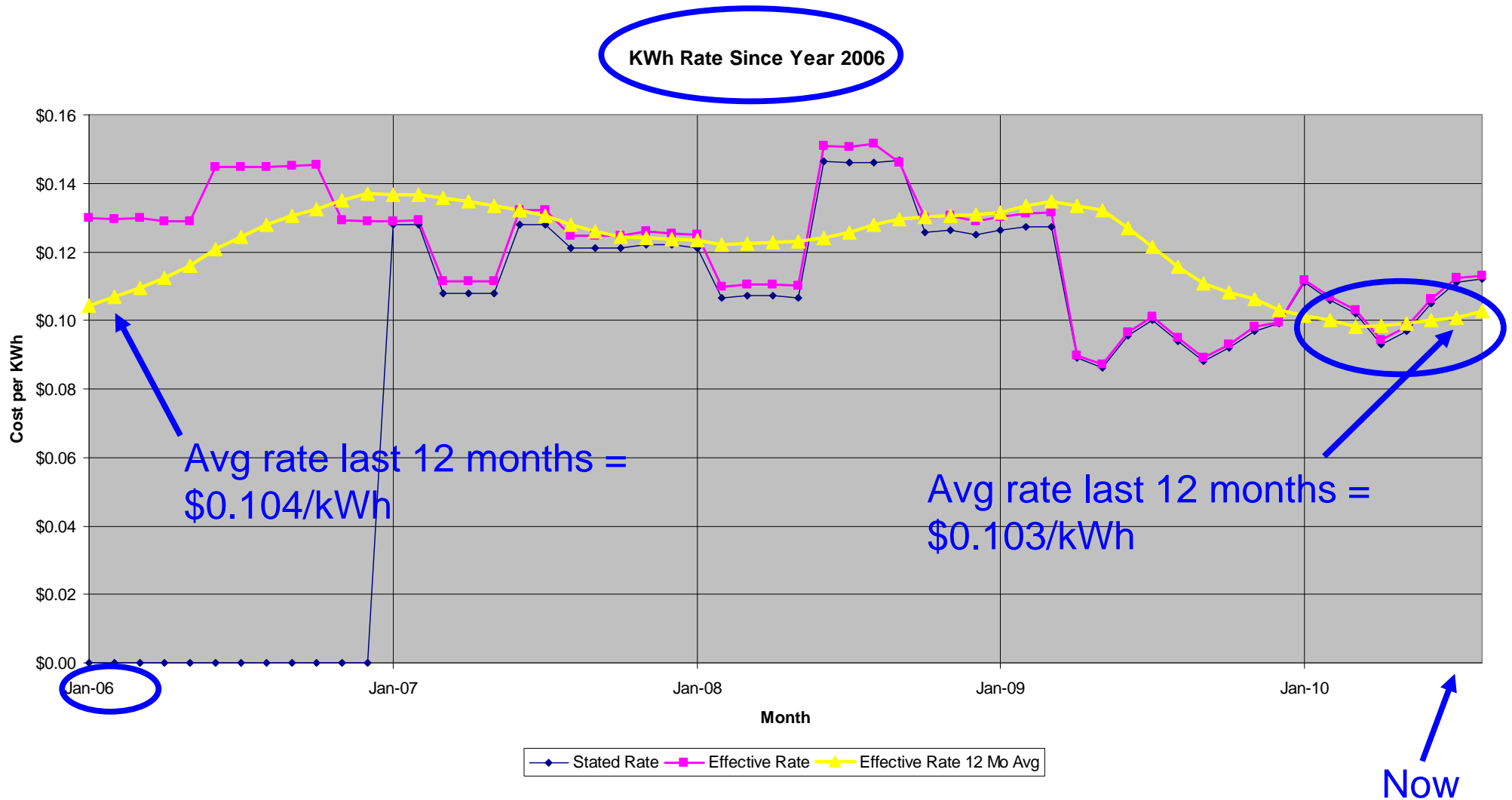
* Monthly NYMEX Gas Adjustment = Monthly NYMEX Natural Gas Price x Natural Gas Factor

** Natural Gas Factor Charge = Monthly NYMEX Gas Adjustment x Billed Usage

This plan is indexed to the NYMEX price of natural gas which changes monthly. For current pricing details please see www.txu.com/mkeon.

If you believe that any charge for a product or service appearing on your bill has not been authorized, please contact TXU Energy at 1-800-242-9113 and we will work to investigate the situation. If you are not satisfied with the resolution on the charges, you may file a complaint with the Public Utility Commission of Texas, PO Box 13326, Austin, TX 78711-3326; (512) 936-7120 or toll free in Texas (888) 782-8477. Hearing and speech-impaired individuals with text telephones (TTY) may contact the Public Utility Commission of Texas at (512) 936-7136.

Step 1: Aggressively Manage Your Electric Utility Rate



Ten Steps to Cut Your Energy Costs in Half

1. **Aggressively manage your electric utility rate**
 - ✓ Get comfortable with variable rate plans – no mess, no fuss
2. **Replace every incandescent light bulb with CFL**
 - ✓ Get it down to everything except oven, refrig, microwave
 - ✓ Say 'no' to ugly CFL bulbs
 - ✓ Be careful what you buy – use amalgam technology bulbs for reliability
3. **Change your living style**
 - ✓ Install programmable thermostats – set reasonable temperatures
 - ✓ Turn on / install ceiling fans
 - ✓ Turn off dishwasher 'heated dry' function
 - ✓ Set hot water heater at Normal or cooler setting
 - ✓ Use only detergents for 'cold' or 'warm' water for clothes washing
4. **Turn stuff off**
 - ✓ Turn off workstations (use off-site backup service – Mozy, use laptops)
 - ✓ Unplug stuff rarely used
 - ✓ Implement power strips for rest of stuff plugged in
 - ✓ Install switch timers and plug-in timers
5. **Understand actual energy consumptions**
 - ✓ Purchase / borrow a [Kill-A-Watt Meter](#)
 - ✓ Put in whole house energy monitoring capability: [The Energy Detective \(TED\)](#) (electricity only), or [Web Energy Logger \(WEL\)](#) (a lot more than electricity)

Step 2: Replace Every Incandescent Light Bulb with CFL

Example bulbs (none burned out since 4Q07; none 'ugly'):



R20: GE FLE11/2/R20XL (80892) reflector

- 10,000 hours
- 400 initial lumens
- 11 watts – replaces incandescent 45 W



A19 Bulb Style: Philips 15700-8 soft white

- 8000 hours
- Equivalent to 800 lumens
- 14 watts – replaces incandescent 60 W



R30: GE FLE15/2/R30XL (80893) reflector

- 10,000 hours – 7 years guaranteed
- 800 initial lumens
- 15 watts – replaces incandescent 65 W



Candelabra: GE FLE7/2/CAC (16103) candle shape

- 6,000 hours
- 370 initial lumens
- 7 watts – replaces incandescent 25 W



R40: GE FLE26/2/R40XL (80894) reflector

- 10,000 hours
- 1400 initial lumens
- 26 watts – replaces incandescent 90 W



Post Light: GE FLE11/2/T14XL (89631) (outdoor rated)

- 10,000 hours
- 500 initial lumens
- 11 watts – replaces incandescent 40 W

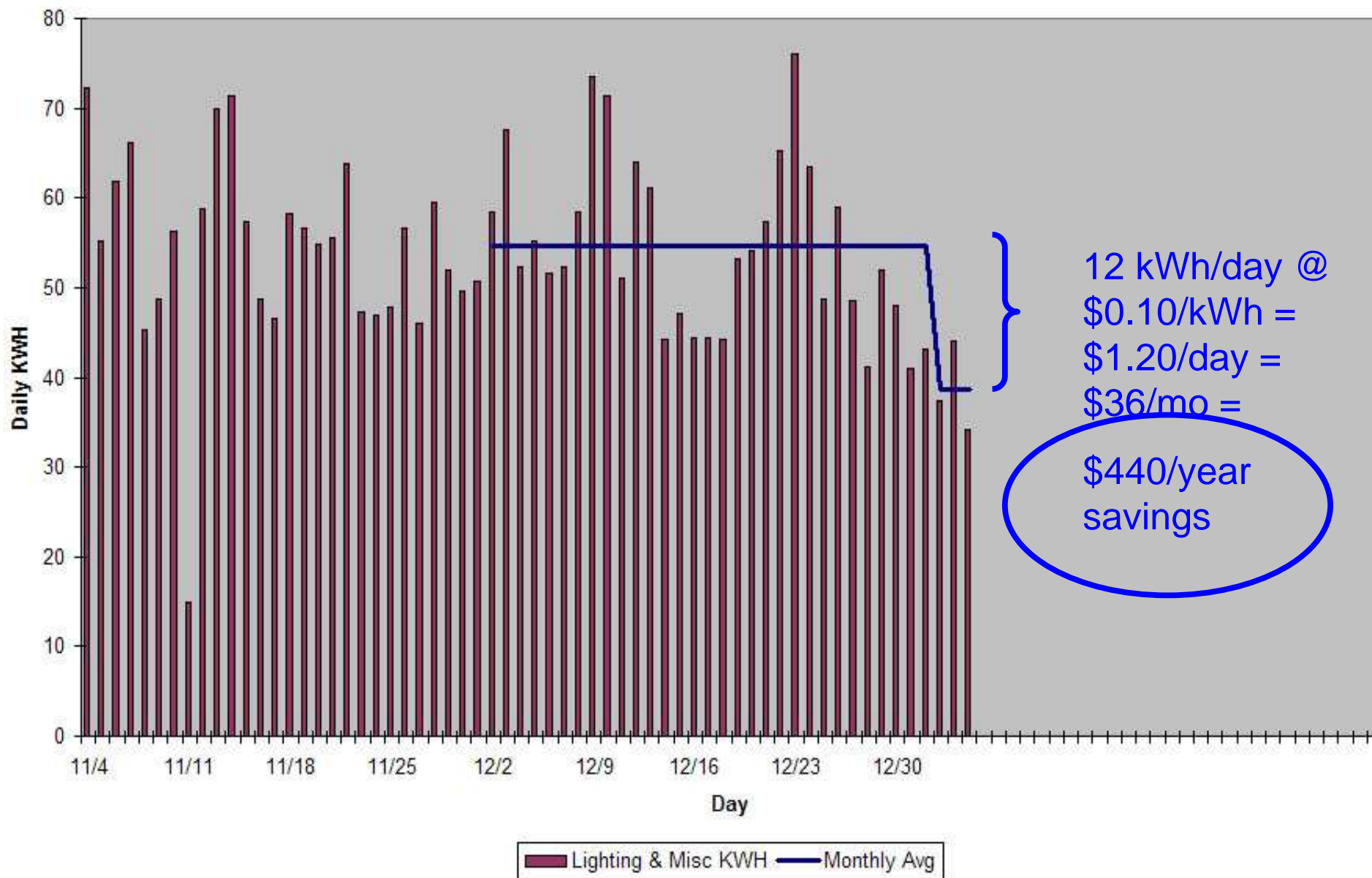


PAR38: GE FLE26/2/PAR38XL (80895) reflector (outdoor rated)

- 10,000 hours
- 1350 initial lumens
- 26 watts – replaces incandescent 90 W

Step 2: Replace Every Incandescent Light Bulb with CFL

Lighting & Misc KWH



Step 3: Change Your Living Style



Install programmable tstats – set reasonable temperatures



Turn on / install ceiling fans



Turn off dishwasher 'heated dry' function



Set to Normal or cooler



Use only detergents for cold/warm water

Step 4: Turn Stuff Off



✓ Turn off workstations - use off-site backup service (Mozy) and laptops



✓ Unplug seldom used items



✓ Put stuff on power strips to make turning off easy



✓ Install switch timers and plug timers

Step 5: Understand Actual Energy Consumptions

- ✓ Purchase / borrow a Kill A Watt meter

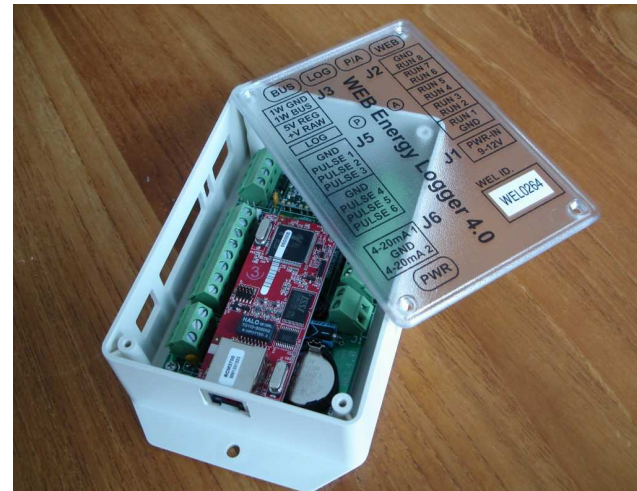


<http://www.p3international.com>

Put in whole house energy monitoring capability:

- The Energy Detective (TED) (electricity only)

- ✓ Web Energy Logger (WEL) (a lot more than electricity)



<http://www.welserver.com>

Step 5: Understand Actual Energy Consumptions

Energy Monitoring – Why?

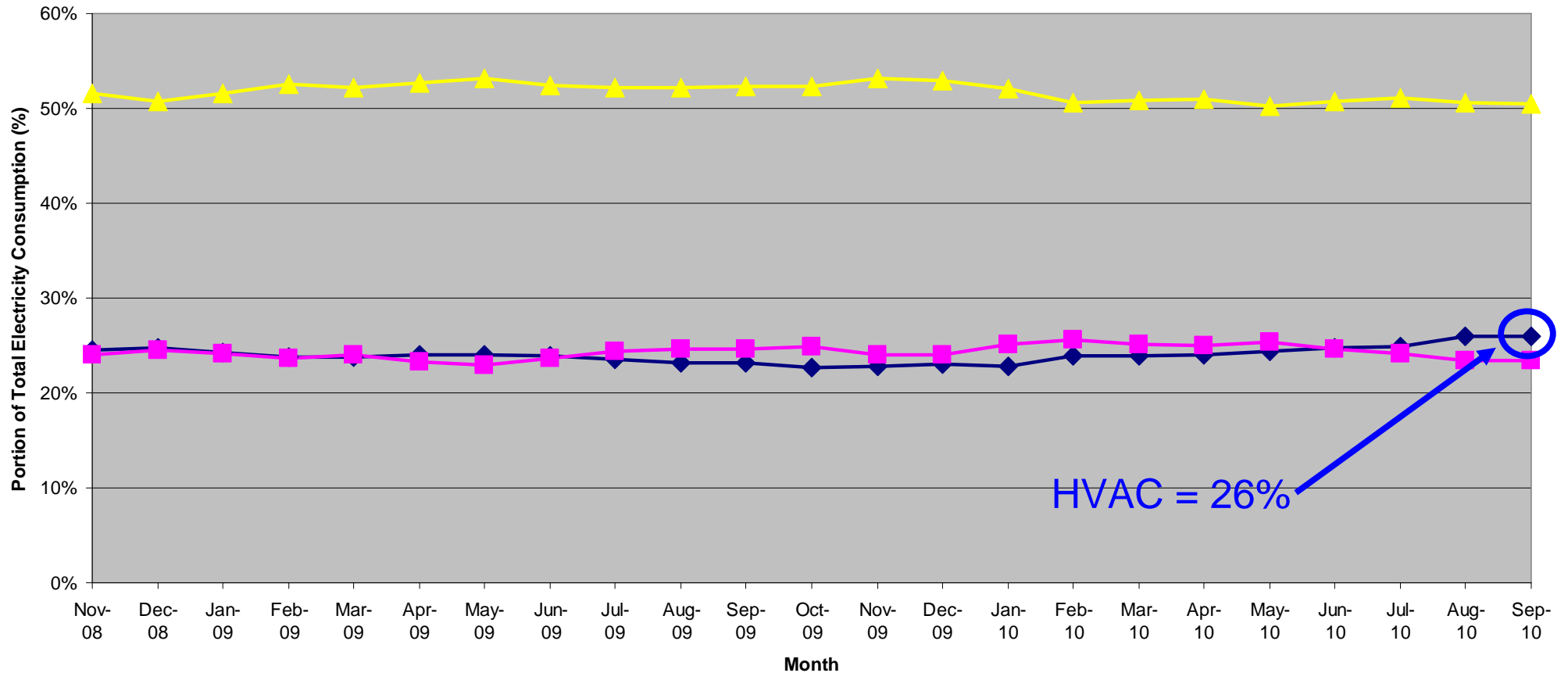
1. Optimize decision making - provides feedback where energy related costs are:
 - Provides 'base line' to compare future actions to.
 - Helps identify what to work on next – facilitates pareto analysis
 - Offers data for informational and analysis purposes – perform accurate ROI analysis
2. Confirm actions result in real savings:
 - Verified geothermal performance after installation, CFL performance after replacement, etc.
 - Ensures results occur, surprises don't happen, promised savings materialize.
3. Affirm major systems are performing as advertised:
 - Lowers operating costs by providing feedback information to adjust design parameters or maintenance settings.
4. Anticipate repair needs in advance of more catastrophic expenses:
 - Lowers maintenance costs by having ability to anticipate repair needs in advance of more catastrophic expenses.

Step 5: Understand Actual Energy Consumptions

Energy Monitoring – Why?

Optimize decision making

Electricity Consumption Distribution
(12 mo. Rolling Averages)



HVAC = 26%

◆ HVAC ■ Pool ▲ Base Load

Now focus here

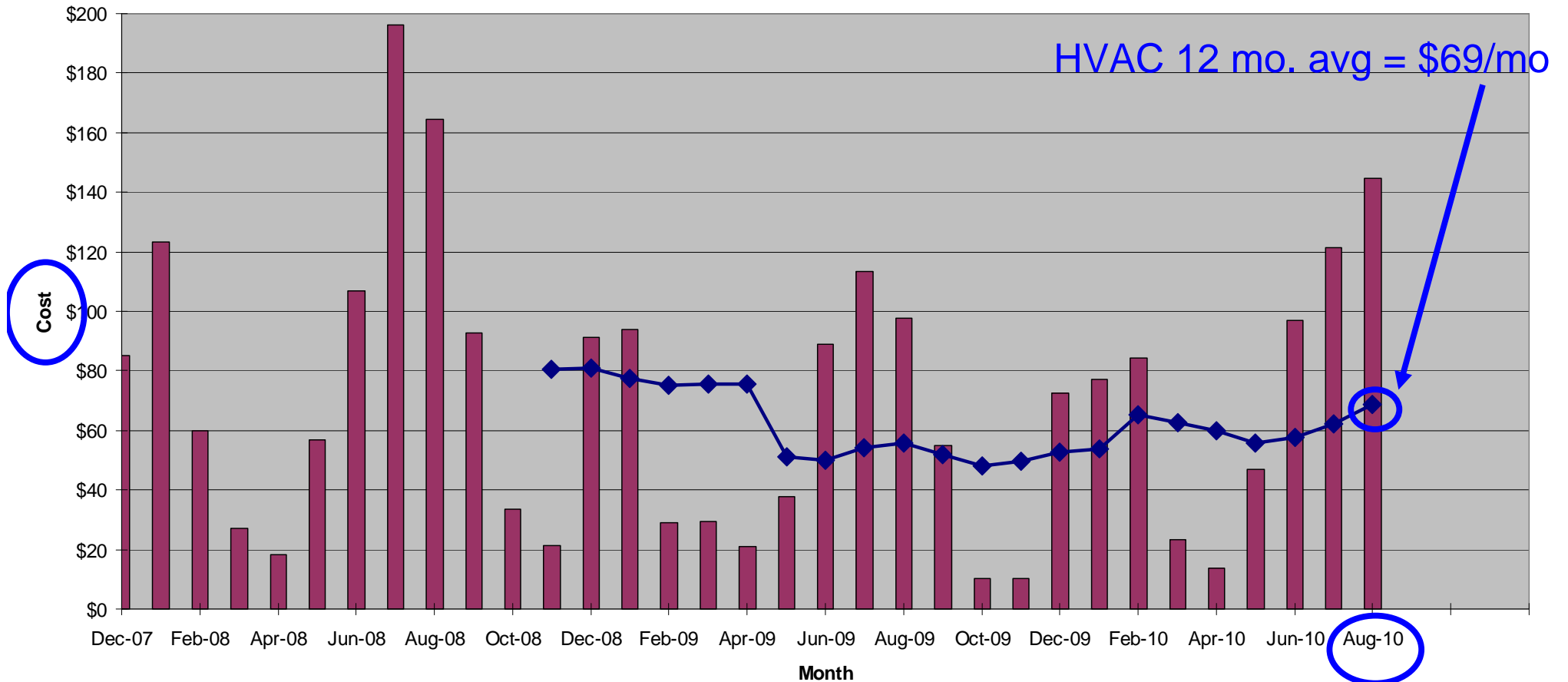
74%

Step 5: Understand Actual Energy Consumptions

Energy Monitoring – Why?

Confirm actions result in real savings

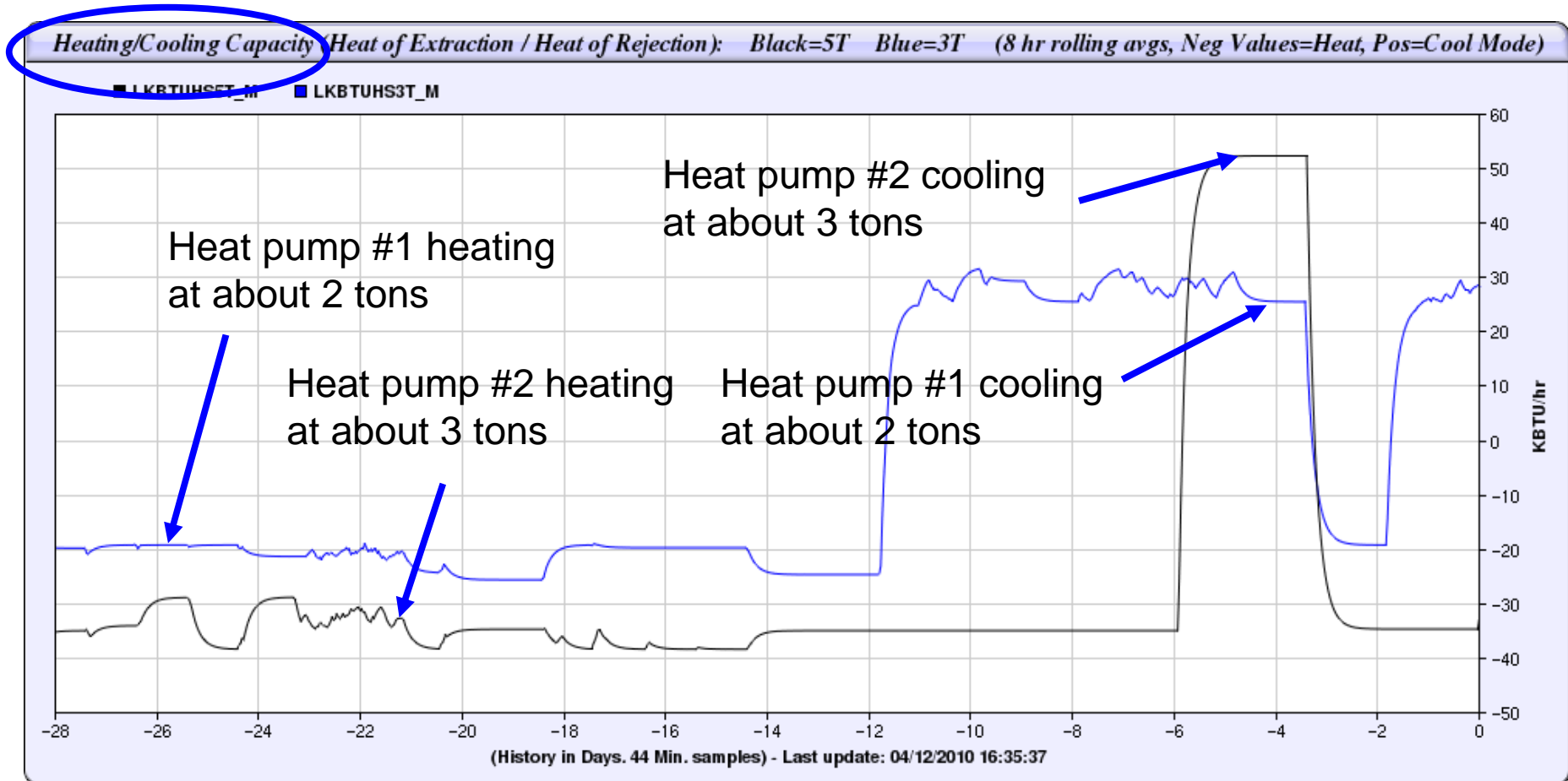
HVAC Cost Per Month



Step 5: Understand Actual Energy Consumptions

Energy Monitoring – Why?

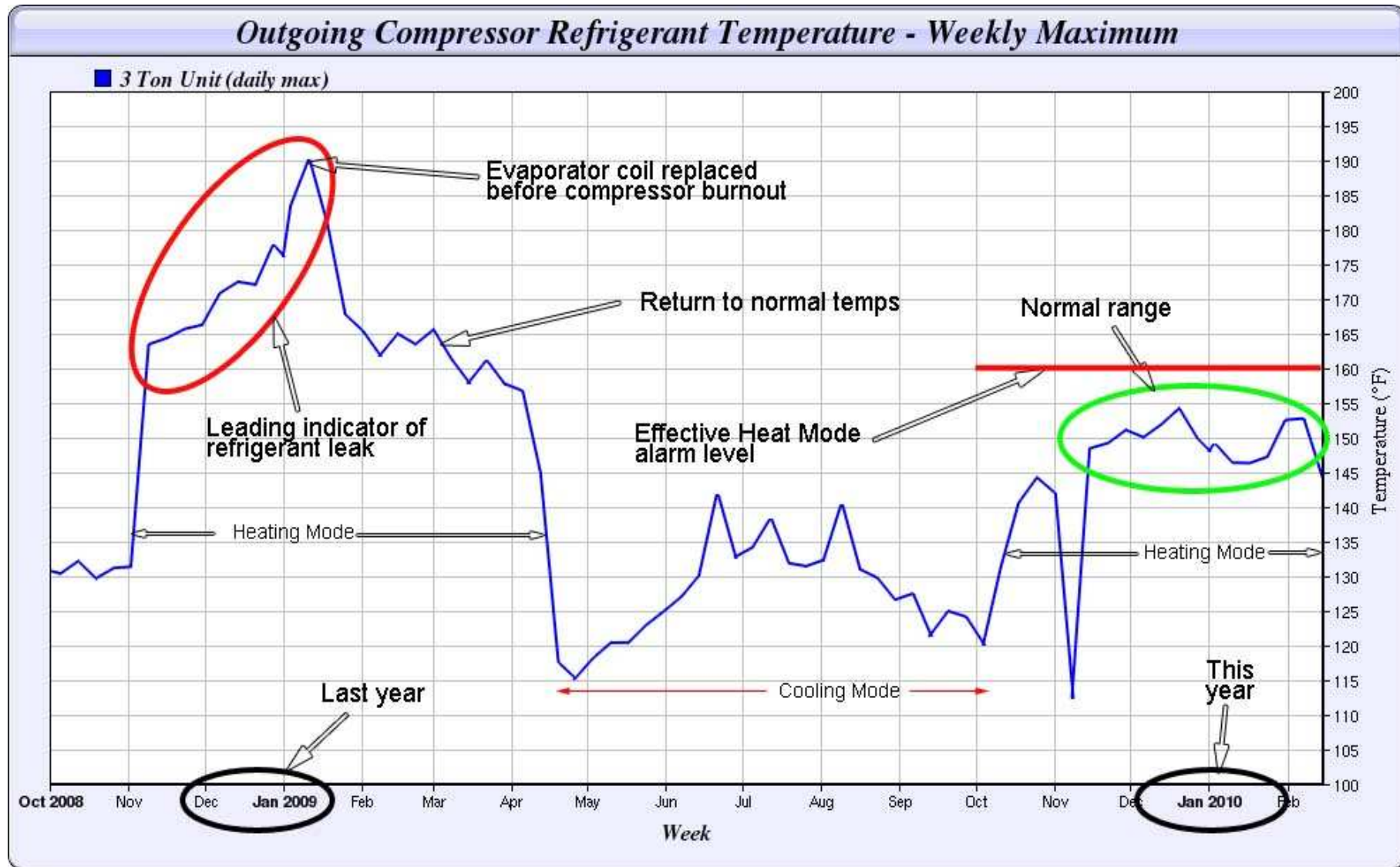
Affirm major systems are operating as advertised/claimed



Step 5: Understand Actual Energy Consumptions

Energy Monitoring – Why?

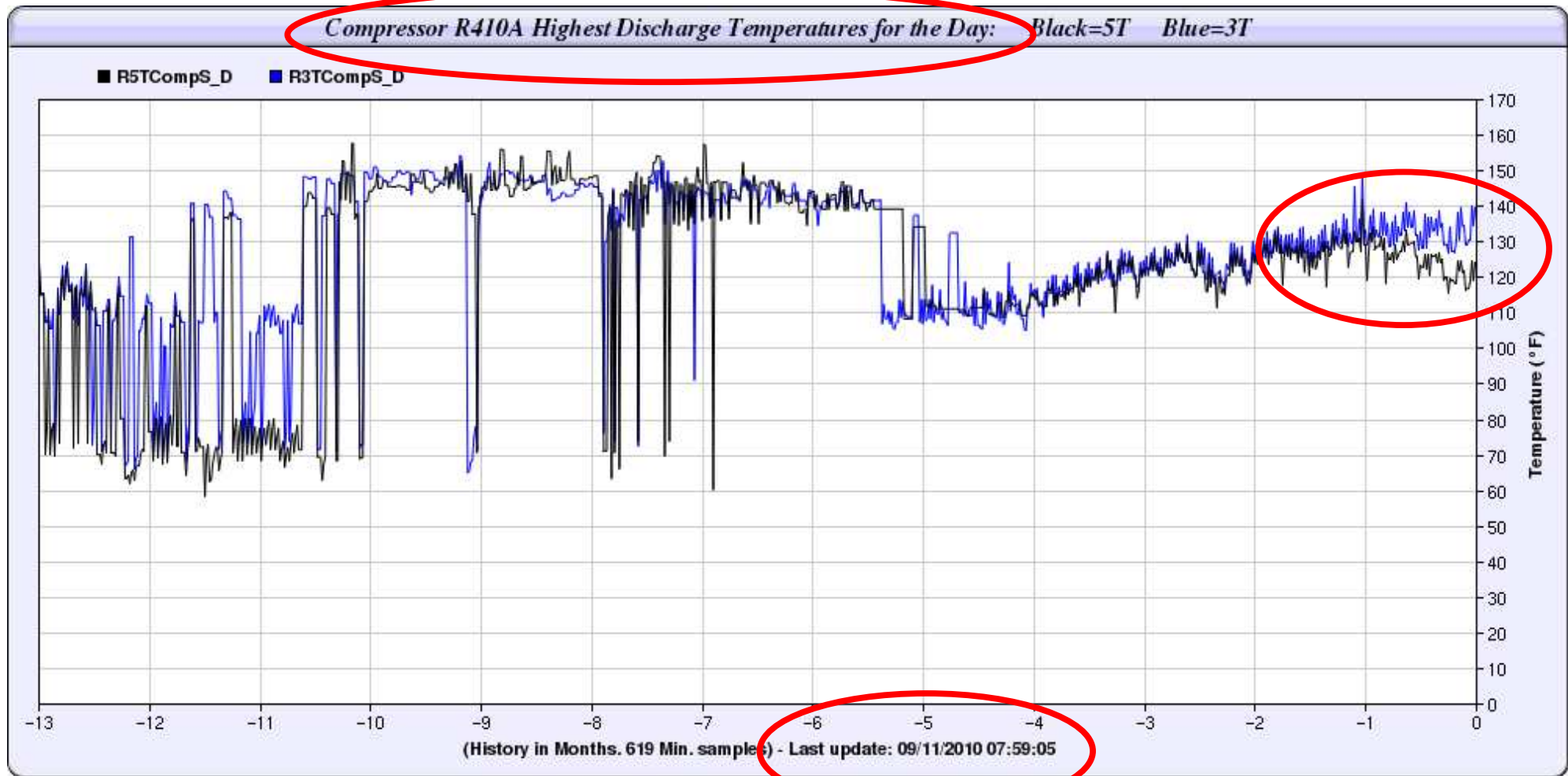
Anticipate repair needs in advance of more catastrophic expenses



Step 5: Understand Actual Energy Consumptions

Energy Monitoring – Why?

Anticipate repair needs in advance of more catastrophic expenses



Energy Monitoring Example

<http://welserver.com/WEL0043>

Plano (Dallas), TX (75074) Last Updated - Time: 22:30:20 CT Date: 03/24/2010 (See welserver.com for info on instrumentation)

(Data updated once per minute. Scroll down for historical charts.)

Electricity Consumption:

Load 9 Amps
Pct of Elec Svc Cap

Load 2128 Watts
Usage Today 47 kWh
MTD Usage 1464 kWh
Avg Daily Usage MTD 61 kWh

HVAC 28 Watts
Usage Today 1 kWh
MTD Usage 159 kWh
Avg Daily Usage MTD 6 kWh

Pool 8 Watts
Usage Today 11 kWh
MTD Usage 323 kWh
Avg Daily Usage MTD 14 kWh

Remaining Load 2092 Watts
Usage Today 36 kWh
MTD Usage 940 kWh
Avg Daily Usage MTD 39 kWh

Solar PV System Performance:

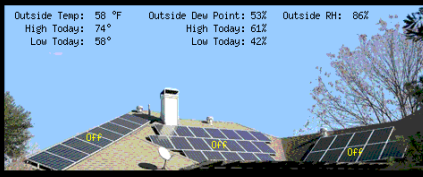
Solar power now (AC) 0 Watts
Current (AC) 0 Amps

Solar production today 20.3 kWh
This month 627 kWh
This year 627 kWh

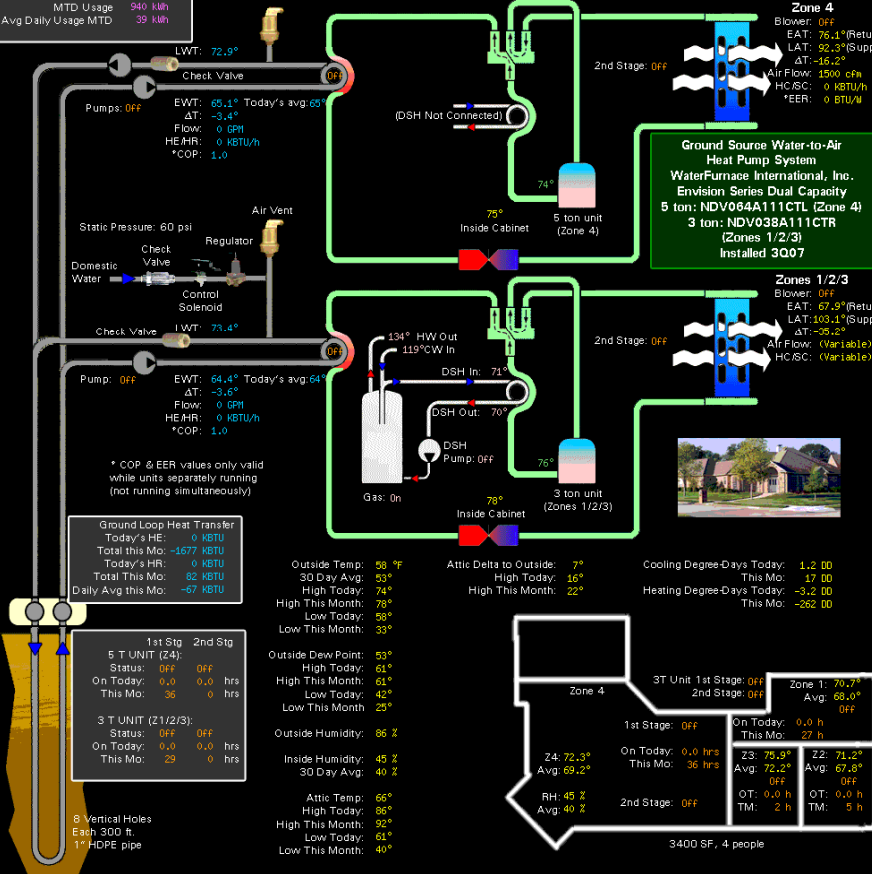
Utility savings now 0 Watts
Today 16.5 kWh
This month 414 kWh
This year 414 kWh
28 %

Exporting to grid now 0 Watts
Exported to grid today 3.9 kWh
This month 189 kWh
This year 189 kWh
30 %

Outside Temp: 58 °F High Today: 74° Low Today: 58°
Outside Dew Point: 53% High Today: 61% Low Today: 42%
Outside RH: 86%



8.1 KW Grid-Tie Solar PV System
Astronergy CHSM 0610 225 W Monocrystalline Panels
SMA Sunny Boy 7000 W Inverter
Tilt = 35°, Azimuth = 210° (27 panels), 285° (9 panels)
3 strings, 12 panels each; Dallas climate



Ground Source Water-to-Air Heat Pump System
WaterFurnace International, Inc.
Envision Series Dual Capacity
5 ton: NDV064A111CTL (Zone 4)
3 ton: NDV038A111CTR (Zones 1/2/3)
Installed 3Q07

Zone 4: Blower: Off, EAT: 76.1°(Return), LAT: 92.3°(Supply), ΔT: -16.2°, Air Flow: 1500 cfm, HC/SC: 0 KBTU/h, *EER: 0 BTU/W

Zones 1/2/3: Blower: Off, EAT: 67.9°(Return), LAT: 103.1°(Supply), ΔT: -35.2°, Air Flow: (Variable), HC/SC: (Variable)

Ground Loop Heat Transfer: Today's HE: 0 KBTU, Total this Mo: -1677 KBTU, Today's HR: 0 KBTU, Total This Mo: 82 KBTU, Daily Avg this Mo: -67 KBTU

1st Stg 5 T UNIT (Z4): Status: Off, On Today: 0.0 hrs, This Mo: 36 hrs
3 T UNIT (Z1/2/3): Status: Off, On Today: 0.0 hrs, This Mo: 29 hrs

Attic Temp: 65° High Today: 86° Low Today: 61° Low This Month: 40°

Outside Temp: 58 °F High Today: 74° Low Today: 58°
Attic Delta to Outside: 7° High Today: 16° High This Month: 22°
Cooling Degree-Days Today: 1.2 DD This Mo: 47 DD
Heating Degree-Days Today: -3.2 DD This Mo: -262 DD

Zone 4: 24: 72.3° Avg: 69.2°
Zone 1: 70.7° Avg: 68.0°
Zone 2: 71.2° Avg: 67.8°
Zone 3: 78.9° Avg: 72.2°
OT: 0.0 h TM: 2 h
OT: 0.0 h TM: 5 h

3400 SF, 4 people

Year	Electricity					Natural Gas				Total		
	Used kWh	Purchased kWh	Solar Provided kWh	Annual Cost \$	Monthly Cost \$	Avg Rate \$	Used MCF	Annual Cost \$	Monthly Cost \$	Avg Rate \$	Annual Cost \$	Monthly Cost \$
2006	51,760	51,760	0	7,093	591	0.137	84	986	82	13	8,080	673
2007	43,264	43,264	0	5,359	447	0.124	89	1,095	91	13	6,454	538
2008	31,052	31,052	0	4,066	339	0.131	49	753	63	16	4,819	402
2009	28,728	28,728	0	2,960	247	0.103	49	519	43	12	3,479	290

Bill Neukranz - 9/11/10
www.neukranz.com

Step 6: Research What Your Government and Utilities Are Offering

Examples:

1. Federal:

- ✓ Tax credits for solar (2010)
- ✓ Tax credits for geothermal heating/cooling
- Tax credits for insulation

2. State:

- Rebates for Energy Star rated appliances



3. Local:

- Plano (coming): HERS audit & weatherproofing
- Plano (coming): Revolving Energy Efficiency Load Fund

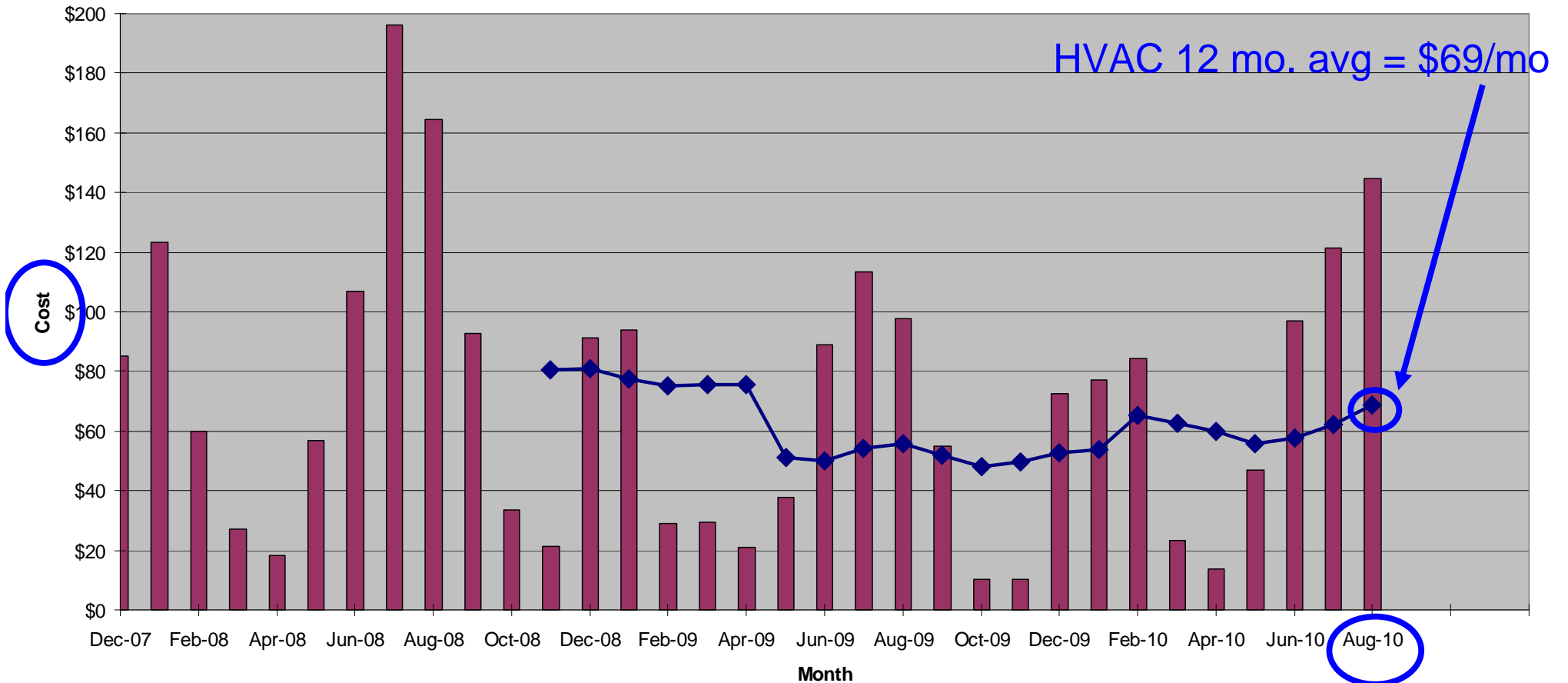
4. Utilities

- ✓ Rebates for solar (2010)

Step 7: Look Very Hard at Heating & Cooling the Structure

Why? The Big Picture: Cost

HVAC Cost Per Month

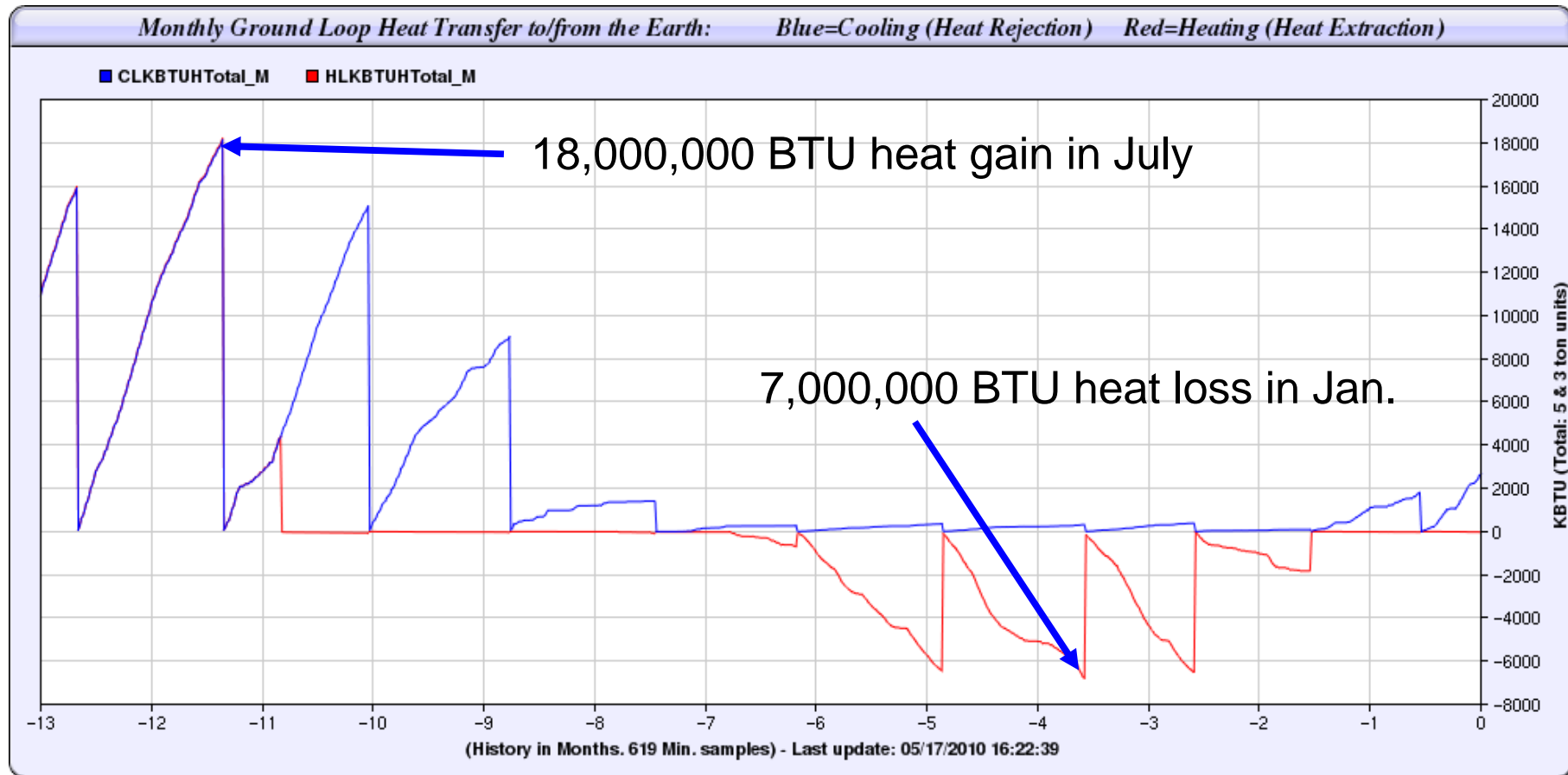


Step 7: Look Very Hard at Heating & Cooling the Structure

Structures have continual heat gain (Summer) / loss (Winter).

Mission:

1. Reduce / eliminate heat gains / losses – air infiltration and insulation actions
2. Make HVAC system as efficient as possible



Step 7: Look Very Hard at Heating & Cooling the Structure

Choose air infiltration actions to remedy:

- Attic ventilation
- Recessed ceiling light fixtures
- Windows/doors weather sealing
- Plumbing pipe penetrations
- Electrical outlet holes
- Room exhaust fans
- Fireplace flue

Choose insulation actions to remedy:

- Insulation itself
- Attic (foam)
- Windows/doors glass high-R
- Shading / heat rejection:
 - Window film/screens
 - Radiant barriers
 - Yard trees

HVAC system:

- Good repair
- Appropriate replacement time point
- Air distribution performance
 - Leaks
 - Adequate airflow
 - Zoning beneficial

Step 7: Look Very Hard at Heating & Cooling the Structure

Choose air infiltration actions to remedy:

- Attic ventilation
- Recessed ceiling light fixtures
- Windows/doors weather sealing
- Plumbing pipe penetrations
- Electrical outlet holes
- Room exhaust fans
- Fireplace flue

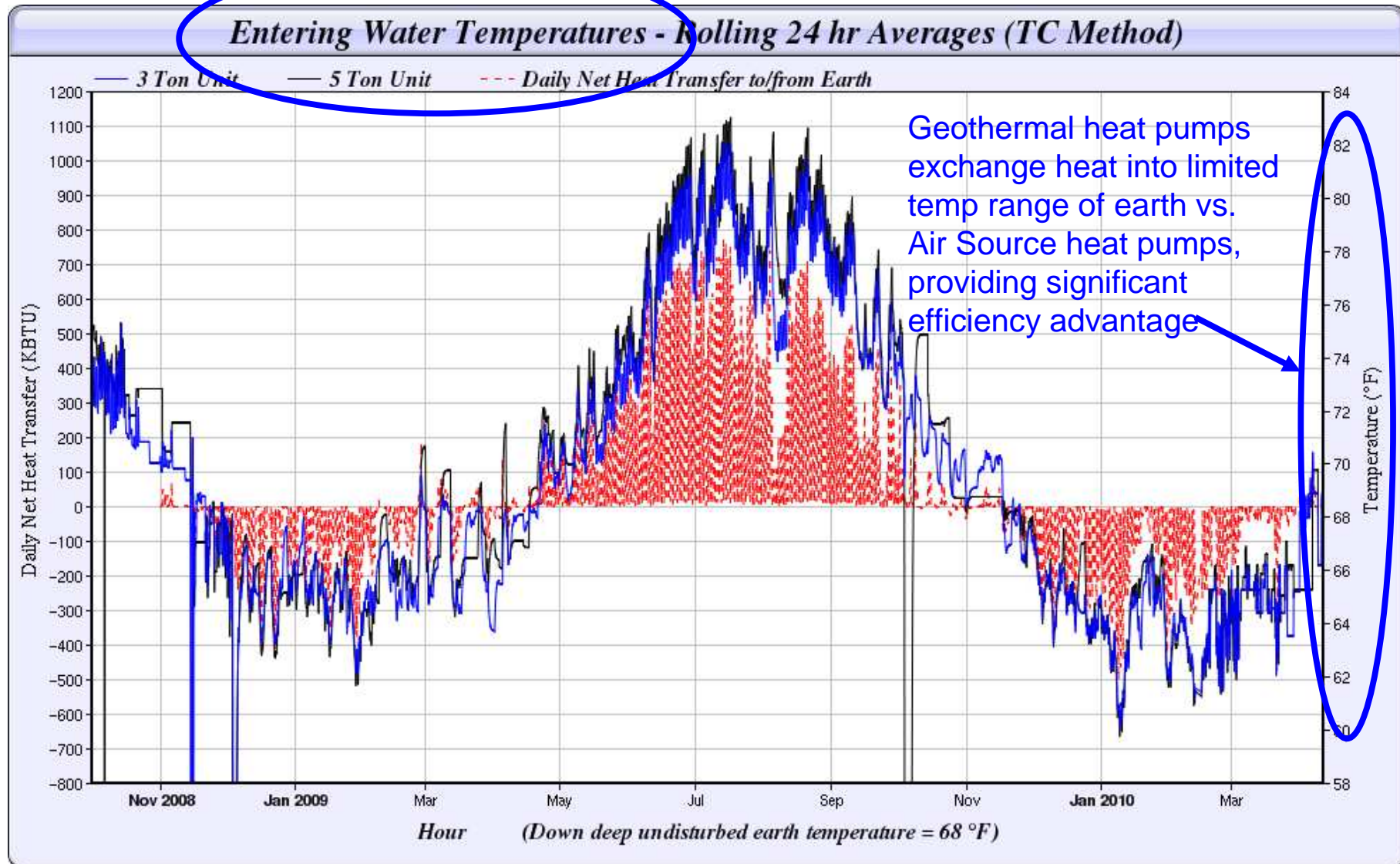
Choose insulation actions to remedy:

- Insulation itself
- Attic (foam)
- Windows/doors glass high-R
- Shading / heat rejection:
 - Window film/screens
 - Radiant barriers
 - Yard trees

HVAC system:

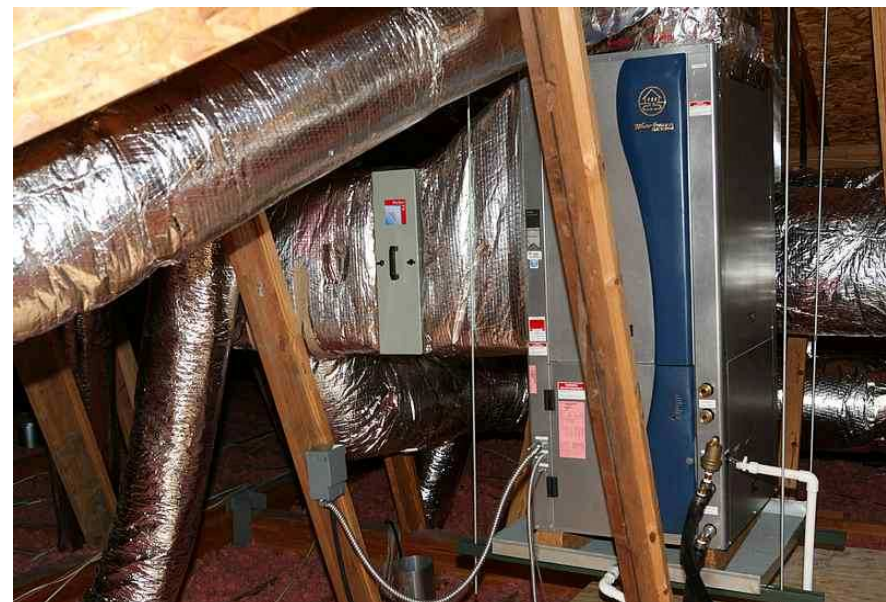
- ✓ Good repair
- ✓ Appropriate replacement time point
- ✓ Air distribution performance
 - ✓ Leaks
 - ✓ Adequate airflow
 - ✓ Zoning beneficial

Step 7: Look Very Hard at Heating & Cooling the Structure



Step 7: Look Very Hard at Heating & Cooling the Structure Geothermal HVAC Installation

Needs good design, availability of land, comfortableness with water pipes in attic



Bill Neukranz - 9/11/10
www.neukranz.com

Ten Steps to Cut Your Energy Costs in Half

6. Research what your governments and utilities are offering

- ✓ Rebates
- ✓ Credits
- Gifts

7. Look very hard at heating & cooling the structure

- ✓ Do an energy audit
- ✓ Ask critical questions:
 - ✓ HVAC system: in good repair? Time to replace?
 - ✓ HVAC air distribution performance: Leaks? Adequate airflow? Zoning beneficial?
 - Insulation performance: Adequate? Foam attic? Windows/doors glass high-R?
 - Air infiltration performance: Attic ventilation, recessed ceiling light fixtures, windows/doors weather sealing, plumbing pipe penetrations, electrical outlet holes, room exhaust fans all OK?
 - Shading / heat rejection: Window film/screens, radiant barriers, yard trees in use?

8. Replace appliances with Energy Star or lower power versions

- ✓ UPS units
- Refrigerators, dish washers, televisions, satellite/cable boxes

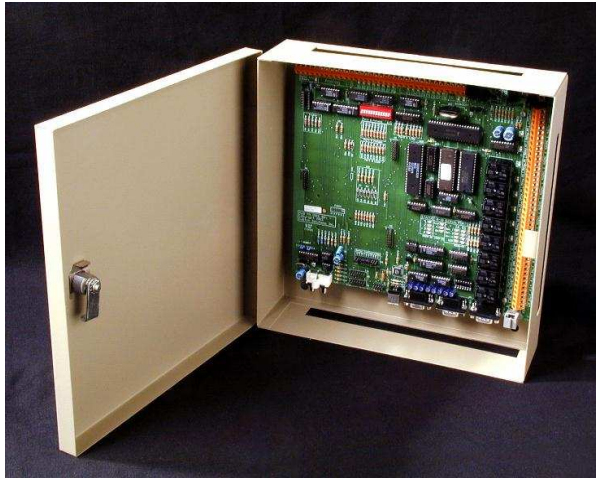
9. Put in home automation system to save even more

- ✓ Become a 'don't worry about turning off the light switch' family

10. Put in solar PhotoVoltaic (PV) system to make your own power (2010)

- ✓ Estimated \$1000 utility expense savings this year
- ✓ Stay cash flow positive

Step 9: Put in Home Automation to Save Even More



HomeVision controller

+



Occupancy sensors

+



X10 technology switches

=



✓ Lights, ceiling fans, exhaust fans, entertainment items turned off automatically when nobody is in a room.

Ten Steps to Cut Your Energy Costs in Half

6. Research what your governments and utilities are offering

- ✓ Rebates
- ✓ Credits
- Gifts

7. Look very hard at heating & cooling the structure

- ✓ Do an energy audit
- ✓ Ask critical questions:
 - ✓ HVAC system: in good repair? Time to replace?
 - ✓ HVAC air distribution performance: Leaks? Adequate airflow? Zoning beneficial?
 - Insulation performance: Adequate? Foam attic? Windows/doors glass high-R?
 - Air infiltration performance: Attic ventilation, recessed ceiling light fixtures, windows/doors weather sealing, plumbing pipe penetrations, electrical outlet holes, room exhaust fans all OK?
 - Shading / heat rejection: Window film/screens, radiant barriers, yard trees in use?

8. Replace appliances with Energy Star or lower power versions

- ✓ UPS units
- Refrigerators, dish washers, televisions, satellite/cable boxes

9. Put in home automation system to save even more

- ✓ Become a 'don't worry about turning off the light switch' family

10. Put in solar PhotoVoltaic (PV) system to make your own power

- ✓ Estimated \$1000 utility expense savings this year
- ✓ Stay cash flow positive

Step 10: Put in Solar PhotoVoltaic System to Make Your Own Power



One-third utility bill reduction


Utility savings now	0 Watts
Today	24.8 kWh
This month	301 kWh
This month	39 %
This year	890 kWh
This year	34 %

Exporting to grid now	0 Watts
Exported to grid today	16.0 kWh
This month	148 kWh
This month	33 %
This year	417 kWh
This year	31 %

Able to use 69%

Ten Steps to Cut Your Energy Costs in Half

Summary

- 
- No cost,
or low cost;
small effort
1. **Aggressively manage your electric utility rate**
 2. **Replace every incandescent light bulb with CFL**
 3. **Change your living style**
 4. **Turn stuff off**
 5. **Understand actual energy consumptions**
 6. **Research what your governments and utilities are offering**
 7. **Look very hard at heating & cooling the structure**
 8. **Replace appliances with Energy Star or lower power versions**
 9. **Put in home automation system to save even more**
 10. **Put in solar PhotoVoltaic (PV) system to make your own power**
- Higher cost;
larger effort