Weatherization Works

2009 NATIONAL WEATHERIZATION TRAINING CONFERENCE

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Electric Baseload

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U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Introduction to this web-posted pdf

There are a few more slides than were presented in the session, including a last slide that lists various things that have contributed to “high bill complaints” through the years.

Enjoy!

Session Objectives

- Explore how baseload energy use fits into whole house systems thinking
- Learn how CFL bulbs save energy over incandescent bulbs, including products and savings calculators
- Review primary (water heating, lighting, refrigeration) and secondary (plug load) savings opportunities
- Reflect on the importance of occupant choices to achieving savings

What is Baseload?

Household Electric Use

Baseload + Seasonal = Total

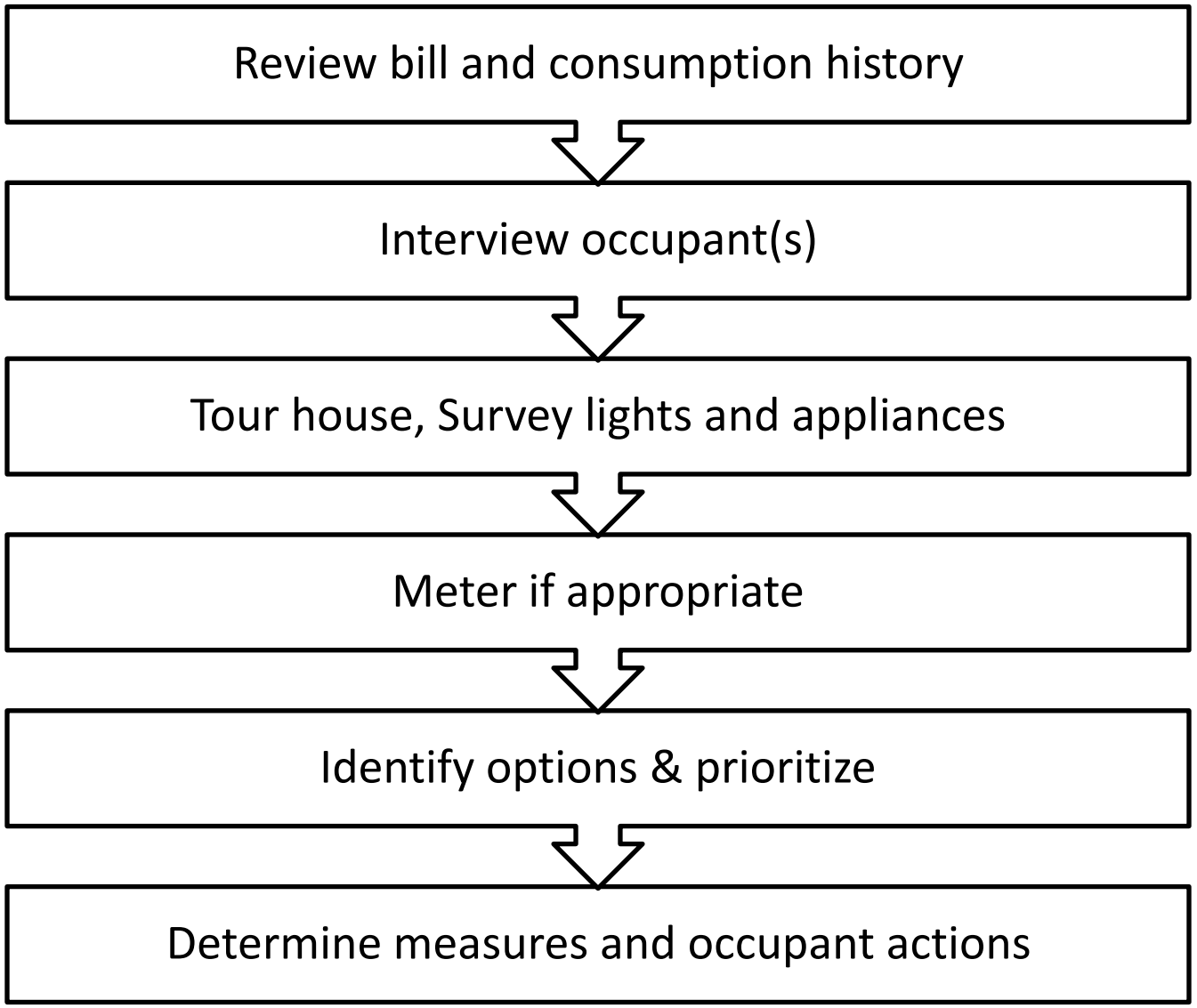
- Baseload: Electricity that powers things—lights and appliances--used year round
- Seasonal load: Electricity used to provide heating, cooling, often dehumidification

The goal is to understand how a particular household uses electricity, identify the possibilities for reducing that use and dialogue with the occupant for the best possible outcomes.

Reasons to Address Baseload

- Sometimes, reducing electric baseload can guarantee better savings than measures geared toward reducing the cost of heating and/or cooling: ***Savings Follows Use***.
- Plug loads across the country are increasing.
- Electric energy waste by energized equipment not in active use is increasing.

General Baseload Analysis Workflow

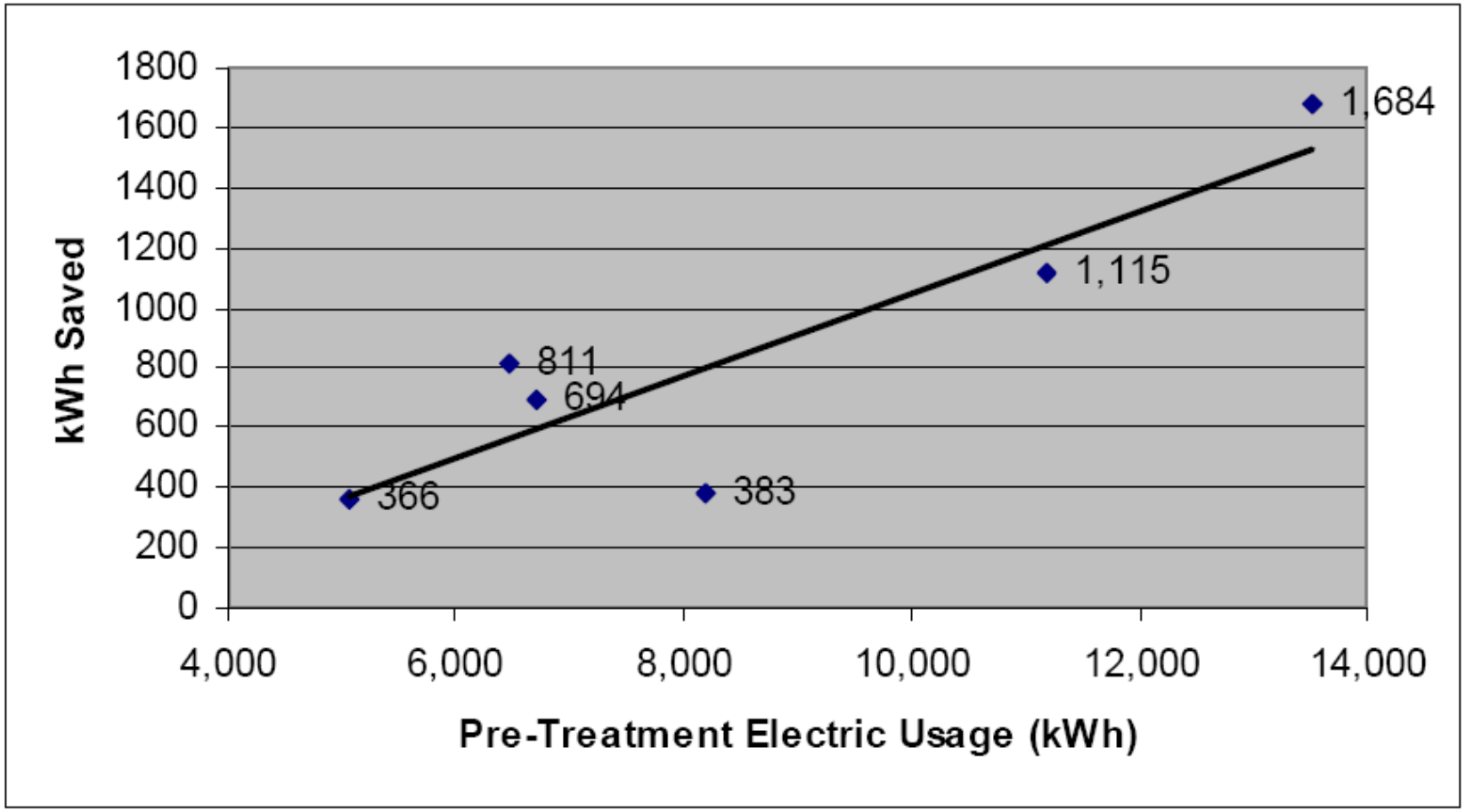


Annual End Use Consumption Ranges (kWh)

Electricity Use	LOW	MID	HIGH
Baseload	**2250**	**5000**	**8000**
Domestic Hot Water			
Hot water use, 1-3 people	**2500**	**4500**	**6000**
Hot water use, 3-6 people	**4000**	**6000**	**8000**
Cooling			
Cooling load (total household)	**750**	**1500**	**2500**
Heating			
Electric heat load	**2000**	**5000**	**8500**

National averages trued up to PA utility program experience

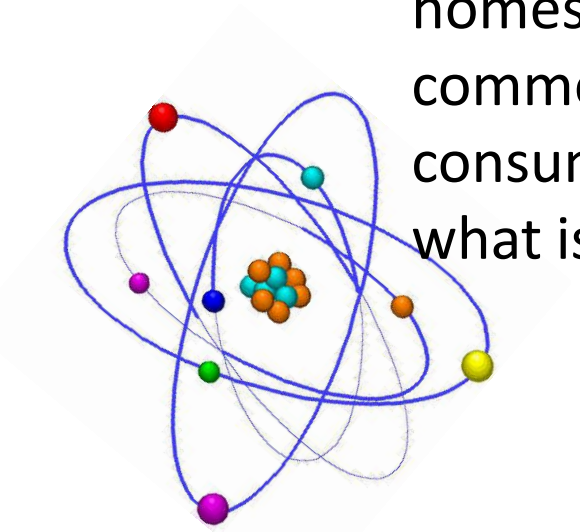
Savings Follows Use / Waste



The best SIR (savings to investment ratio) will be where use, waste & costs are high.

What is Electricity?

“ Electricity originates inside clouds. There it forms lightning, which is attracted to the earth by golfers. After entering the ground, the electricity hardens into coal, which, when dug up by power companies and burned in big ovens called “generators,” turns back into electricity, which is sent in the form of “volts” (also known as “watts” or “rpm” for short) through special wires with birds sitting on them to consumers’ homes, where it is transformed by TV sets into commercials for beer, which passes through the consumer and back into the ground, thus completing what is known as a “circuit.”



Dave Barry, Funny Times, 2002

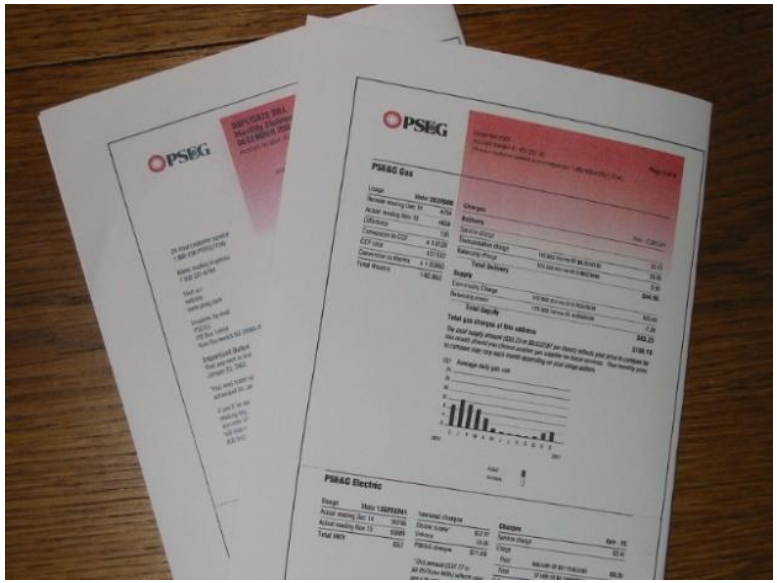
Electricity: Energy & Power

Energy

From meter to utility bill

power over time

- Watt hour - Wh
- kiloWatt hour - kWh (1,000 Wh)

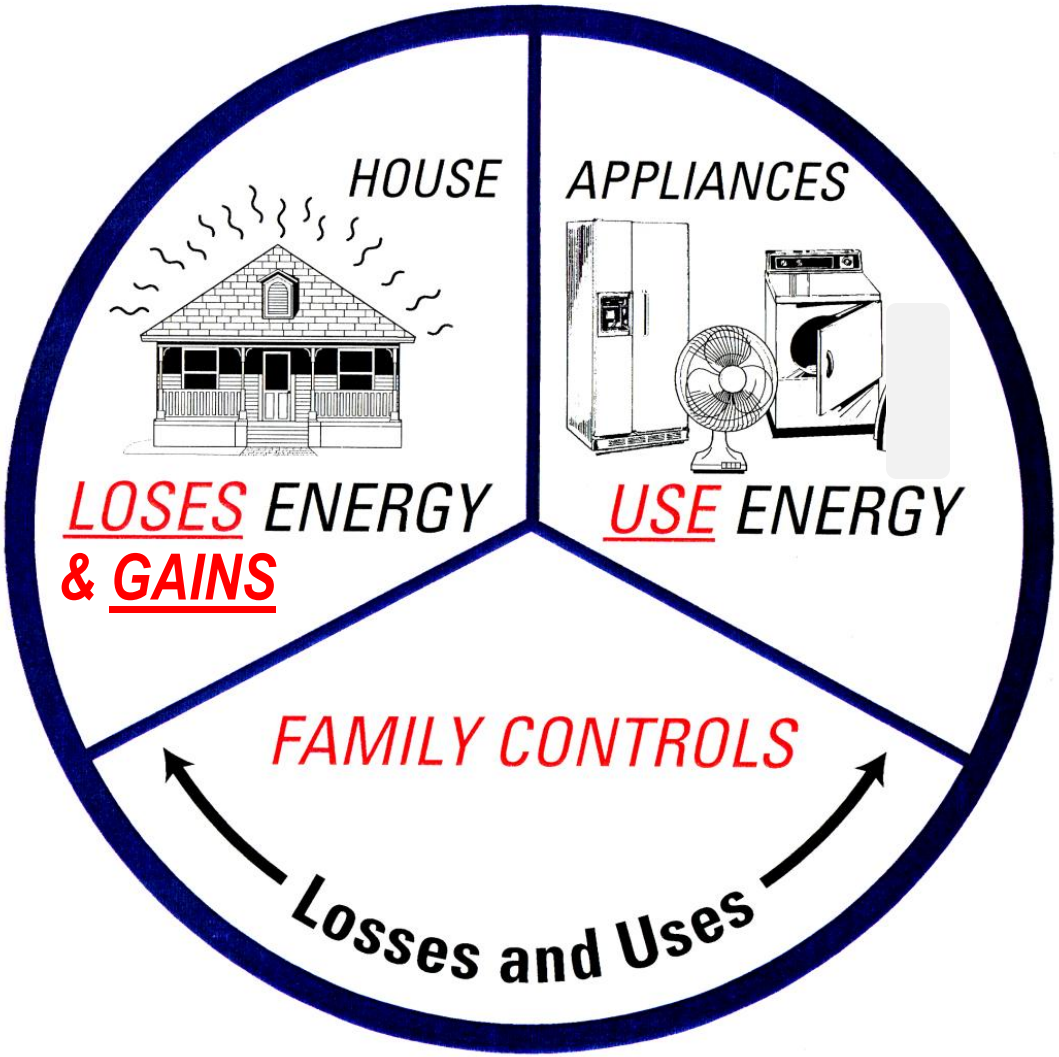


Power

Nameplate – potential – instantaneous demand

- Watt - W
- kiloWatt (1,000 W) – kW
- Watt - together voltage and current give power. Something that uses one Watt can move one joule per second.

Whole House (Systems) Thinking



Conservation Choices ranabelshe@centurytel.net

Lighting

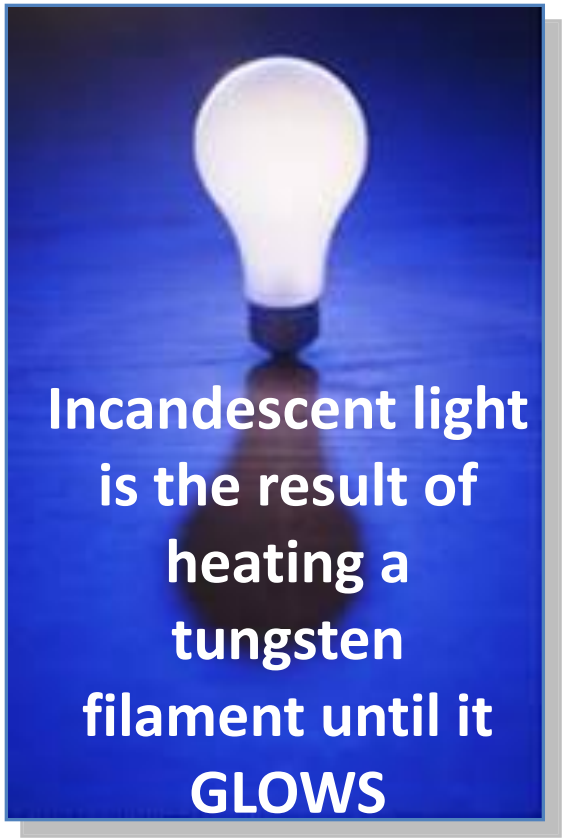
- Average number of sockets/bulbs per house?
- How much more efficient than incandescents are CFLs?
- What does the term “lumen” describe?
- Who has ever used this formula?

Watts x hours = Watt hours (Wh)

Wh x .001 = kiloWatt hours (kWh)

kWh x $/kWh = Cost to operate

Incandescent vs. CFLs

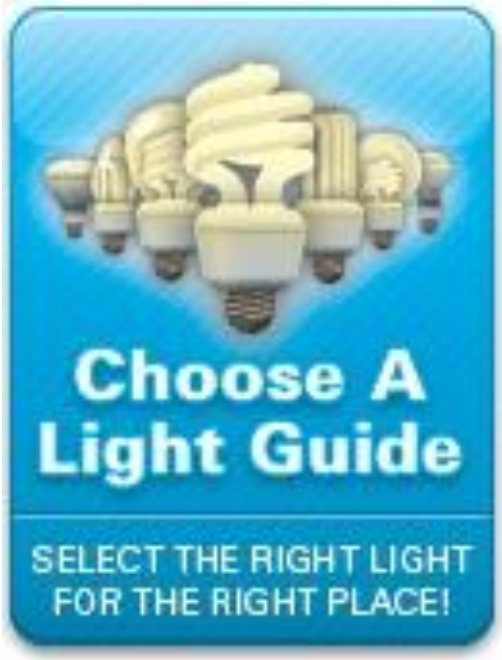


1) Electrodes take electrical energy from the power supply and generate moving electrons. 2) The moving electrons collide with mercury atoms in the tubes to make ultraviolet light. 3) The white phosphor coating of the tubes converts the ultraviolet light into visible light (that we can see)

http://www.explainthatstuff.com/energysavingfluorescentlamp.html

First, Choose Energy Star

- Select the best bulb for the family & fixture
  - Shape
  - Highest lumens per Watt
  - Color quality
  - Dimmability
  - Location
- Use Lumen equivalency, not Watts
- Be aware of weight and overheating
- Electronic interference
- Make arrangements for premature failure
- Mercury content/disposal



CFLs and Mercury

- Over a five year period, an incandescent bulb uses electricity equal to 10 mg of mercury emissions from a coal-fired plant.
- A CFL may contain 1- 4 mg of mercury, but "uses" only 2.4 mg worth of emissions from electricity.
- Mercury in a CFL is contained and is recycled with proper disposal*. Once out of the smokestack mercury is uncontrollable.

*** Recycle locally or check www.Earth911.org**

U.S. EAP 2002

Value-Added Education

Buy Low-Mercury (Hg) Bulbs

1mg

www.EFI.org

http://maine.gov/dep/rwm/homeowner/fluorescent.htm

Coal-Fired Electricity Generation

Atmospheric Effects

Greenhouse Gases

GHG

Carbon Dioxide Equivalency

CO_2e

NOX

SOX

Mercury (Hg)

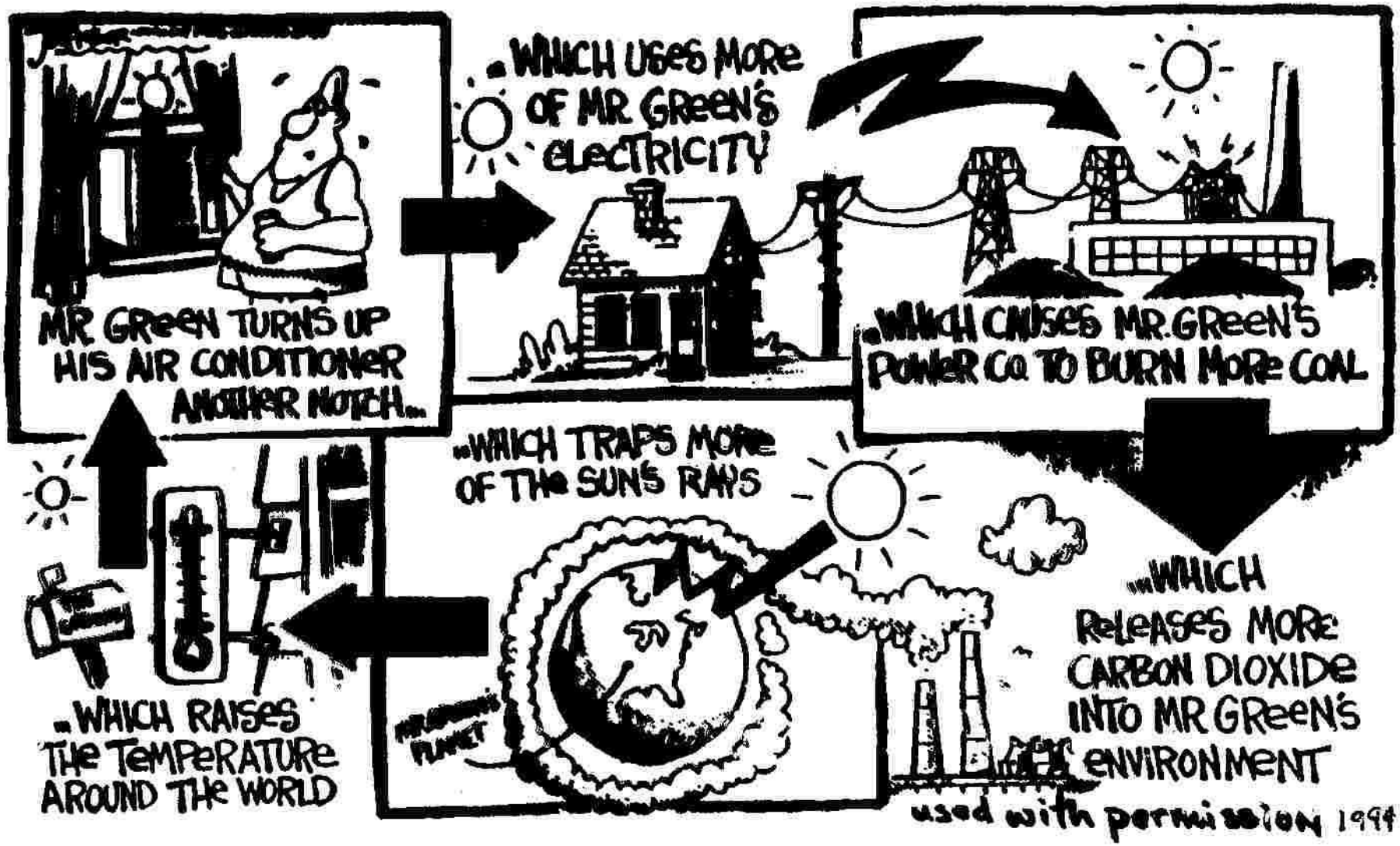
Particulates

Water waste:

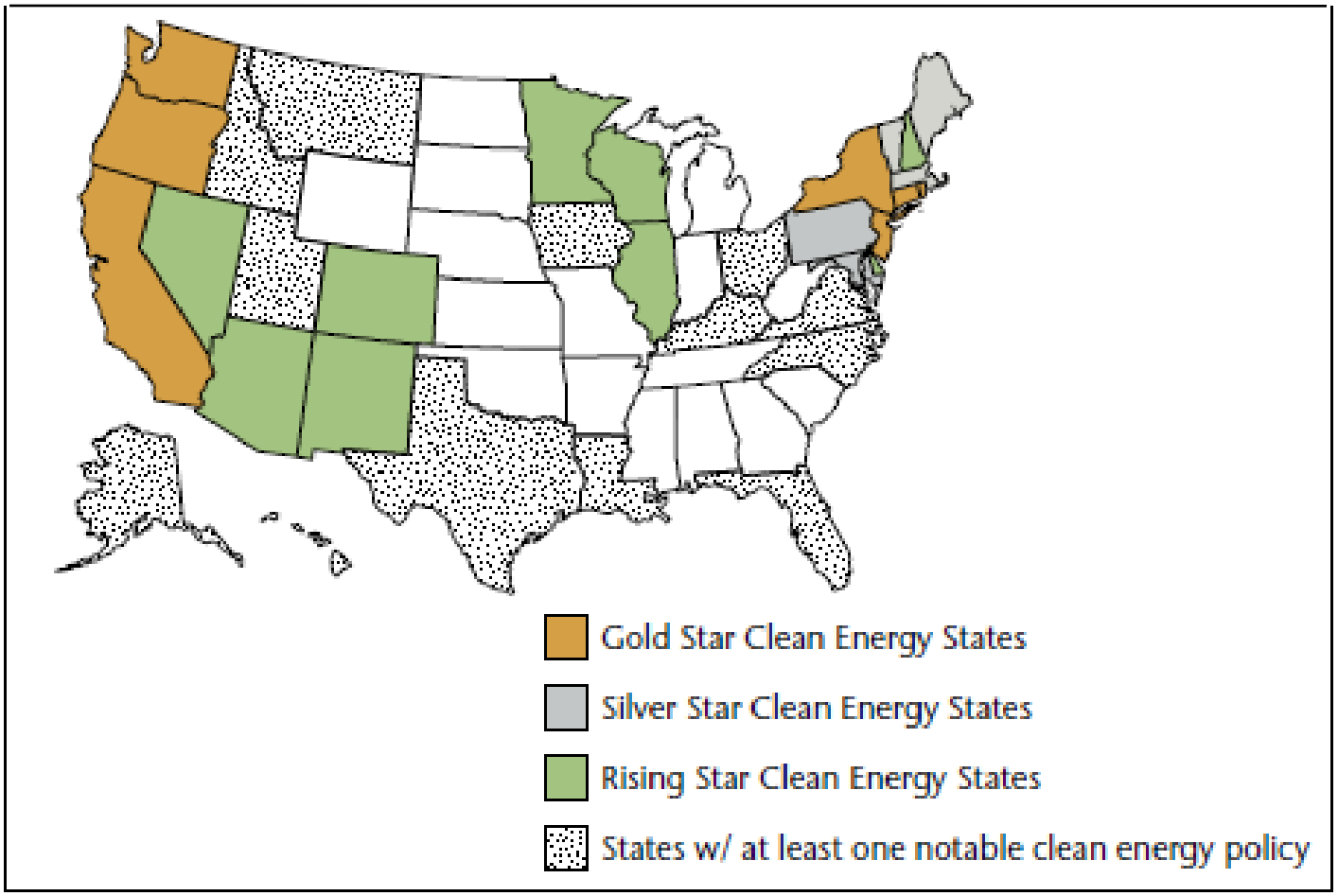
½ to 1 gallon per kWh

Photo: Rana Belshe

The "Green" house effect explained:



America's Clean Energy Stars



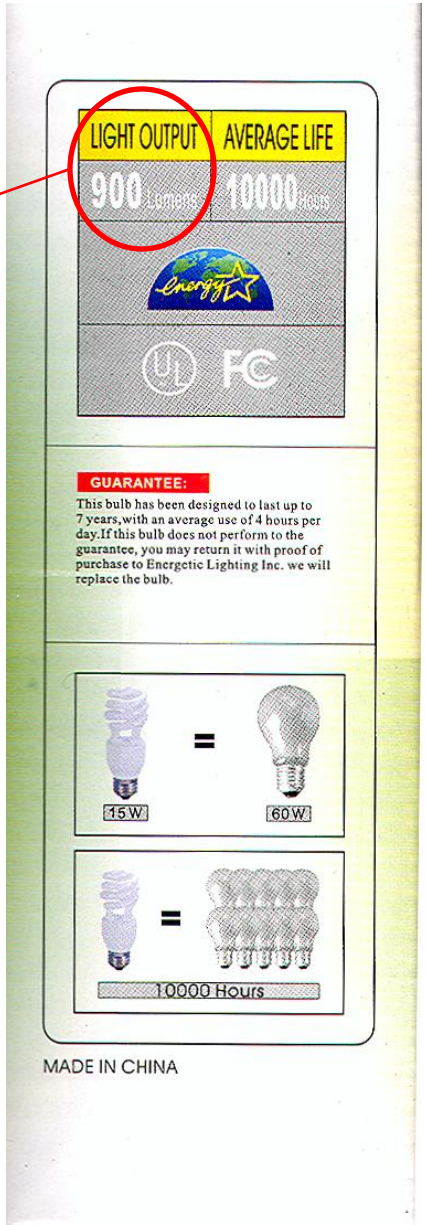
For a full listing of the states and how their policies were rated, see Table 9, page 32.

http://www.environmentamerica.org/home/reports/report-archives/new-energy-future/new-energy-future/americas-clean-energy-stars-state-actions-leading-america-to-a-new-energy-future

Choose A Light Guide

http://www.energystar.gov/index.cfm?c=cfls.pr_cfls

3 Valuable Pieces of Information



Lumens

Watts

Life

Use the box as a teaching aid with customers

CFL Savings Calculator

Home > Products > Lighting > CFLs > **Savings**

Summary of benefits for changing out 1 60W incandescent to a 15W cfl

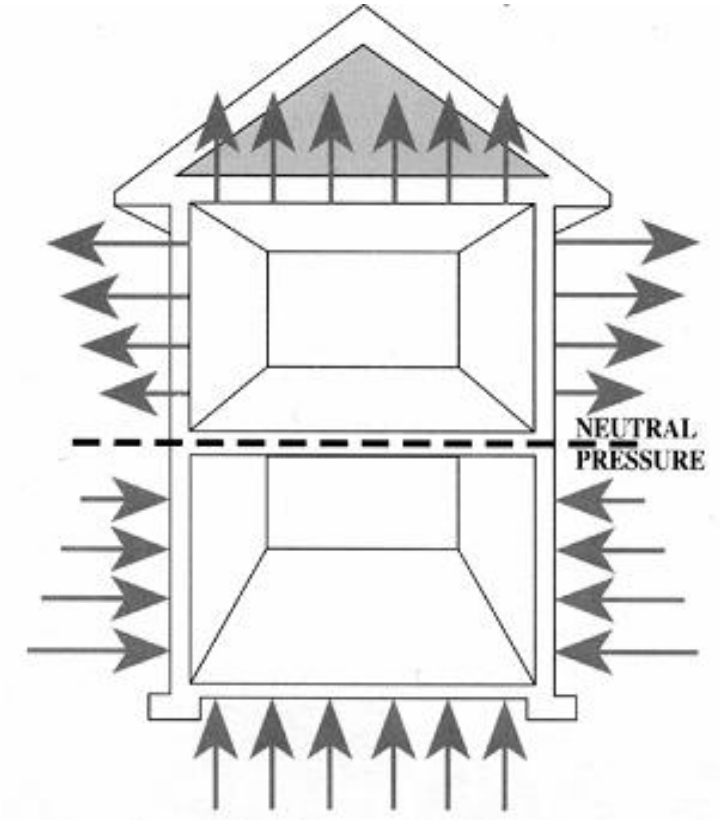
Initial cost difference	**$3**
Life cycle savings	**$65**
Net life cycle savings (life cycle savings - add'l cost)	**$62**
Simple payback of additional cost (years)	**0.3**
Life cycle energy saved (kWh)	**450**
Life cycle air pollution reduction (lbs of CO_2)	**691**
Air pollution reduction equivalence (number of cars removed from the road for a yr)	**0.06**
Air pollution reduction equivalence (acres of forest)	**0.09**
Savings as a percent of retail price	**1767%**

Excel Spreadsheet at:
http://www.energystar.gov/index.cfm?c=cfls.pr_cfls_savings

Baseload and Building Science

One example:

- Recessed lights are holes in the envelope, most of which leak air
- Local hot spot enhances exfiltration forces
- A 13 watt bulb increases air flow through a leaky can by 60% when it's on, a 50 watt bulb by 170% and a 100 watt bulb by 400%!



Telltale Signs in the Snow

Larry Kinney, Synertech Systems Inc

Can Light Above Bed in MBR

- Customer complained about cold air in bedroom
- IR spot radiometer with laser pointer
- Reveals non-trivial problem that's clear to all (including customer)
- IAT = 70F; OAT = 25F; Can = 43F
- Warm air rises, cold air descends!

Larry Kinney, Synertech Systems Inc

Hard-wired Fixtures

Residential Light Fixtures for Consumers

(Are you a partner? For Partners)

By replacing the five most frequently used light fixtures in your home with ENERGY STAR qualified models, you can save $70 each year in energy costs. Light fixtures that have earned the ENERGY STAR combine quality and attractive design with the highest levels of energy efficiency available today.

Examples of ENERGY STAR Qualified Fixtures

Earning the Government's ENERGY STAR

ENERGY STAR Qualified Fixtures:

- Use 1/4 the energy of traditional lighting.
- Save money on energy bills and bulb replacements, with bulbs that must last at least 10,000 hours (about seven years of regular use).
- Distribute light more efficiently and evenly than standard fixtures.
- Come in hundreds of decorative styles including portable fixtures — such as table, desk and floor lamps — and hard-wired options such as front porch, dining room, kitchen ceiling and under-cabinet, hallway ceiling and wall, bathroom vanity fixtures, and more
- Deliver convenient features such as dimming on some indoor models and automatic daylight shut-off and motion sensors on outdoor models.
- Can be found at most home centers, lighting showrooms, and specialty stores.
- Carry a two year warranty — double the industry standard.

FIND A PRODUCT

Product List
Excel | PDF

GU24-Based Bulbs
Excel | PDF

FIND A STORE

SPECIAL OFFERS

RESIDENTIAL LIGHT FIXTURES FOR PARTNERS

http://www.energystar.gov/index.cfm?c=fixtures.pr_light_fixtures

High Use- Dirty Photocell

A. Tamasin Sterner, Pure Energy

Holiday Hell-o

Photo: *A. Tamasin Sterner, Pure Energy*

There is seasonal variation!

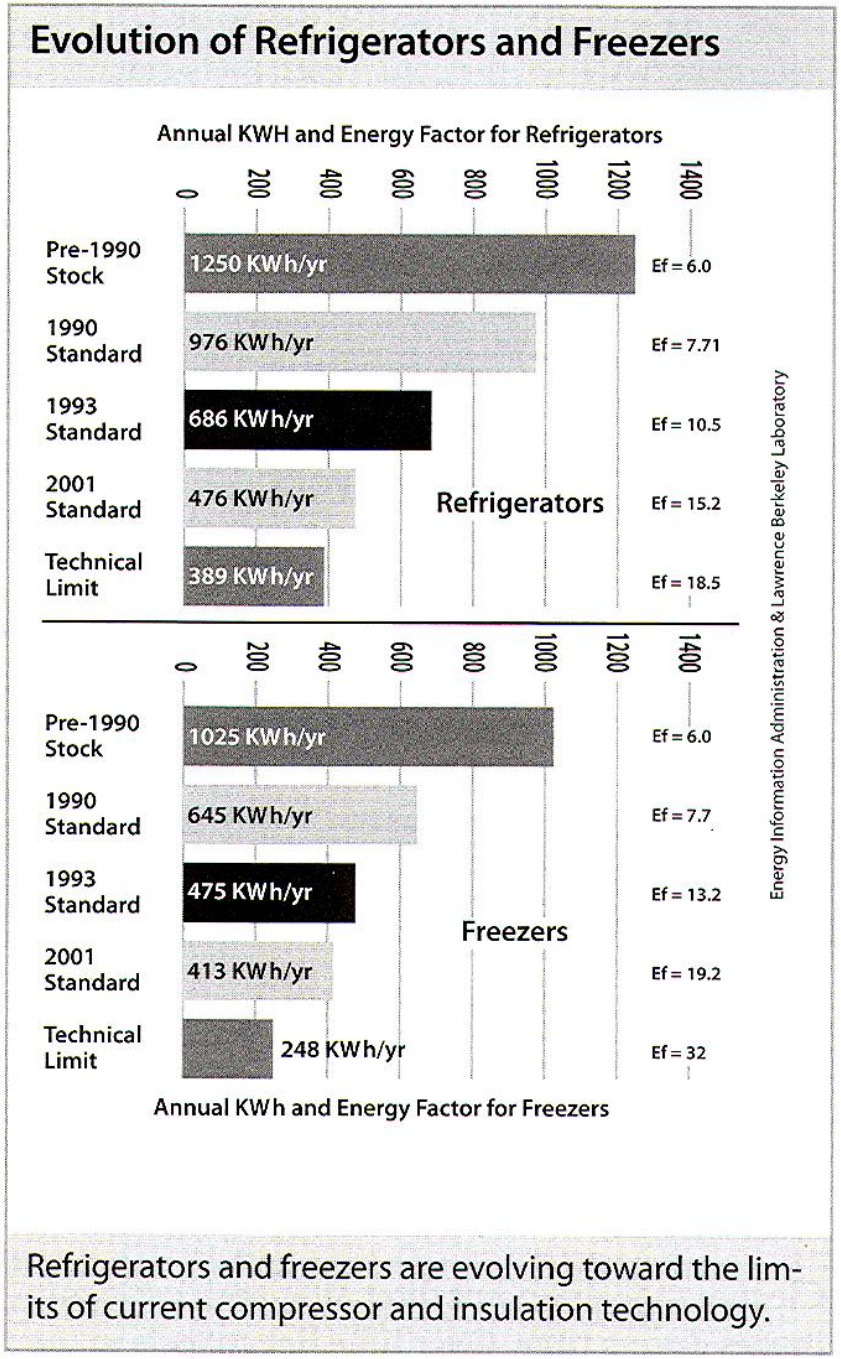
Occupant Based Savings Strategies

- Use natural light whenever possible
- Turn lights off when not needed – especially anything left on 24/7
- Consider photo and occupancy sensors
- Select lighting to fit each task or situation
- Use a low watt nightlight instead of a main light
- Use light colored lampshades/reflector cans
- Clean bulbs and fixtures for brightest light

GE Refrigerator circa 1934

Refrigerator Energy Use History

- Older refrigerators used an average of 1250 kWh/year and cost $125 to operate for the year.
- Newer refrigerators use an average of 410 kWh/year and cost $41 to operate for the year.



Factors Affecting Energy Use

- Size
- Features
- Age
- Ambient air temperature
- Control settings
  - Thermostats
  - Anti-sweat (energy saver) switch
- Loading patterns
- Covered containers
- Condition of door gaskets
- Cleanliness of coils
- Door openings

Photo: Rana Belshe

Safe and Efficient Temperatures

Desired Temperatures:

Fresh food: 36-40°F
Freezer: 0-5°F

- Measure temperatures in the middle of the fresh food and freezer compartments
- Use standard or digital thermometers. A non-contact thermometer is not suitable for testing the temperatures inside refrigerators.

http://www.aham.org/ht/a/GetDocumentAction/i/844

Replacement Criteria

Is it a good return on investment (ROI)?

Annual Energy Use as determined by:

- Nameplate information & look up in data base
- Age
- Refrigerant R-134a
- Metering – 2 hours preferred
- Broken – hardware failure, constant running, insufficient cooling

Refrigerator Dataplate &

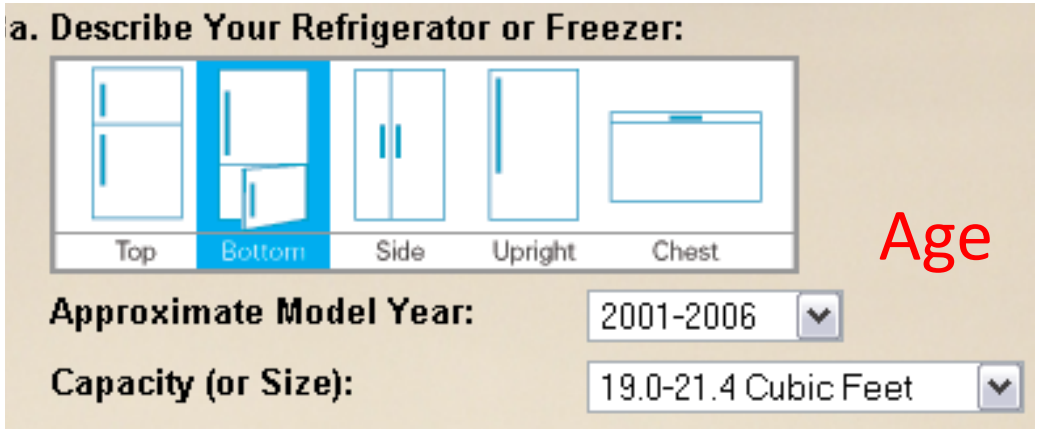
www.energystar.gov

ENERGY STAR

Your Information

Model	BX21T 20.5 cubic feet Bottom Freezer
Electricity Rate	$0.102
Annual Cost	$65.88
Annual kWh	646 kWh

Style

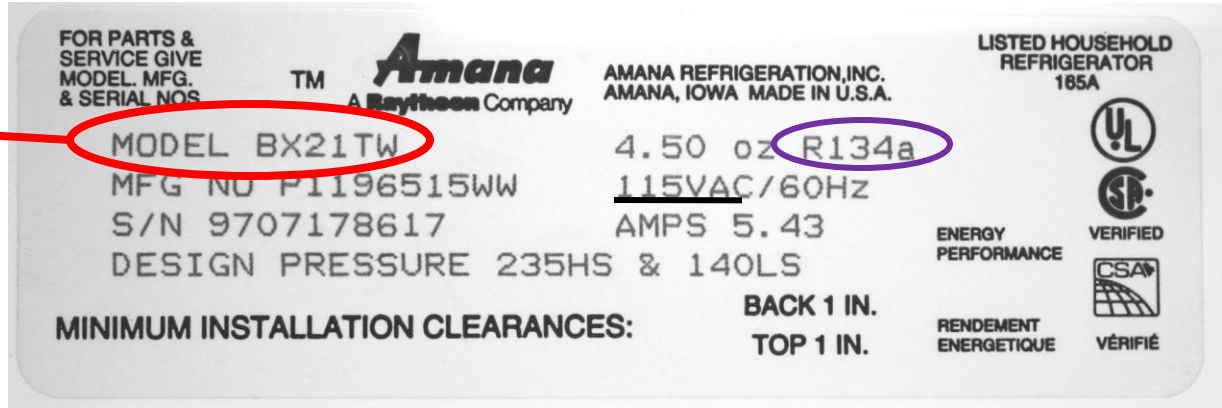


Age

Size

Mfg

Model



If You Meter Refrigerators

Using the
Brultech ECM-1200

kiloWatt Hour Meters

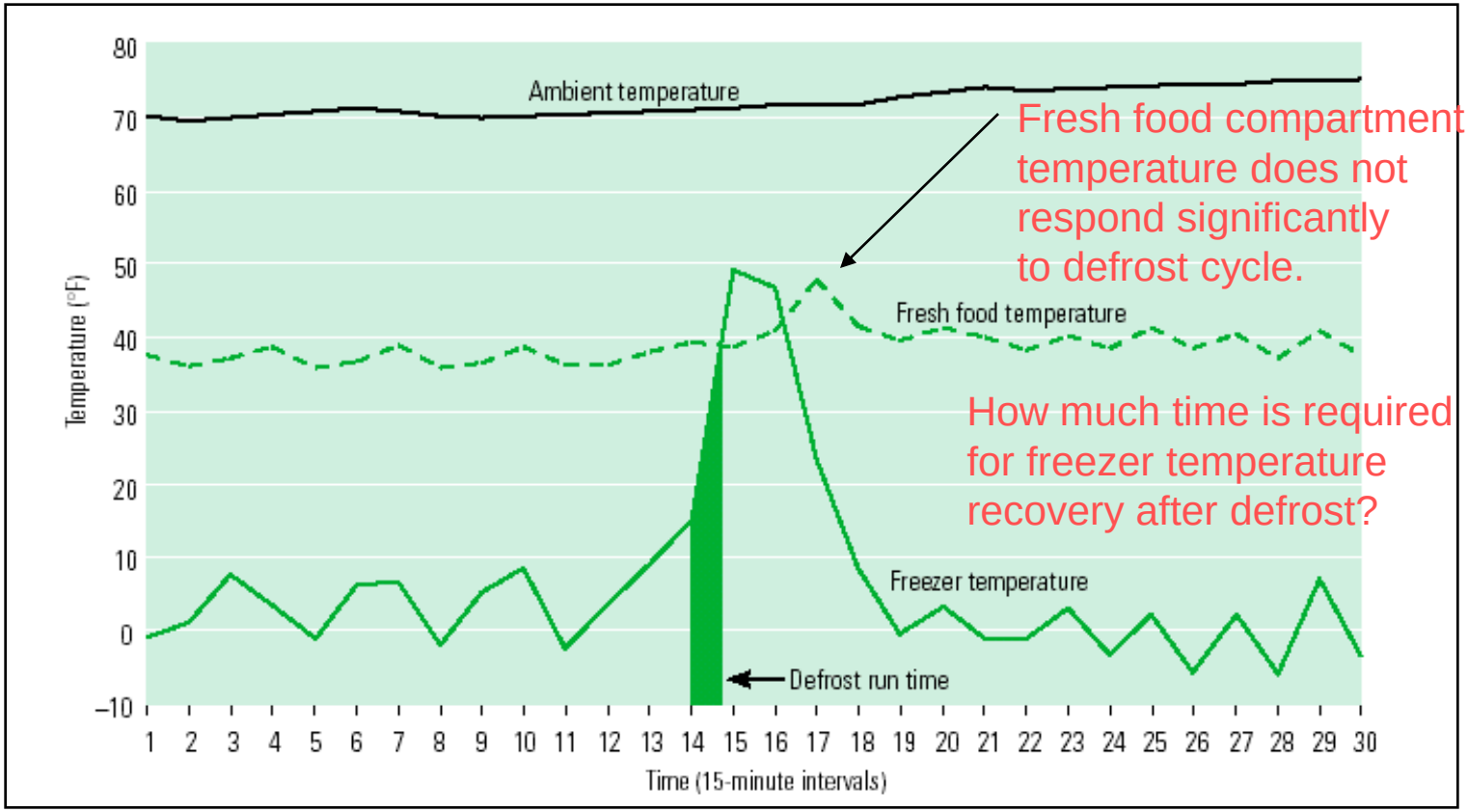
Brultech ECM-1220b		www.brultech.com Volts, Watts, Elapsed time, kWh/period Total cost for period Dual or 240V appliance metering
Kill A Watt EZ		www.p3international.com Volts, Amps, VA (Watts), Hertz, Power Factor kWh, Elapsed Time
Brand Electronics, Model 20-1850		www.brandelectronics.com Watts, kWh, Elapsed time Cost per month, Total cost Peak power , Amps, Power factor
Watts Up? PRO Meter		www.dom.com/products Watts, kWh, Elapsed time Cost per month, Total cost Peak power, Amps, Power factor

Refrigerator Testing Tips

- If you interrupt a compressor cycle, wait 8 minutes before plugging it back in
- If door is closed and you still have 40W on the meter, perhaps the door switch is broken or the anti-sweat heater is running
- The usual running range (compressor on) is 200-400 Watts. Newer refrigerators draw about 150 Watts
- Watch for defrost periods (~400 Watts)
- Unplug a refrigerator to clean the coils

Automatic Defrost Cycle

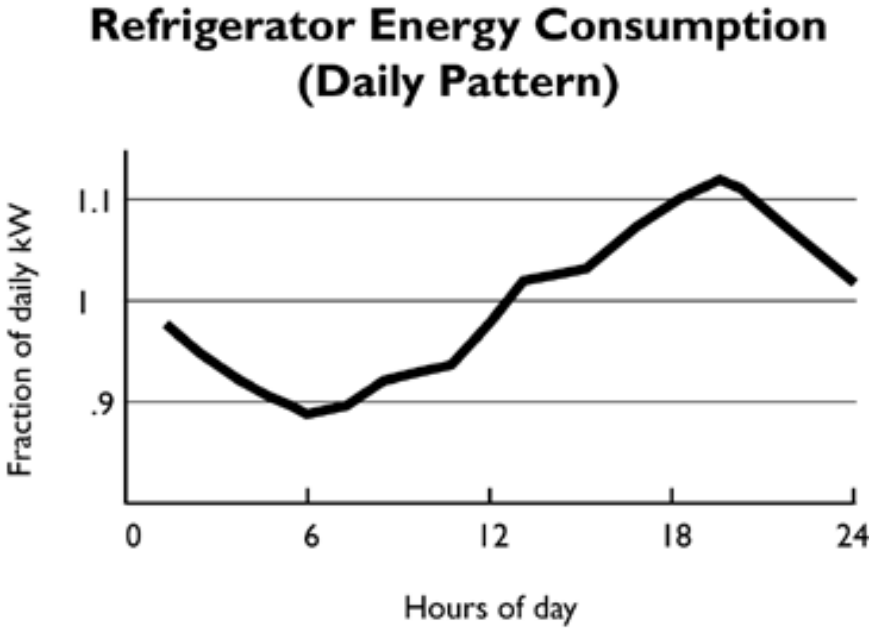
(14.4 ft^3 GE unit, 355 Btu for 13.45 minutes)

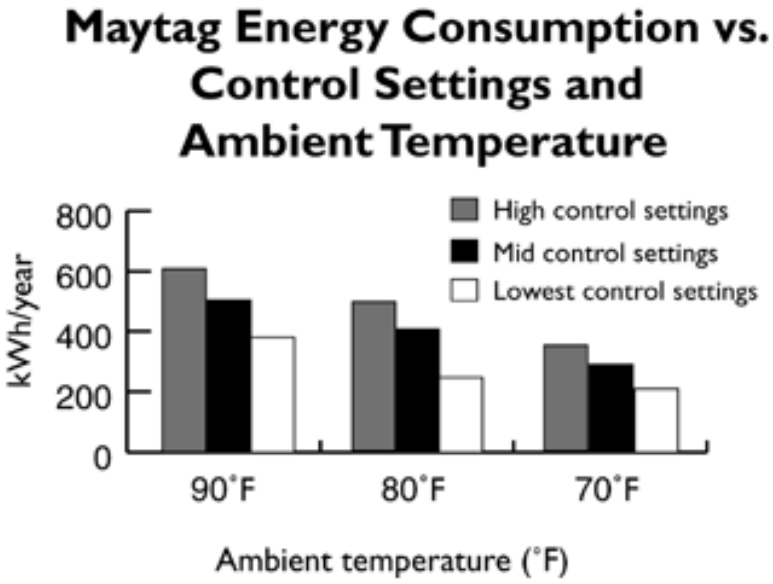


Source: Kinney and Belshe, *Refrigerator Replacement in the Weatherization Program: Putting a Chill on Energy Waste*. E Source, September 2001, page 16.

Other Confounding Factors

(NJ Comfort Partners Program)





Best Practice is to adjust for:

- Room temperature
- Monitoring time of day

Get Rid of 2nd Fridges!

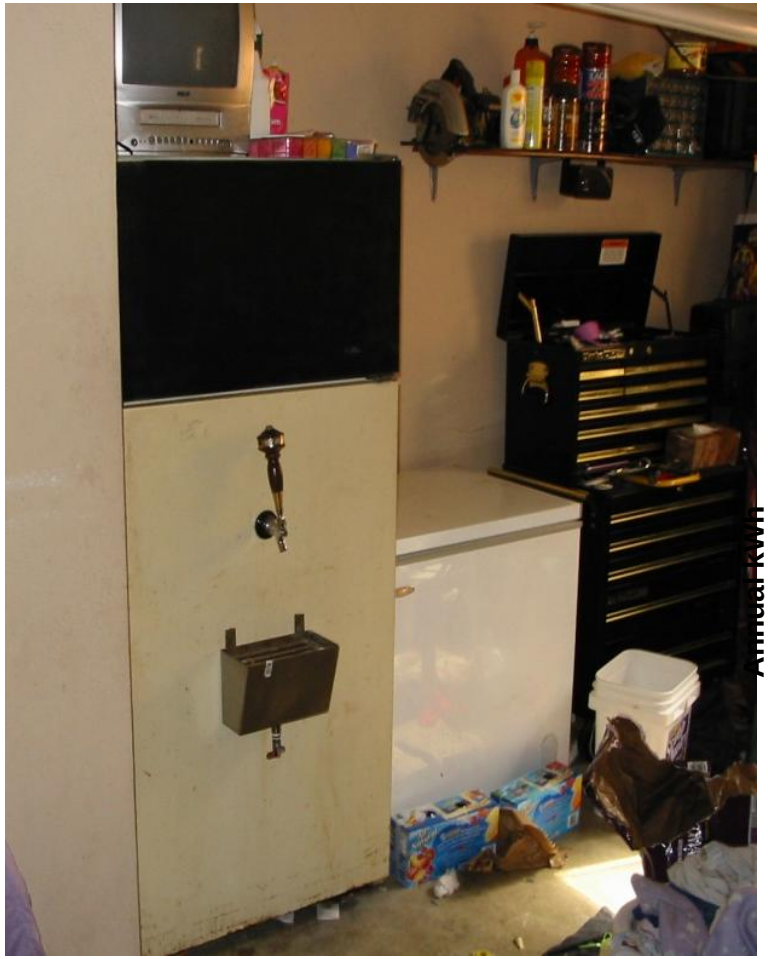
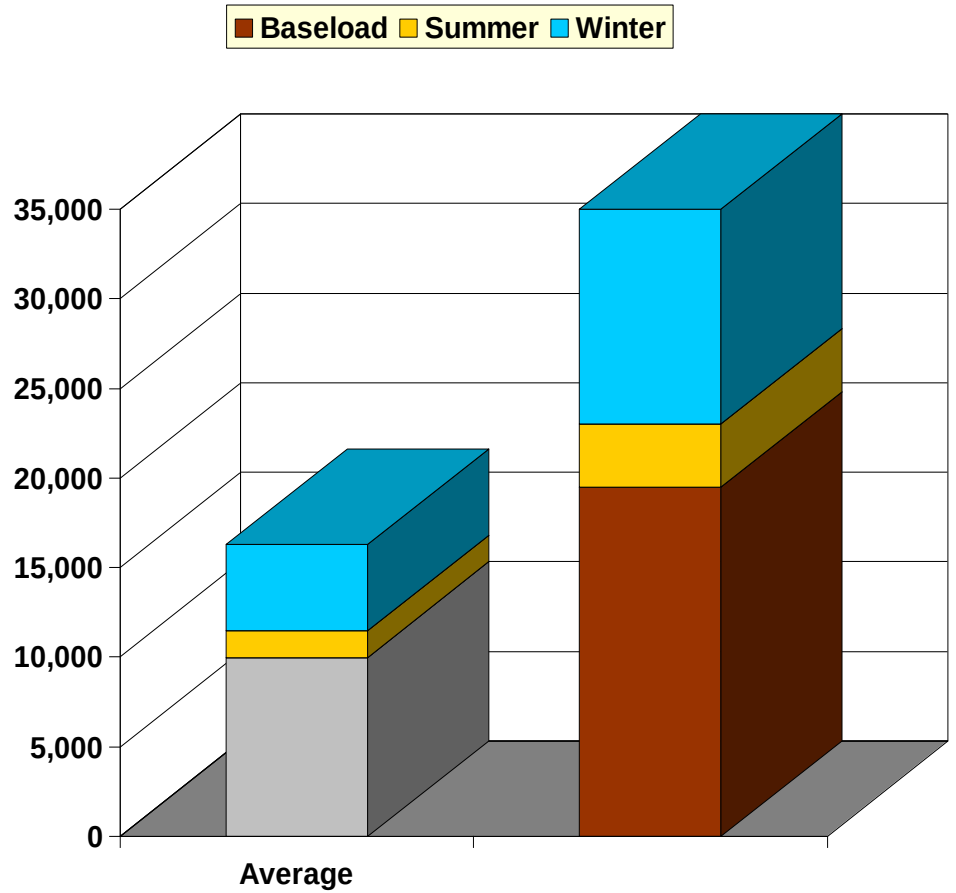


Photo: A. Tamasin Sterner, Pure Energy



Beer fridge & freezer in heated garage is an expensive choice

Calculating Payback Fridge/Freezer Removal

Annual Cost	$163.38
Annual kWh	1,556 kWh

kWh/yr x $/kWh = operating cost/year
= annual Savings for **removing unit**

Alabama	$0.0902	Montana	$0.0874
Alaska	$0.1506	Nebraska	$0.0751
Arizona	$0.0942	Nevada	$0.1158
Arkansas	$0.0874	New Hampshire	$0.1480
California	$0.1433	New Jersey	$0.1384
Colorado	$0.0909	New Mexico	$0.0897
Connecticut	$0.1850	New York	$0.1690
Delaware	$0.1317	North Carolina	$0.0930
Dist. Of Columbia	$0.1062	North Dakota	$0.0734
Florida	$0.1122	Ohio	$0.0946
Georgia	$0.0895	Oklahoma	$0.0836
Hawaii	$0.2300	Oregon	$0.0795
Idaho	$0.0623	Pennsylvania	$0.1080
Illinois	$0.0973	Rhode Island	$0.1408
Indiana	$0.0813	South Carolina	$0.0916
Iowa	$0.0935	South Dakota	$0.0802
Kansas	$0.0817	Tennessee	$0.0773
Kentucky	$0.0711	Texas	$0.1250
Louisiana	$0.0934	Utah	$0.0796
Maine	$0.1486	Vermont	$0.1396
Maryland	$0.1112	Virginia	$0.0867
Massachusetts	$0.1645	Washington	$0.0718
Michigan	$0.1014	West Virginia	$0.0656
Minnesota	$0.0890	Wisconsin	$0.1068
Mississippi	$0.0928	Wyoming	$0.0782
Missouri	$0.0745	United States	$0.1052

Replacement Savings

old op cost – new op cost = savings/yr

Purchase Price / savings $/yr = simple payback in years

and “Savings” = tax free income!

Occupant Based Savings Strategies

- GET RID OF 2nd, 3rd, 4th UNITS
- Set controls to avoid over-cooling
- Keep it as cool as possible—away from stove, heat registers, direct sunlight
- Understand and use the energy saver or moisture control switch if present
- Be sure the door closes tightly after opening
- Keep containers covered
- Allow air to circulate freely around the unit and clean the condenser coils

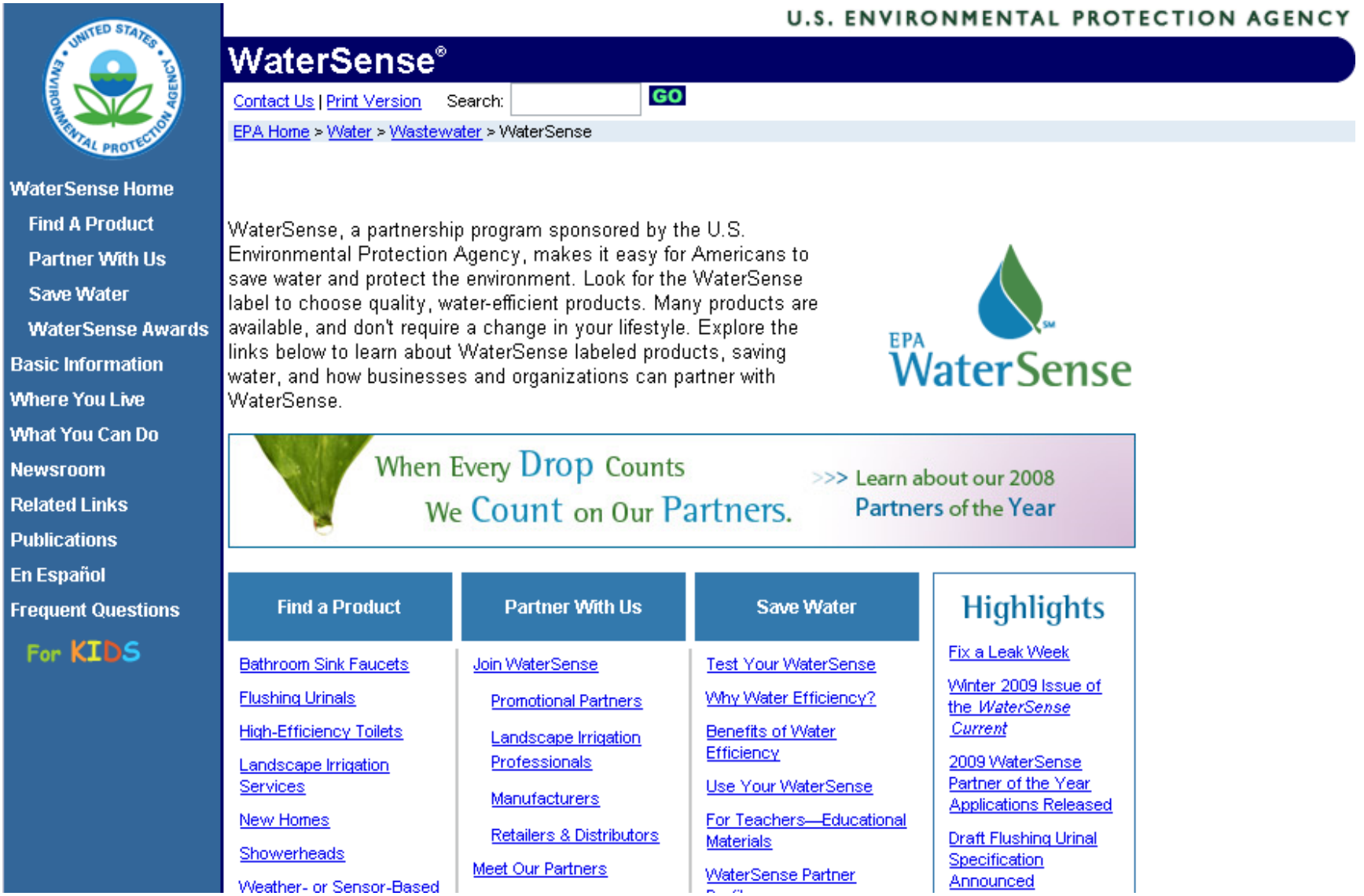
Water Use Quiz

- What percent of the world's water is fresh?
- UNICEF announced that humans need about how many gallons of clean water a day to survive?
- What is average daily American household use?
- How much more is this than other developed nations use?

www.good.is/goodguide

GOOD Guide to Reducing Your Water Use. GOOD Magazine, Summer 09

EPA WaterSense



http://www.epa.gov/watersense/

Household Hot Water Use

Buildings Energy Data Book: ***8.2 Residential Sector Water Consumption*** September 2008

8.2.4 Per Capita Use of Hot Water in Single Family Homes by End Use (Gallons per Capita per Day) (1)

Fixture/End Use	Average gallons per capita per day	Household Use gallons per day	Percent of Total Hot Water Use	Percent of End Use that is Hot Water
Toilet	0.0	0.0	0.0%	0.0%
Clothes Washer	3.9	10.1	15.5%	27.8%
Shower	6.3	16.4	25.1%	73.1%
Faucet	8.6	22.4	34.2%	72.7%
Other	0.0	0.0	0.0%	35.1%
Bath	4.2	10.9	16.7%	78.2%
Dishwasher	0.9	2.3	3.6%	100%
Leaks	1.2	3.1	4.8%	26.8%
Total	**25.1**	**65.2**	**100%**	**39.6%**

Note(s): 1) Based analysis on 10 single family homes in Seattle, WA
Sources: 2000 Residential End Uses of Hot Water in Single-Family Homes from Flow-Trace Analysis

http://buildingsdatabook.eren.doe.gov/docs/xls_pdf/8.2.4.pdf

What Affects Hot Water Use?

- Leaks
- The number of occupants & habits
- Difference (ΔT) between incoming & hot water temperature
- Fixture flow rate
- Appliance type and style
- Water heater energy factor (EF)
- Water heater tank insulation
- Distribution piping design & location
- Climate and localized ambient temperature
- Time of use options

Energy Star

BUY PRODUCTS THAT MAKE A DIFFERENCE

U.S. Environmental Protection Agency • U.S. Department of Energy

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Products | Home Improvement | New Homes | Buildings & Plants | Partner Resources

Home > Products > Residential Water Heaters

Products

- Appliances
- Heating & Cooling
- **Water Heaters**
  - Gas Condensing
  - Heat Pump
  - High-Efficiency Gas Storage
  - Solar
  - Whole-Home Gas Tankless
- Home Electronics
- Lighting
- Commercial Food Service
- Office Equipment

- Purchasing & Procurement
- Interested in Partnering?

Join ENERGY STAR

Residential Water Heaters

From warm showers to clean dishes, we count on hot water. In fact, the average household spends $400–$600 per year on water heating — making it the second largest energy expenditure behind heating and cooling.

Get your energy bills out of hot water.

Most Americans have conventional water heaters that are barely more efficient than ones sold 20 years ago. Today's new ENERGY STAR qualified water heaters include smart design enhancements that offer significant improvements in efficiency — and performance. Depending on the technology you choose, you can cut your water heating costs in half!

Water Heater Technology	Average Annual Savings*
High-Efficiency Gas Storage	$30
Gas Condensing	$110
Whole-Home Gas Tankless	$115
Solar	$220
Heat Pump	$290

* Savings for average household of 2.6 people.

Five types of water heaters can now earn the ENERGY STAR.

Find the one that's right for you

Don't get burned, plan ahead.

A water heater lasts about 10–15 years, and when it fails it can leave you with a big mess. When in a rush to replace, it's hard to evaluate options and consumers often end up with the least efficient choice. If you're one of the 27 million households with a water heater that's more than ten years old, consider replacing it with an ENERGY STAR qualified model before it fails. By acting early you have more control of your purchase and can start saving money right away.

Water Temperature

Photo: Rana Belshe

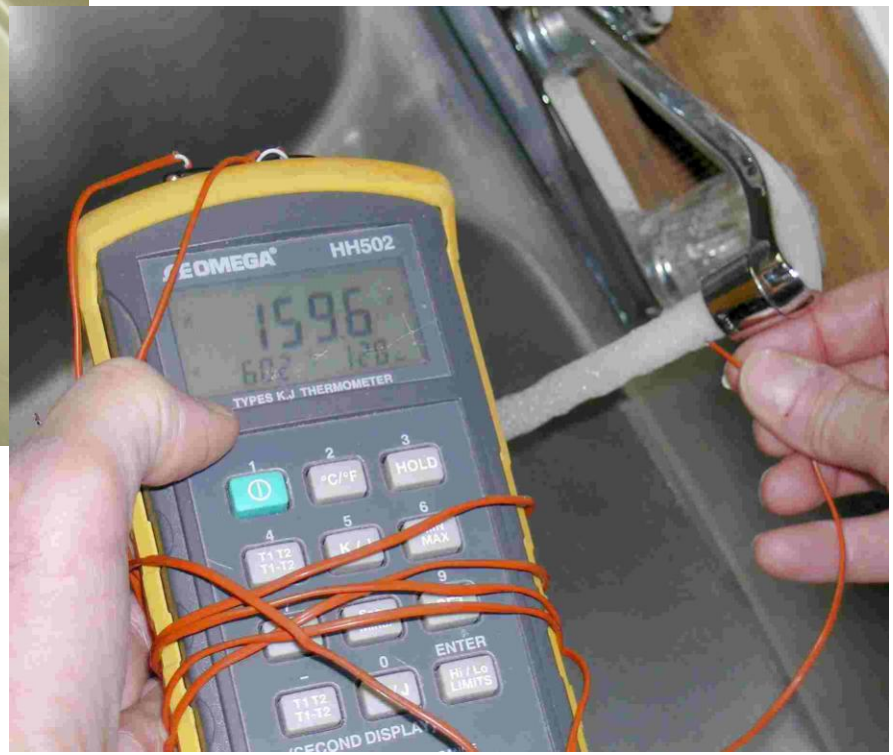
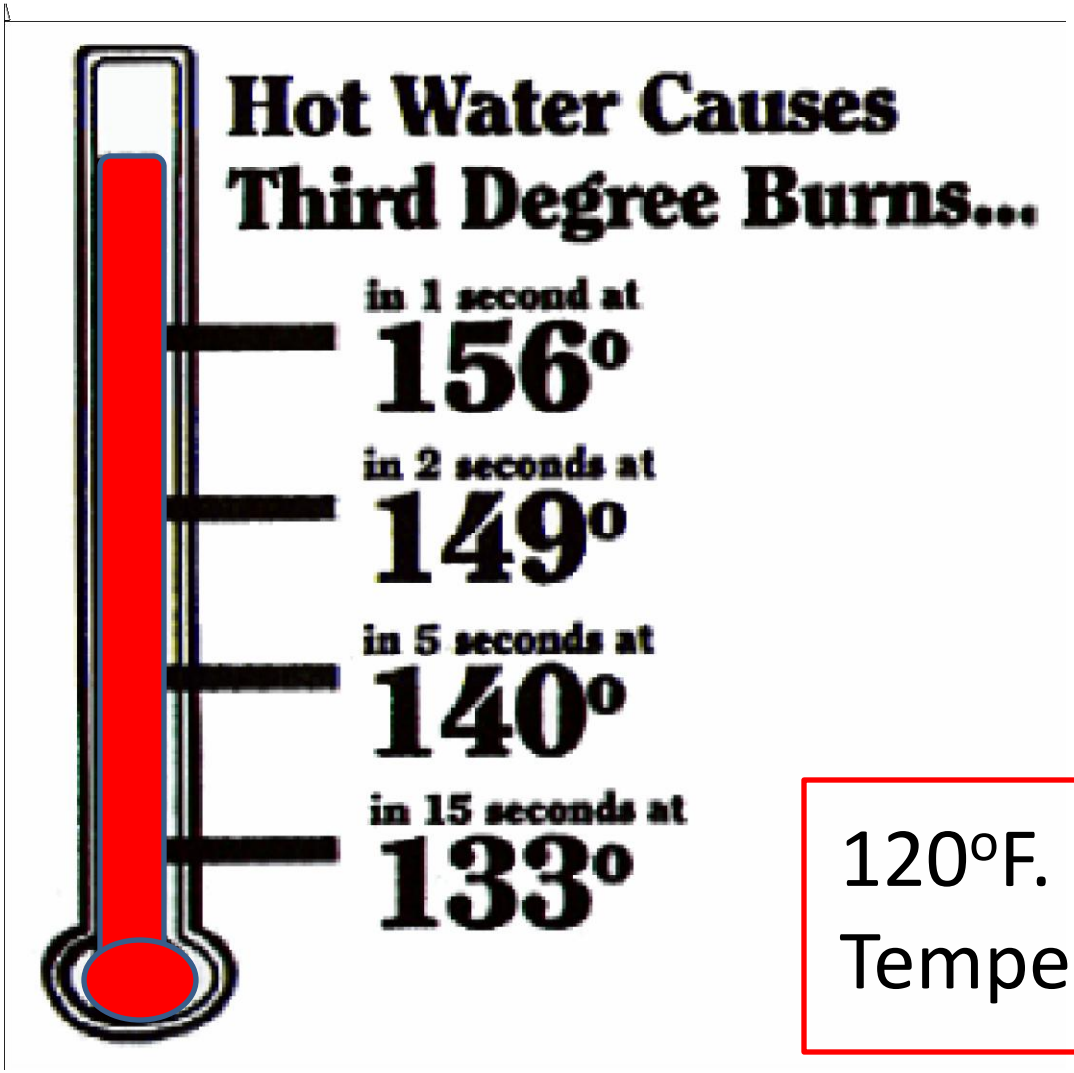


Photo: Larry Kinney

Too Hot Water is Dangerous



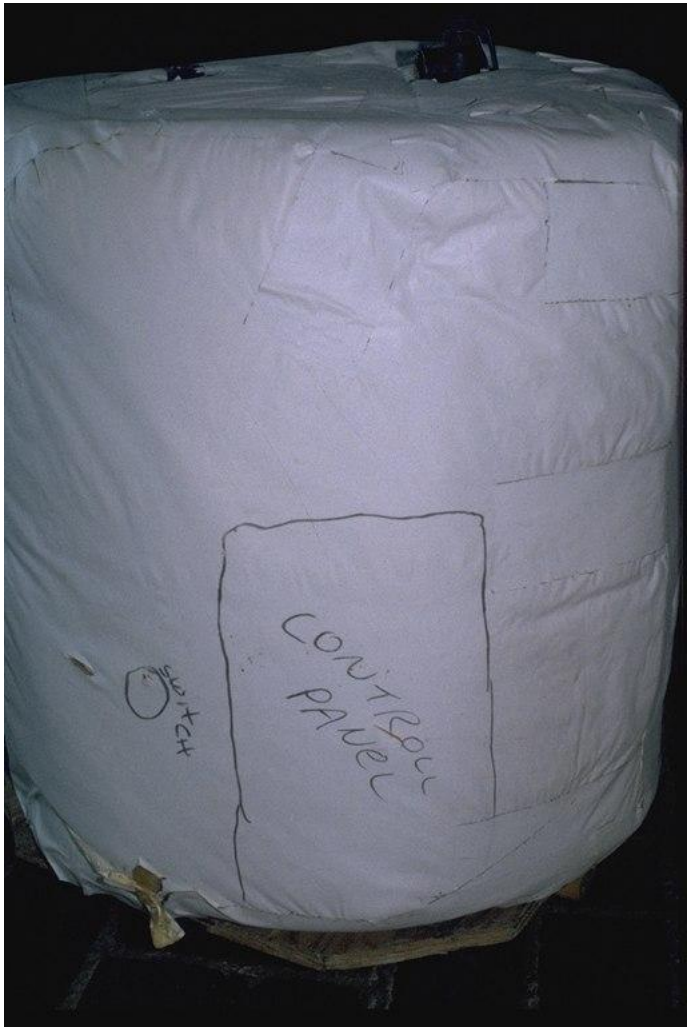
Children & elderly are at greatest risk for injury

120°F. Recommended Temperature for most

Insulate Tank & Piping

Photo: Rana Belshe

Write date & Tstat setting on tank when setback to track for changes & simplify adjustments. Bottom board insulation works!



Flow – Gallons per Minute (gpm)

Photo: Larry Kinney

MicroWeir

OR… a stop watch & a gallon jug. If it fills in less than 2 minutes, it is likely a candidate for replacement!

Showerheads:
2.5 gpm is the rule
Less is better!

- $10 1.2 gpm Real Goods (with pause button)
- $40 1 gpm Bricor

Household Water Use – Not only Hot

Water-Related Products

Model #: Click for list

With current technologies the benefits of water conservation can be realized without any sacrifice of comfort or convenience. Conservation of water can help to insure that communities have an adequate supply of clean drinking water, with enough left over for wildlife and recreational uses. Reduced water consumption can extend the life of wells, and is good for water treatment facilities and septic systems as well. Finally, since water use is frequently heated water use, effective water conservation measures are also likely to lead to reduced energy bills as well.

Accessories

Kitchen Aerators/Sprays

Toilet Water-Savers

Bath Faucet Aerators

Showerheads: Fixed Mount

Showerheads: Handheld

http://www.energyfederation.org/consumer/default.php/cPath/27

Use Cold Water for Laundry

Water Temperature Setting for Clothes Washer

(millions of households)

Wash Cycle

- Hot..... 6.2
- Warm..... 49.7
- Cold..... 28.2

Rinse Cycle

- Hot..... 1.4
- Warm..... 16.6
- Cold..... 66.1

No Washing Machine..... 22.9

Source: www.projectlaundrylist.org

http://www.eia.doe.gov/emeu/recs/recs2001/hc_pdf/usage/hc6-1a_climate2001.pdf

Use of Clothes Washer

(millions of U.S. households)

- Loads of Laundry Washed Each Week
  - 1 Load or Less..... 6.8
  - 2 to 9 Loads..... 65.1
  - 10 to 15 Loads..... 9.6
  - More than 15 Loads..... 2.7

www.projectlaundrylist.org

www.eia.doe.gov/emeu/recs/recs2001/hc_pdf/usage/hc6-1a_climate2001.pdf

Use of Clothes Dryer

(millions of U.S. households)

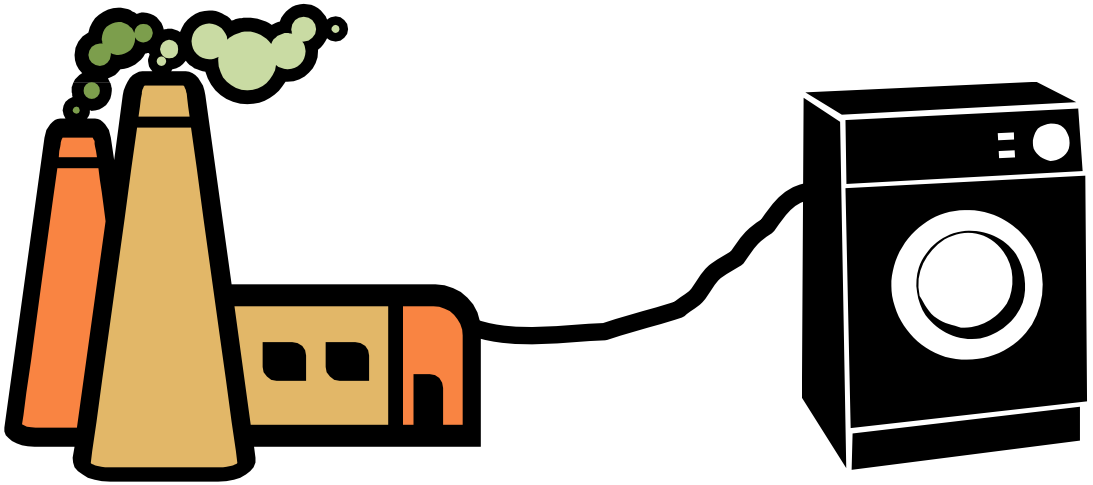
- Use a Clothes Dryer..... 78.8
  - Every Time Clothes are Washed... 63.5
  - Some, but not All, Loads..... 12.7
  - Used Infrequently..... 2.7
- No Clothes Dryer.....28.2

www.projectlaundrylist.org

www.eia.doe.gov/emeu/recs/recs2001/hc_pdf/usage/hc6-1a_climate2001.pdf

Simple Facts

Dryers are responsible for 6-10% of domestic electricity use.



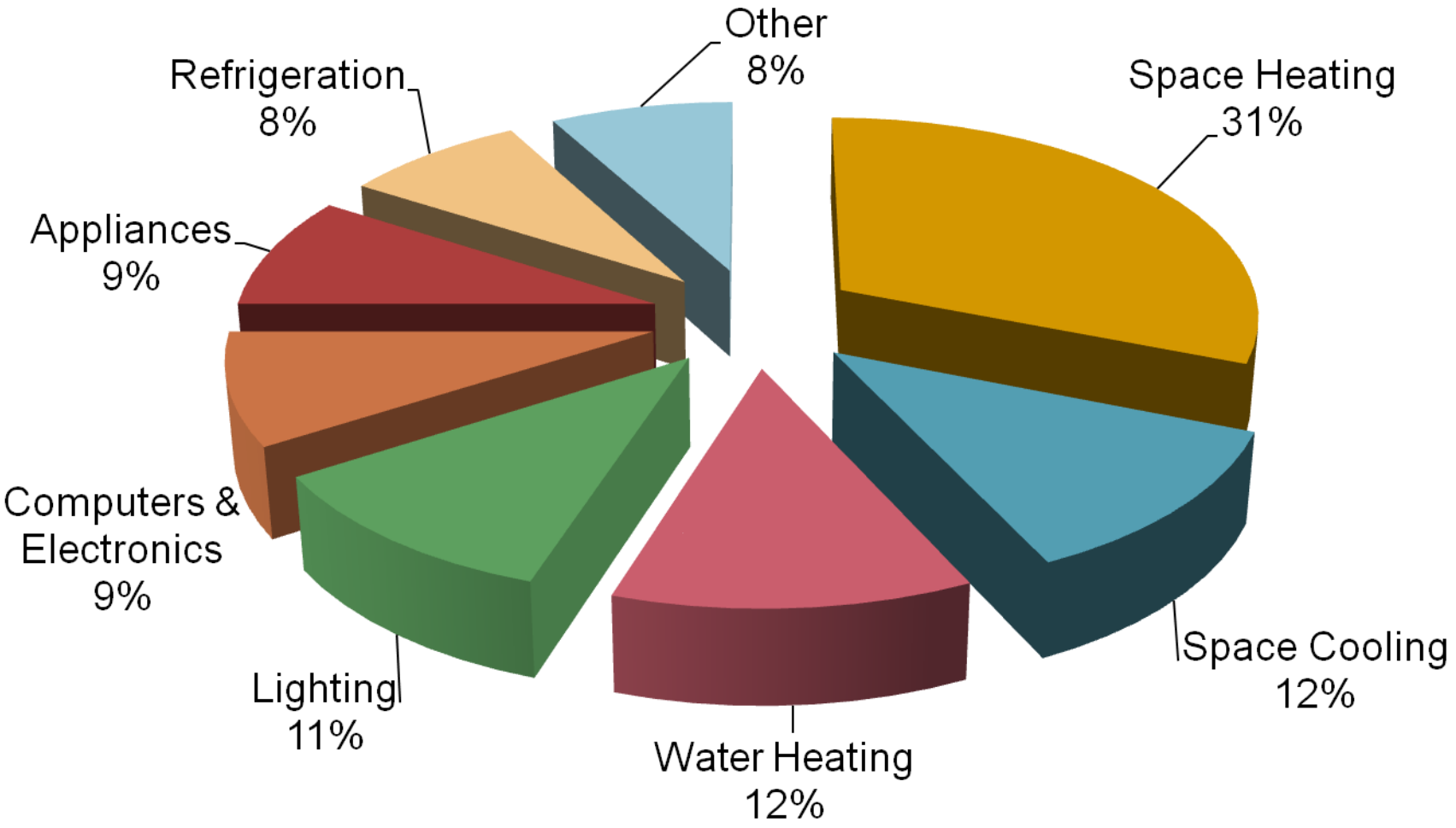
PROJECT LAUNDRY LIST
A POSITIVE APPROACH TO CHANGE
www.projectlaundrylist.org

Occupant Based Savings Strategies

- Fix all leaks – hot or not
- Keep thermostat at safe & efficient setting
- Reduce standby losses with hot water use
- Limit use of hot water when doing laundry or cleaning
- Take shorter showers
- Shower rather than bath
- Turn water heater thermostat down or off for vacations
- Treat water as the precious resource it is
- Use only as much water as you need
- Harvest water while waiting for hot to arrive
- Turn water off when not using
- Manage outdoor H2O use: washing car & irrigation
- Manage your Water Footprint

http://www.waterfootprint.org/?page=files/WaterFootprintCalculator

What Does My Bill Pay For?



Source: 2007 Buildings Energy Data Book

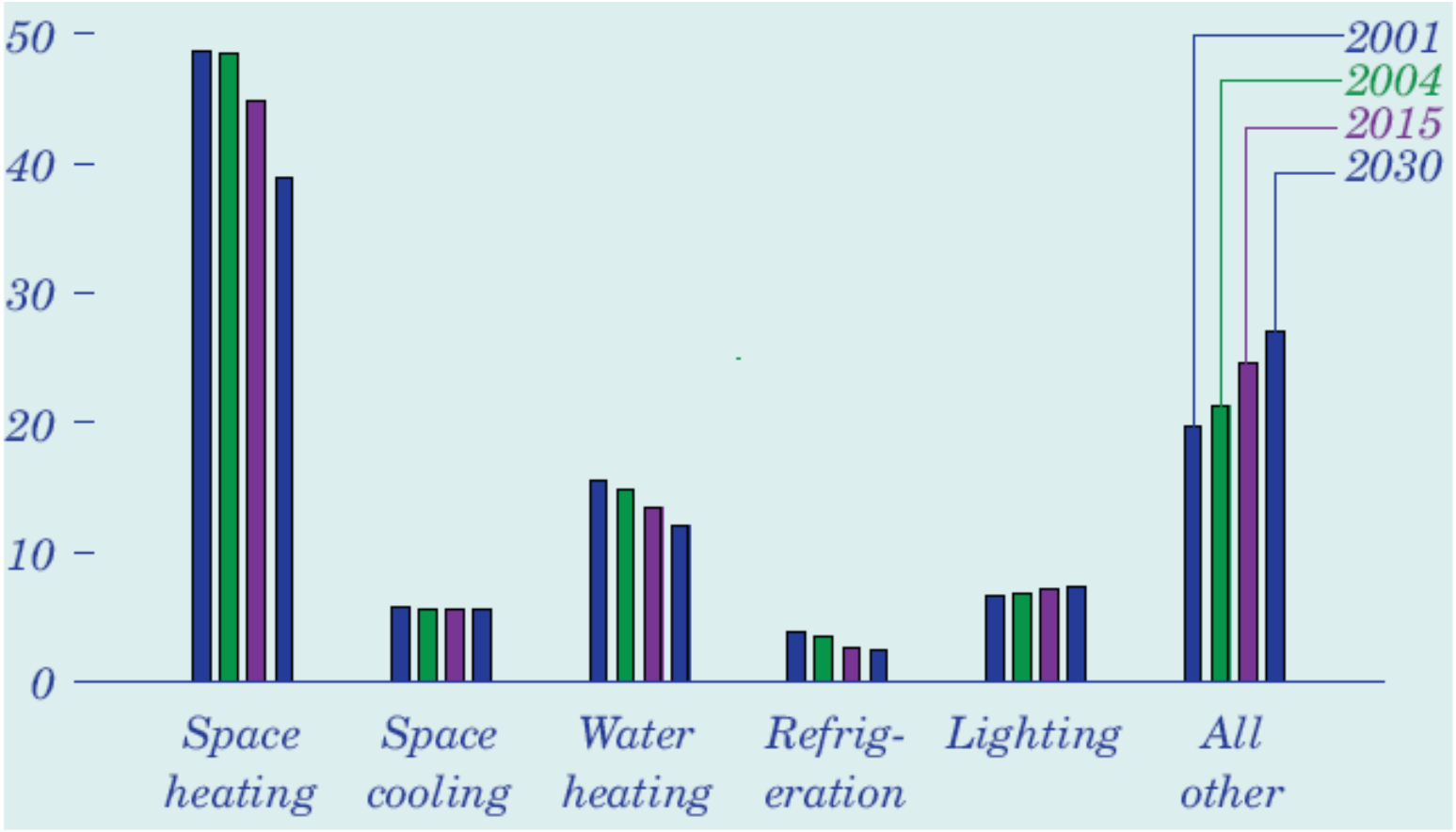
Reasons for High Baseload

- Time on – 24/7 adds up quickly
- High demand / power (kW)
- Poor control strategies
- Not known to be operating
- Faulty equipment
- Intermittent use
- Hidden loads
- Lots of people in the household

- Lots of things plugged in

PPL Managing CAP Credits Pilot Program, 2006

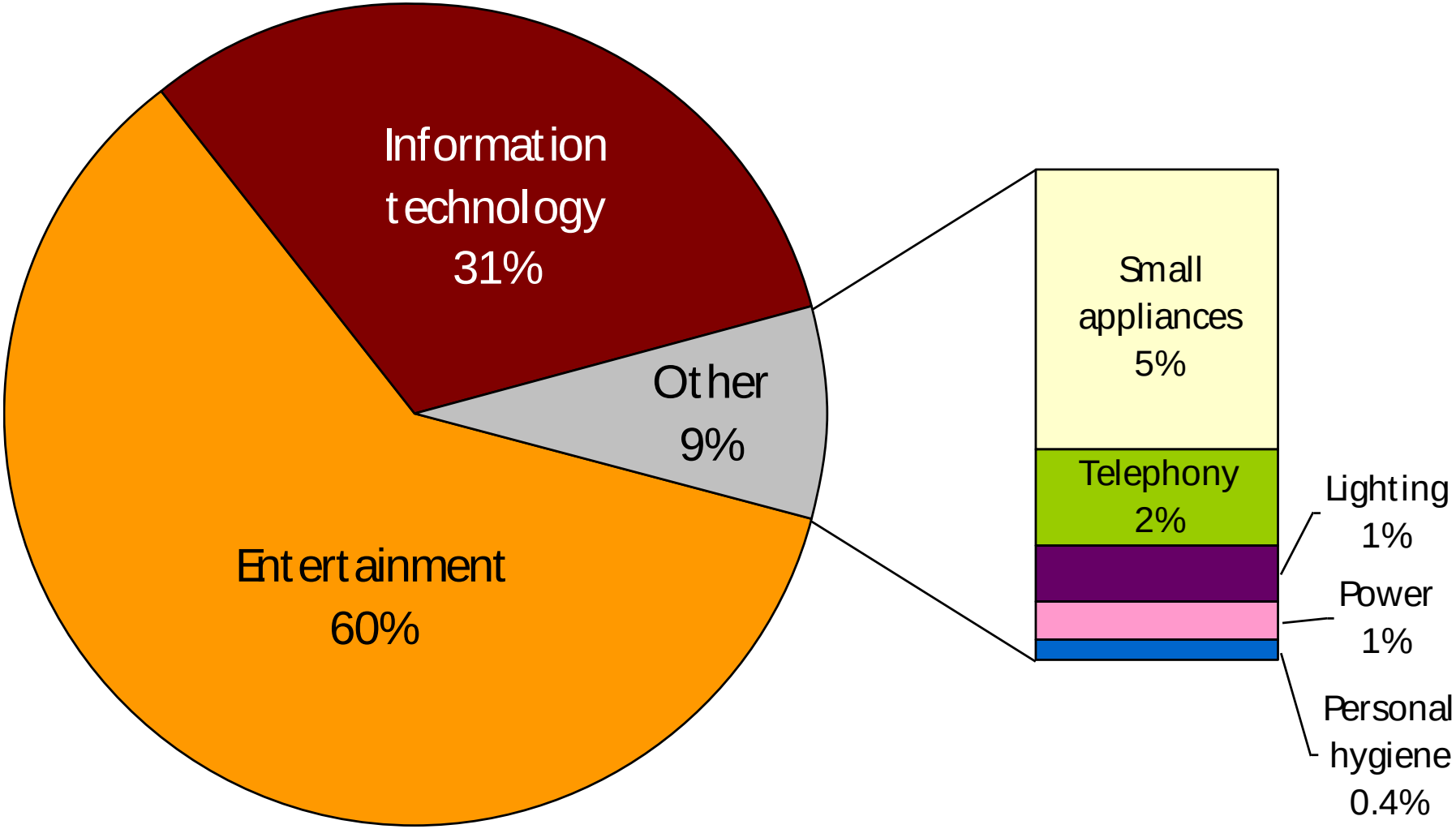
Plug Load Energy Use is Increasing



U.S. delivered residential energy consumption by end use, 2001, 2004, 2015, and 2030 (million Btu per household)

Source: Energy Information Administration 2006

Plug Load Energy Use by Product Category



2007 Ecos Consulting, "Final Field Research Report": Share of Plug Load Energy Use by Product Category27

Power Settings & Mode

ON	"OFF"	REALLY OFF
• Active power • Low power mode • Indeterminate power • Sleep/hibernate	▪ Standby power ▪ Phantom load ▪ Vampire power ▪ Idle power	• No power • Unplugged • Power switched off with strip or other control device

Anything with a remote, display, touchpad, or light is using power even when turned "off"

Power: On vs Off - Ent. System # 1

DEVICE	POWER USE (W) ON	POWER USE (W) "OFF"/Standby
ENERGY STAR 37" LCD TV	149	1
VCR/DVD	17	7
Cable Box, HDDTV DVR	35	25
Stereo Home Theater (audio)	65	2
CD Player	10	2
Sub Woofer	15	7
TOTAL	**291 Watts**	**44 Watts**

Data: Danny Parker, 2008 FSEC

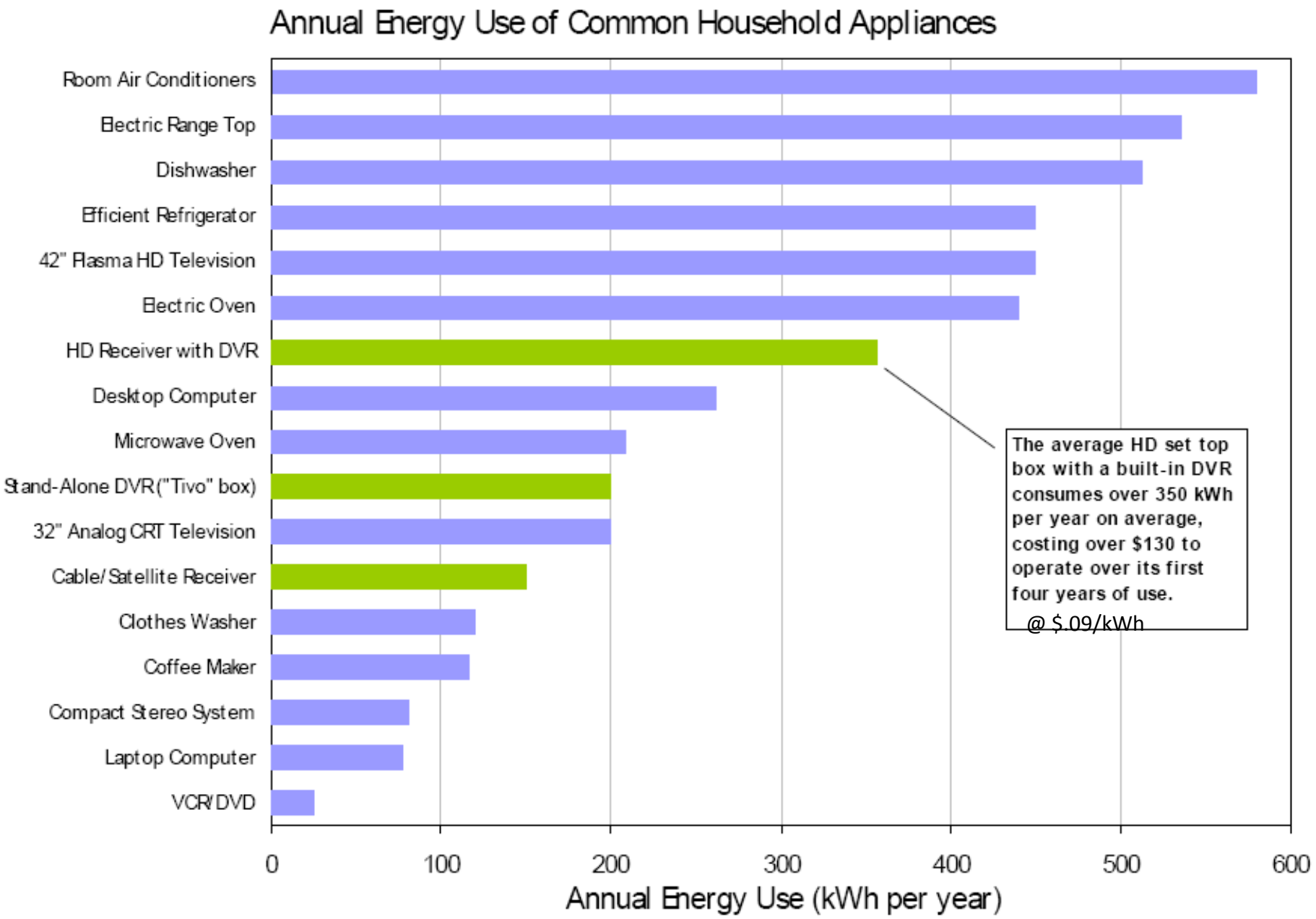
Energy: COST when On & Off

	Day	Month	Year
On Hours	3	90	1095
kWh	< 1	24	290
COST ON	$0.08	$2.40	$29.00
Off Hours	21	630	7665
kWh	< 1	28	333
COST OFF	$0.09	$2.80	$33.30

Note powerstrip

Based on watching TV 3 hrs/day

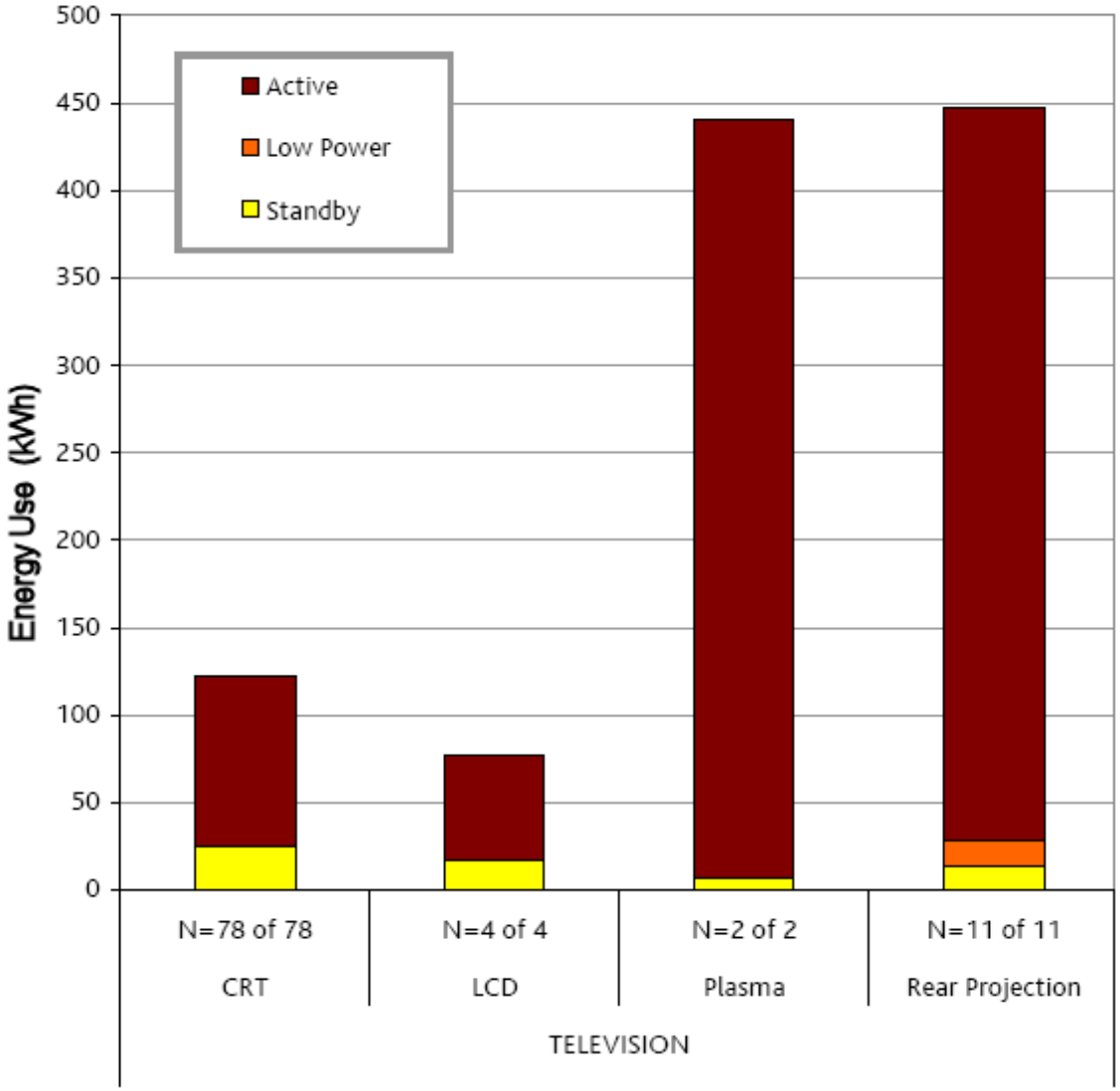
Danny Parker, 2008 FSEC



"NRDC Study of Set Top Box and Game Console Power Use", Peter Ostendorp, Ecos Consulting, May 2007

Sample Annual kWh of TVs by Mode

- Standby power is similar regardless of TV type or size.
- Newer TVs use a lot more energy than older ones.
- Larger and newer technologies (plasma & rear projection) tend to be used more and are frequently part of a larger entertainment set up.



Source: Ecos Consulting, “Final Field Research Report”, 2007

Technology Ho! Shop Smart

Credit: Philips

Philips' Eco TV 2008

<u>0.15W</u> off/standby

- Ambient light sensor to brighten & dim
- Dynamically lowers brightness in dark scenes

"The 42PFL5630D uses less power than any 42-inch LCD we've seen."

David Katzenmeir, 2008 Consumer Electronics Show

http://ces.cnet.com/8301-13855_1-9843645-67.html

Manage TV Screen Settings

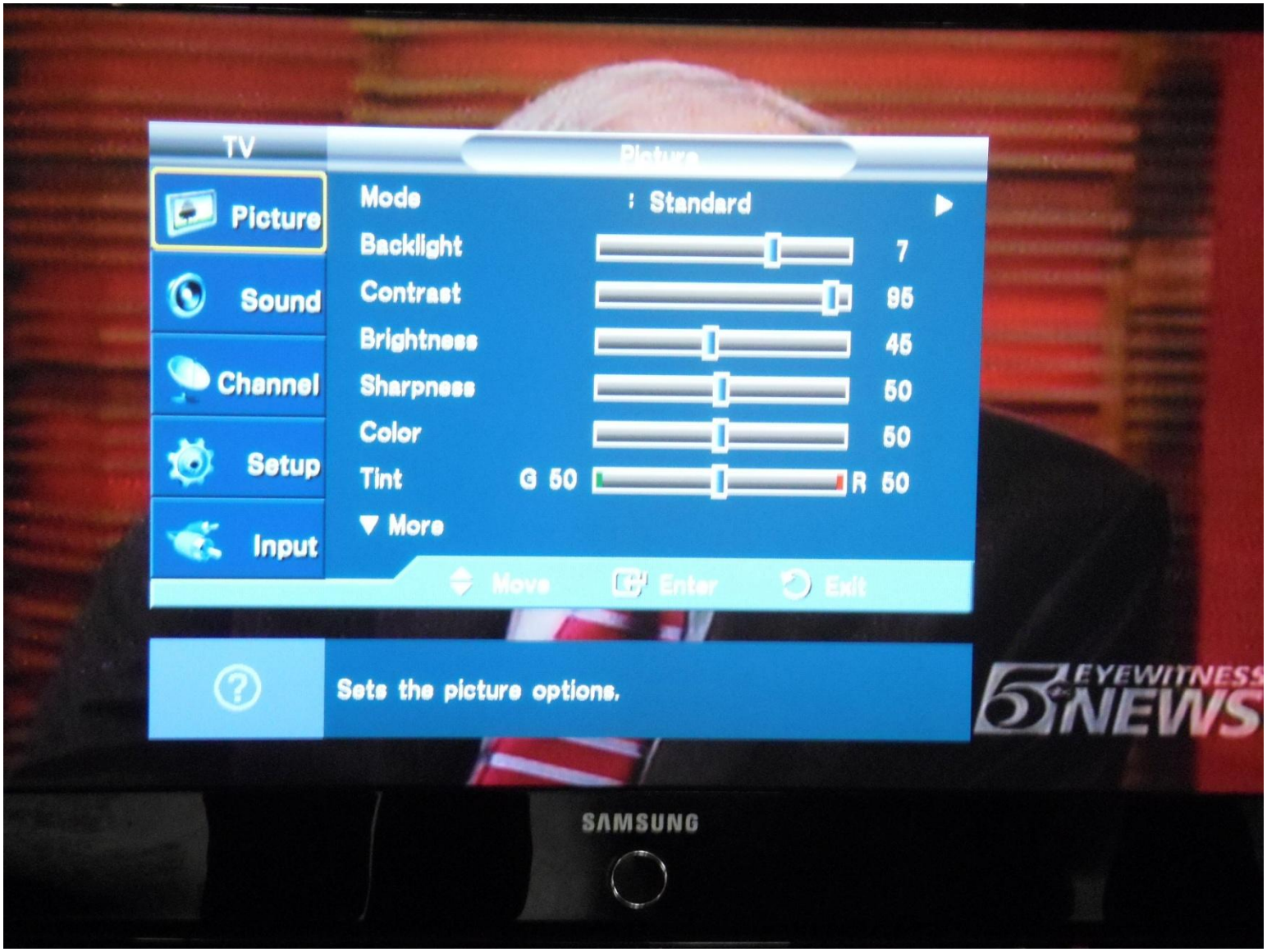
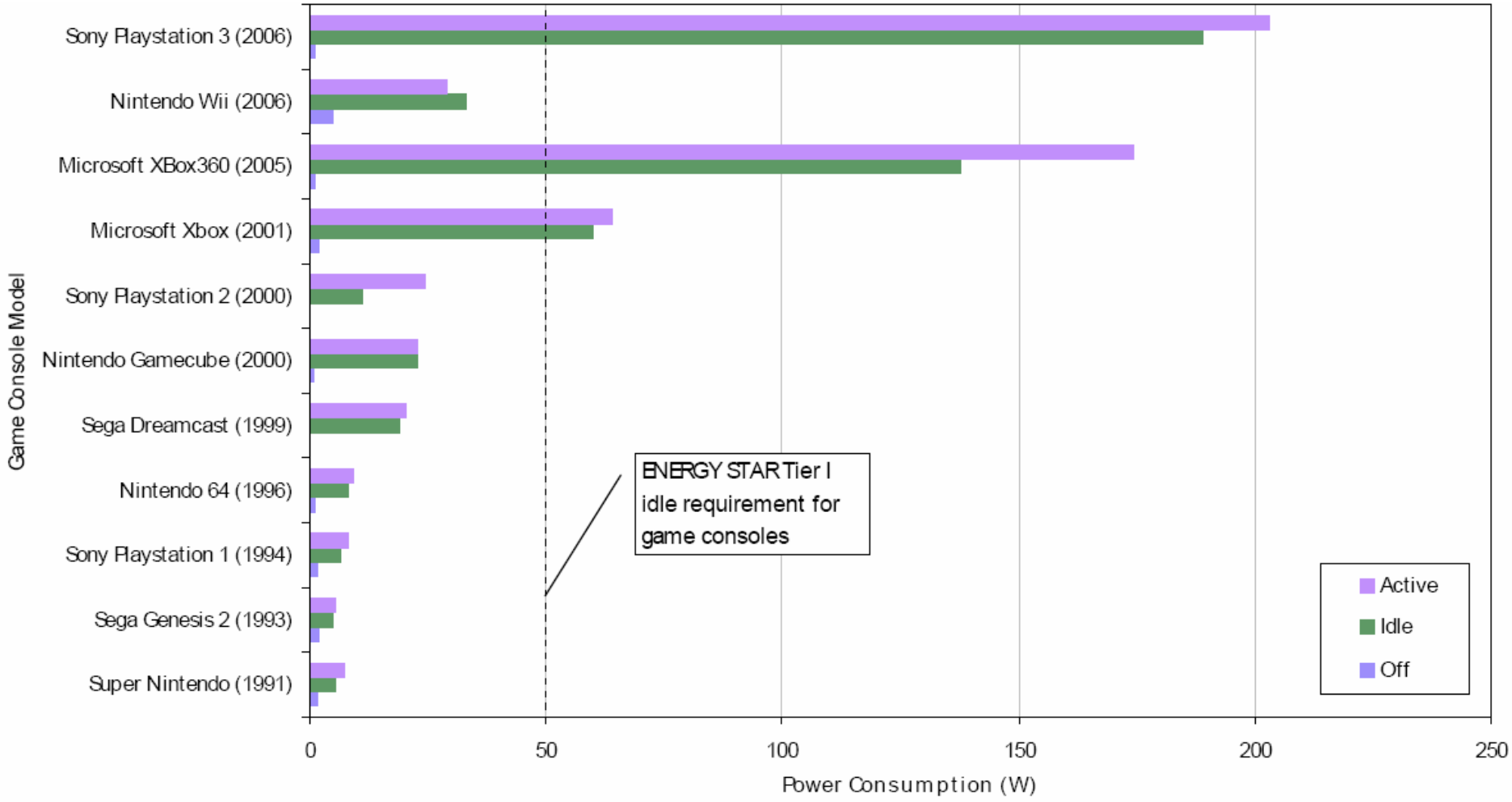


Photo: Rana Belshe

Game Console Power Use



NRDC Study of Set Top Box and Game Console Power Use, May 2007, Peter Ostendorp, Ecos Consulting

Activate Power Management for Gaming

Photo: Rana Belshe

Photo: Rana Belshe

Our PC World

Photo: Rana Belshe

Power modes vary

- Active power
- Low power - Sleep
- Off - Standby

- Up to 60% of office personal computers are left on overnight
- Average desktop PC system draws 140W
- Monitor accounts for about one half the use
- On average, an ENERGY STAR computer uses 70% less electricity than standard unit—but only if power management features are activated

Manage Computer Power Use

- Teach everyone that it makes sense to ***Turn off monitor if not using for > 5-20 min. and both CPU and monitor if not using for > 30-60 min.***
- Use power strips for positive “off” and control of peripherals
- Learn about and teach others about how to activate Power Management functions
- Maximize sleep features in the operating system

Check DOE & www.energystar.gov for great stuff on this.

Advanced Power Strip Options

http://www.**p3international**.com

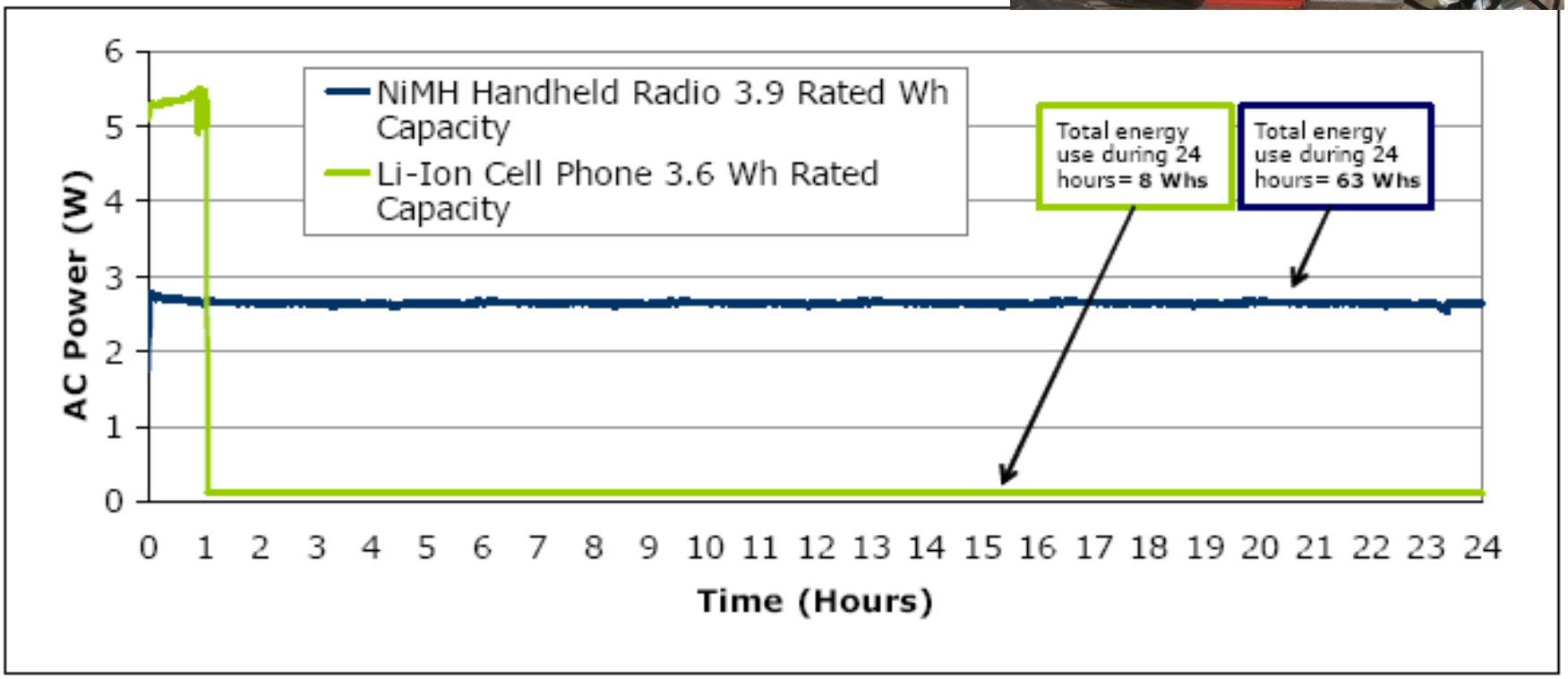
http://**wattstopper**.com

http://www.smarthomeusa.com/Shop/Smart-Energy/Smart-Strip

Battery Types & Chargers Matter

Battery chargers with similar charging capacity use varying amounts of energy to charge & maintain the battery

Photo: Rana Belshe



2007 Ecos Consulting, "Final Field Research Report"

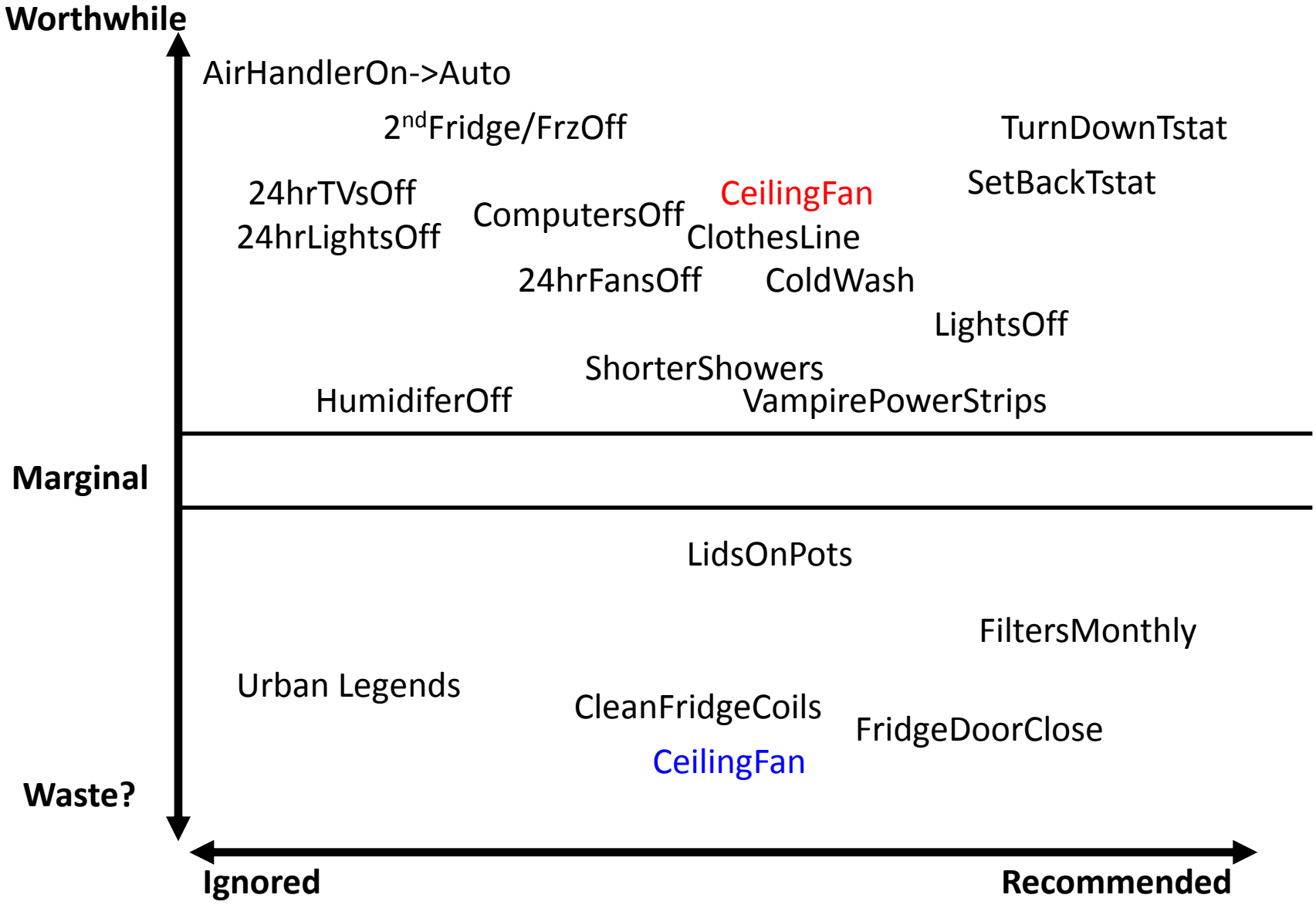
Occupant Based Savings Strategies

- Manage control settings for maximum efficiency
- Turn equipment off when not actively using
- Minimize standby use with power strips, switched outlets, unplugging, etc.
- Unplug devices you don’t use
- Buy the most efficient products possible
- Purchase less stuff

Influencing Change

- Identify all possible opportunities to save
- Put costs on operations and equipment use
- Recognize what customer cares about and will/won't do
- Focus on biggest users
- Prioritize where you spend your time
- Present only options that make sense and offer a return on investment

Priorities: Recommended vs. Worthwhile: Actions



Note: Values based somewhat on difficulty in maintaining action

Michael Blasnik, "Ten Simple Things that Don't Save Very Much Energy"

Feedback Welcome!

Thanks to:
A. Tamasin Sterner
www.PureEnergyAudits.com
and
Larry Kinney
www.synertechsystems.com
for their work and
collaboration through the years

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We Looked: We Saw…

- High occupancy
- Anything running 24/7: air handler, lighting
- Extra lighting
- Multiple refrigerators and/or freezers
- Broken appliances
- Failing motors
- Malfunctioning equip: well, septic, sump pumps
- Heavy-duty battery chargers
- Home entertainment rooms
- Large/multiple aquariums
- Off-site but connected loads
- Waterbed heaters
- Dehumidifiers set too high
- Forgotten heaters in crawl spaces, garage, porches
- Grow lights
- Ice makers running without water hookup
- Washers always using hot water
- Ventilation equipment
- Pressure tank problems
- Current leaking to earth: water heater, yard line, well pump

This is a bonus list of circumstances associated with high baseload use. Though not part of a “basics” course, it may help as you are trouble-shooting a job.