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# Scouting for Residential Electricity Savings

Scott Pigg, Principal Project Manager  
Ingo Bensch, Senior Project Manager

January 27, 2010

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
## Accelerating Energy Efficiency Webinar Series

[www.ecw.org/webinarseries](http://www.ecw.org/webinarseries)

### On-demand webcasts:

- The Silver Lining in Climate Survey Results: Refining the Design of Energy Efficiency Programs and Climate Policy
- The financial effect of energy efficiency on utilities: a closer look at decoupling
- Energy efficiency's great potential
- How risk and uncertainty affect energy efficiency decisions: a real options analysis

# What's on your screen?

-  Ask a question via chat
-  Bios, description
-  Submit your feedback, additional resources
-  Get help

## Technology Guy (but likes people)



Scott Pigg

**His passions:** home energy use, guitar, sailing

**researcher** at the Energy Center of Wisconsin

M.S. University of Wisconsin  
*Land Resources – Energy Analysis and Policy*  
*Agricultural Engineering*

B.S. University of Wisconsin  
*Agricultural Engineering*

Researching residential energy use for 23 years

## People Guy (but likes technology)



Ingo Bensch

**His passions:** behavioral research, homeschooling, chocolate

**researcher** at the Energy Center of Wisconsin

previously **program evaluator** for Wisconsin legislature

M.P.A. Indiana University  
*Environmental and Natural Resources Management*

B.A.S. Stanford University  
*Economics & Science-Technology Studies*

*Human Dimensions* panel leader for the **American Council for an Energy Efficient Economy** Summer Study (2008 and 2010)

## Acknowledgements

- **Our funding**
  - **Minnesota Department of Commerce, Office of Energy Security**
  - **Minnesota Power Company**

Thank you!
- **Our team**
  - **Ingo and Scott**
  - **Karen Koski – Energy Center of Wisconsin**
  - **Rana Belshe – Conservation Connection Consulting**

## Study Objectives

- Characterize electricity use by plug-in devices in homes
- Scout for energy-saving opportunities among existing plug-in devices that people could and would obtain at low or no cost
- Link opportunities to program approaches

## Plug-In Devices

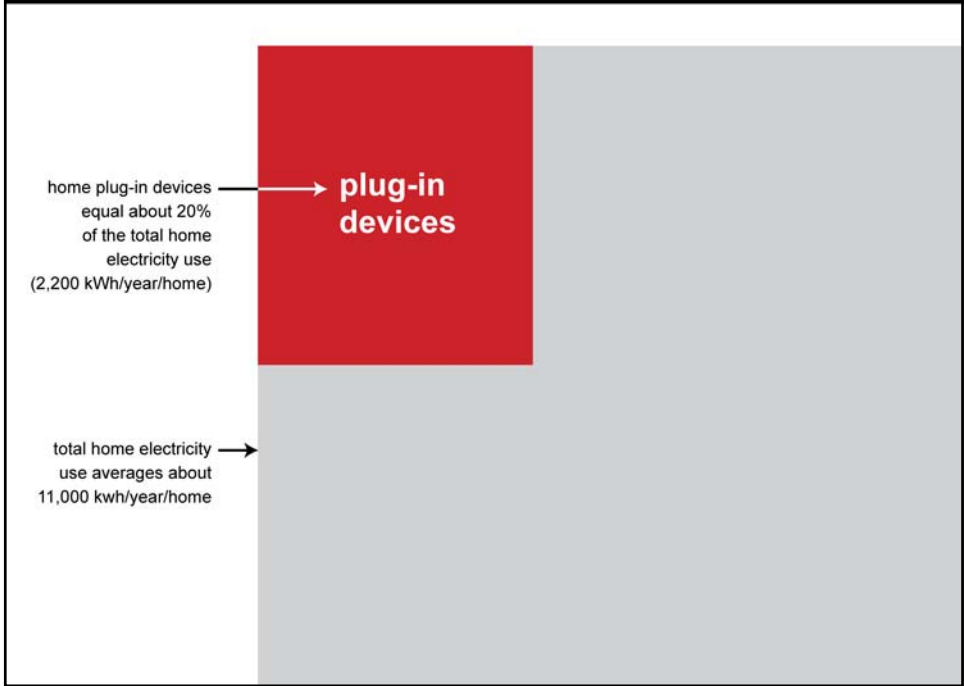


**Not Included**

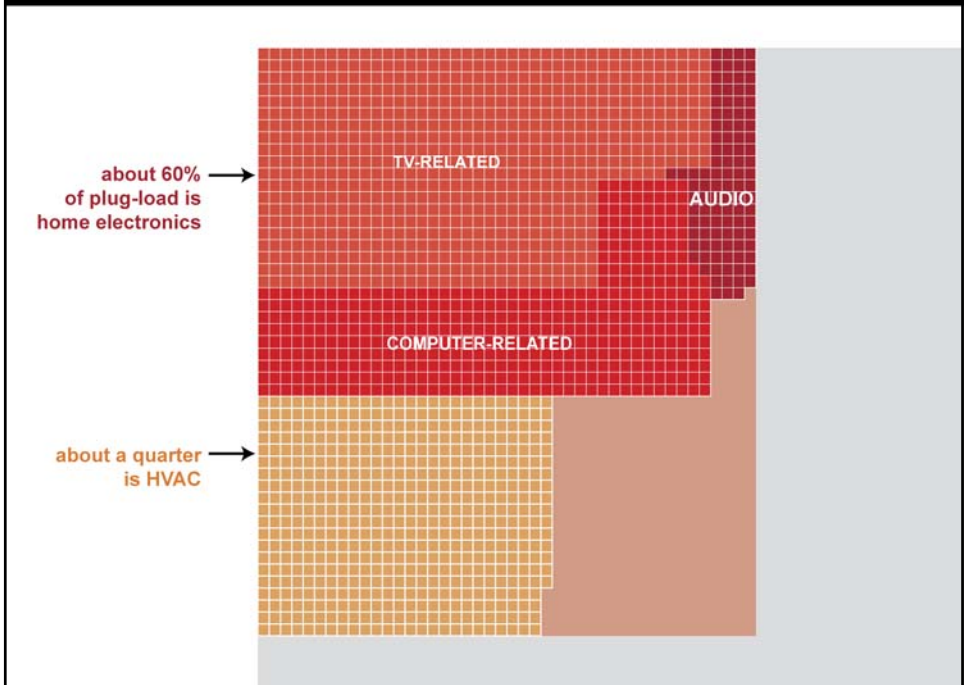


**In a Nutshell...**

AVERAGE ELECTRICITY USE IN MINNESOTA SINGLE-FAMILY HOMES

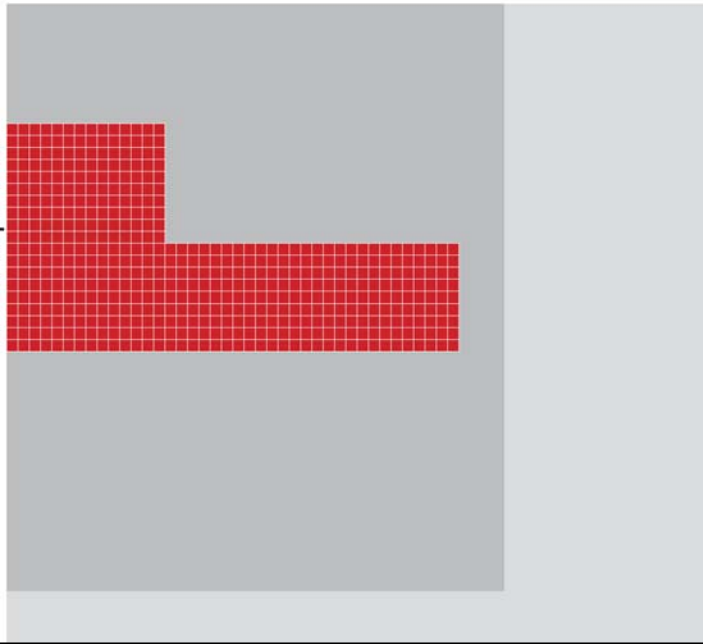


AVERAGE ELECTRICITY USE IN MINNESOTA SINGLE-FAMILY HOMES



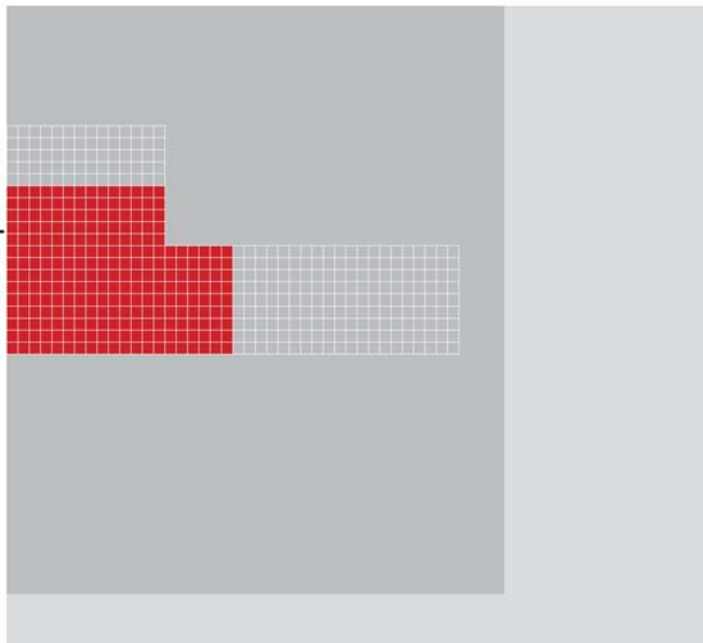
SAVINGS

about 20%  
of plug-load  
electricity can  
be saved through  
low/no-cost  
strategies



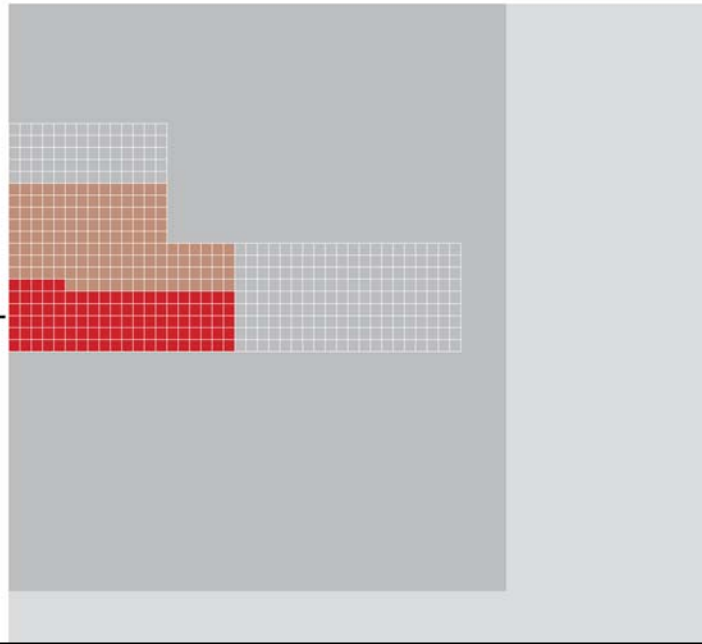
SAVINGS

after adjusting  
for behavioral  
likelihood, we  
estimate 10%  
savings potential



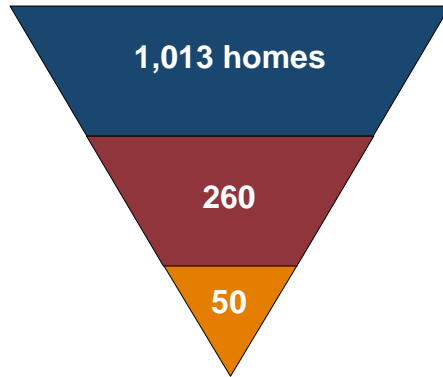
## SAVINGS

biggest single  
opportunity for  
savings (40%)  
is enabling  
computer power  
management



**Now the details...**

## Study Approach



### Telephone Survey

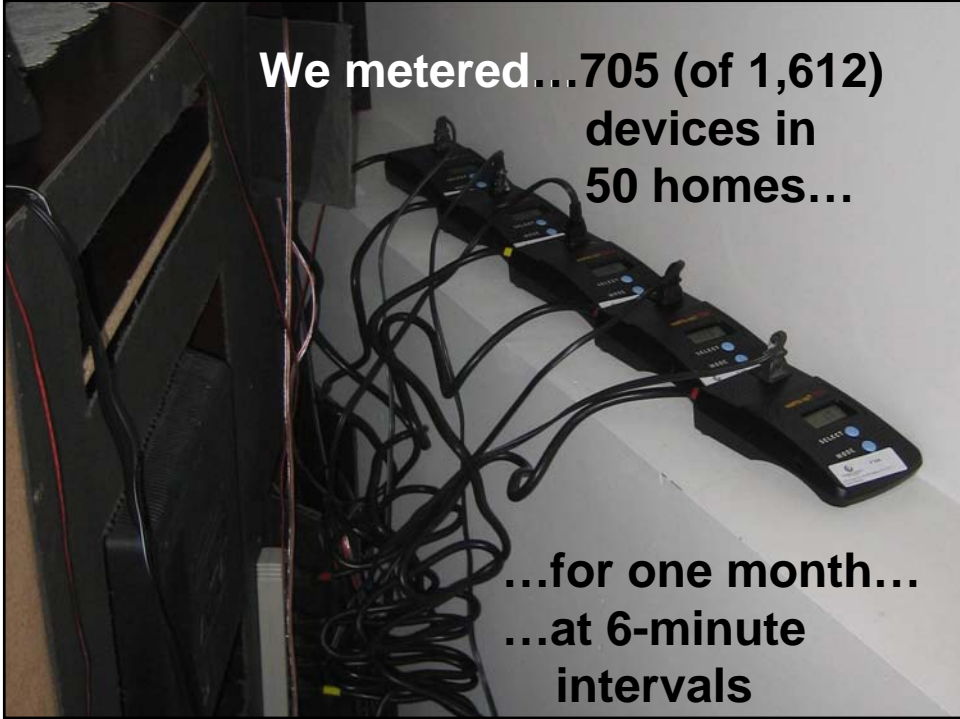
- Demographics
- Attitudes
- TV & Computer counts

### Mailed Appliance Survey

- Computer & peripheral details
- TV & peripheral details
- Saturation for other plug-in devices

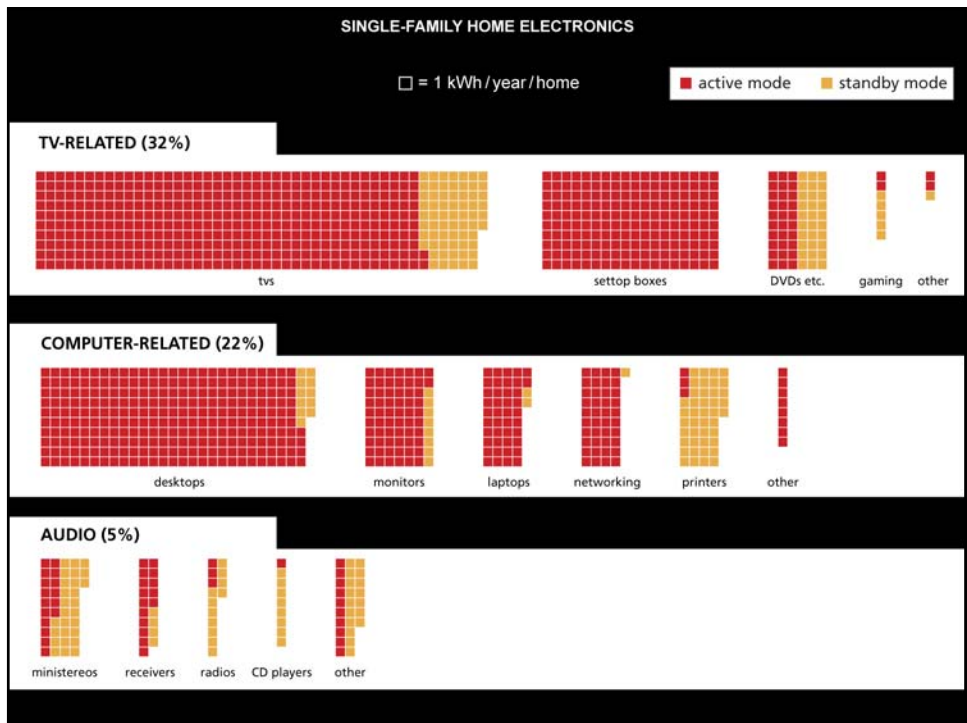
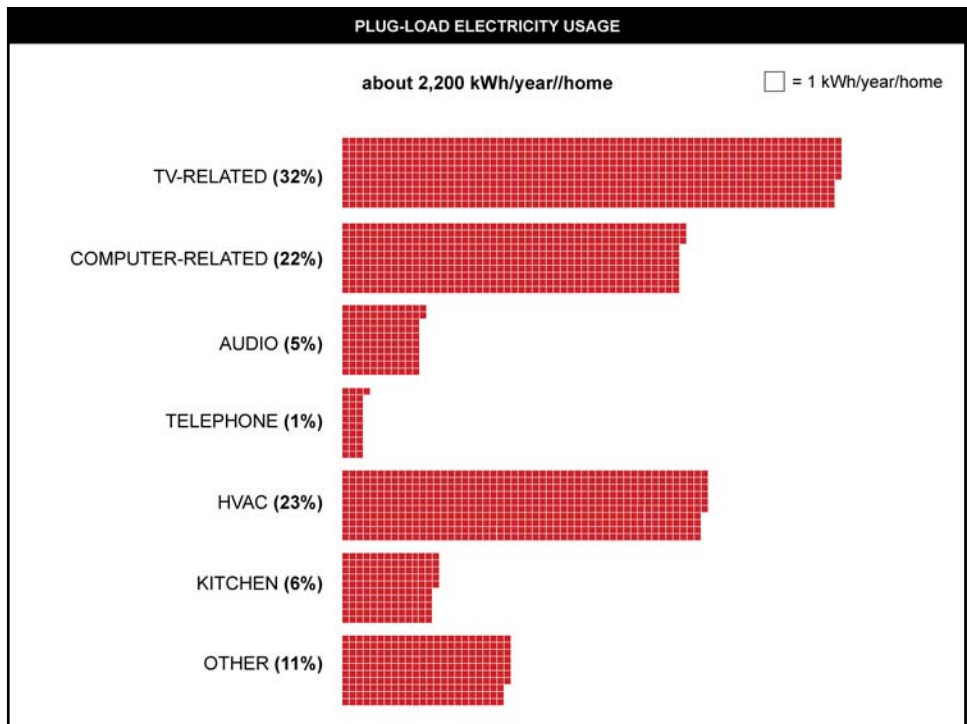
### Site Visits

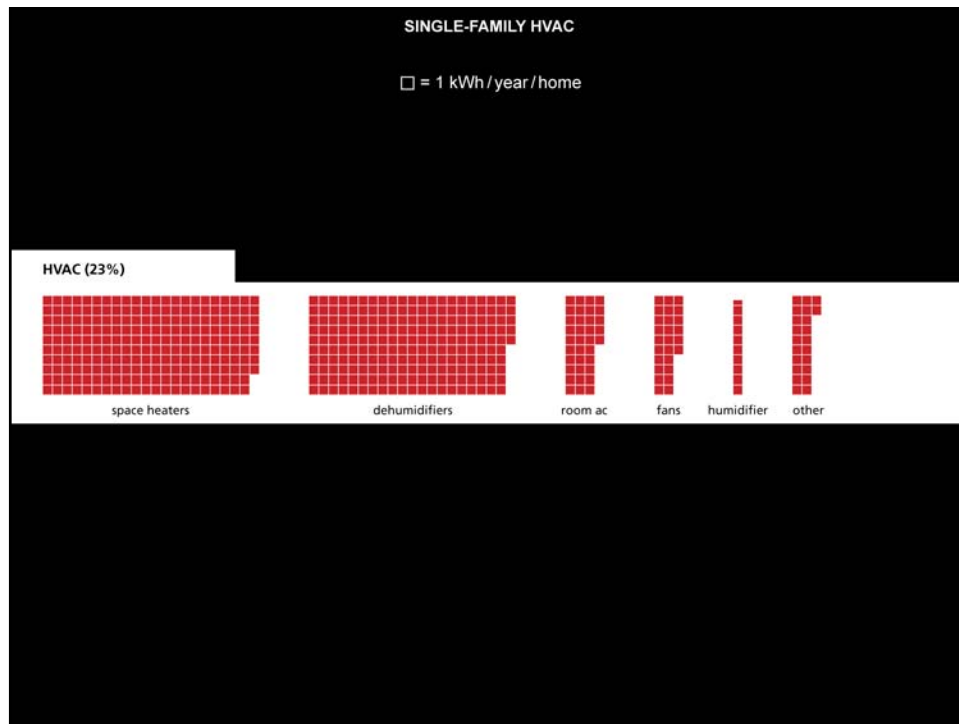
- Full inventory of devices
- Metering (5-30 devices/home, 1 mo.)
- Household interview



**We metered...705 (of 1,612)  
devices in  
50 homes...**

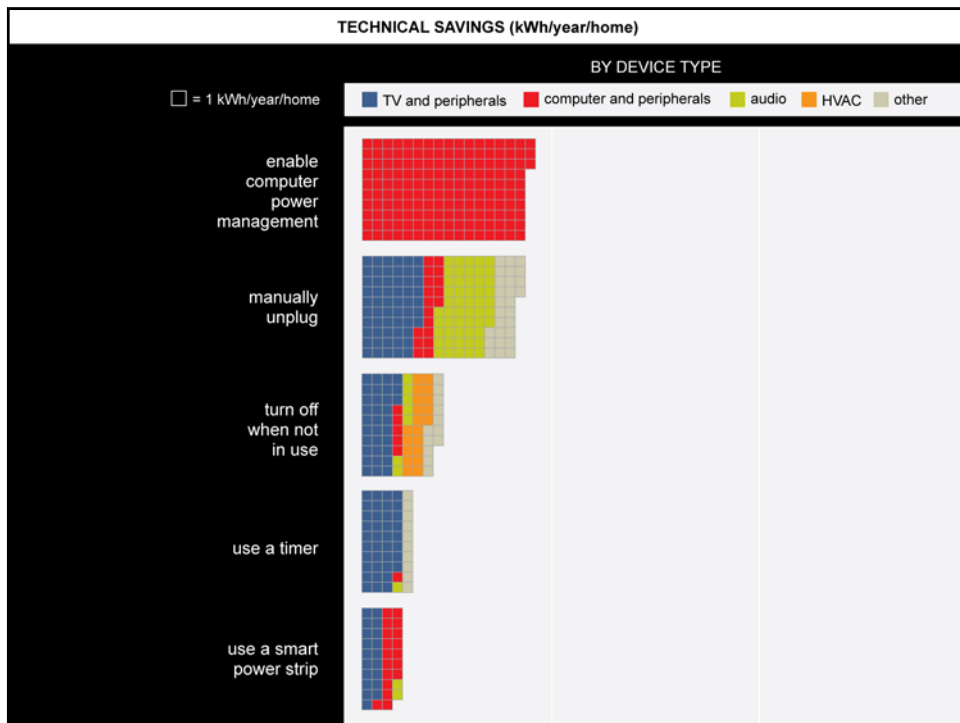
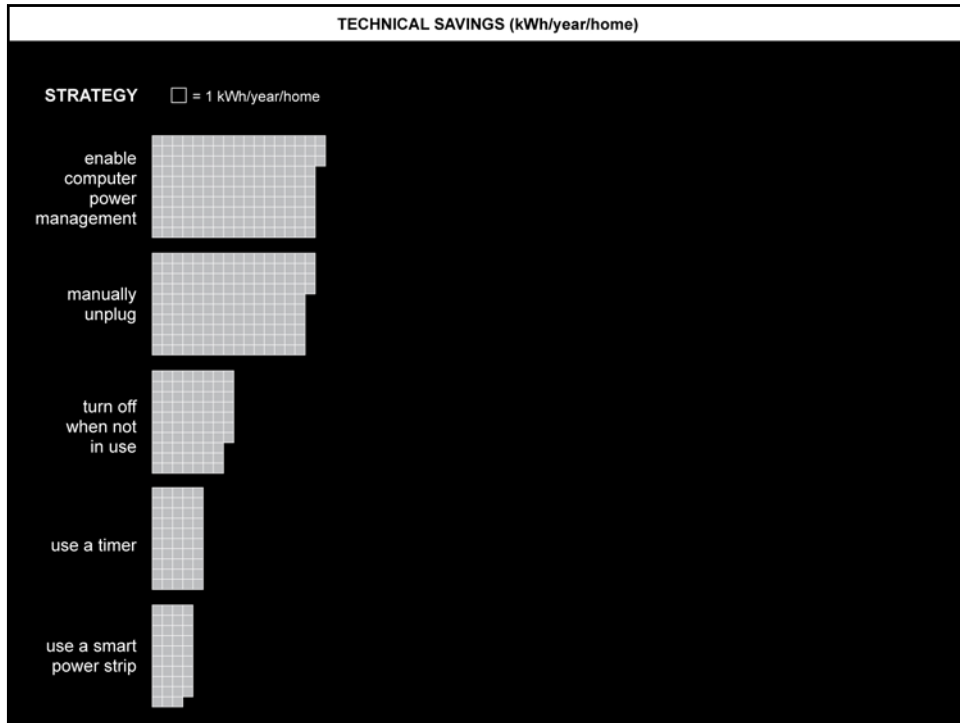
**...for one month...  
...at 6-minute  
intervals**



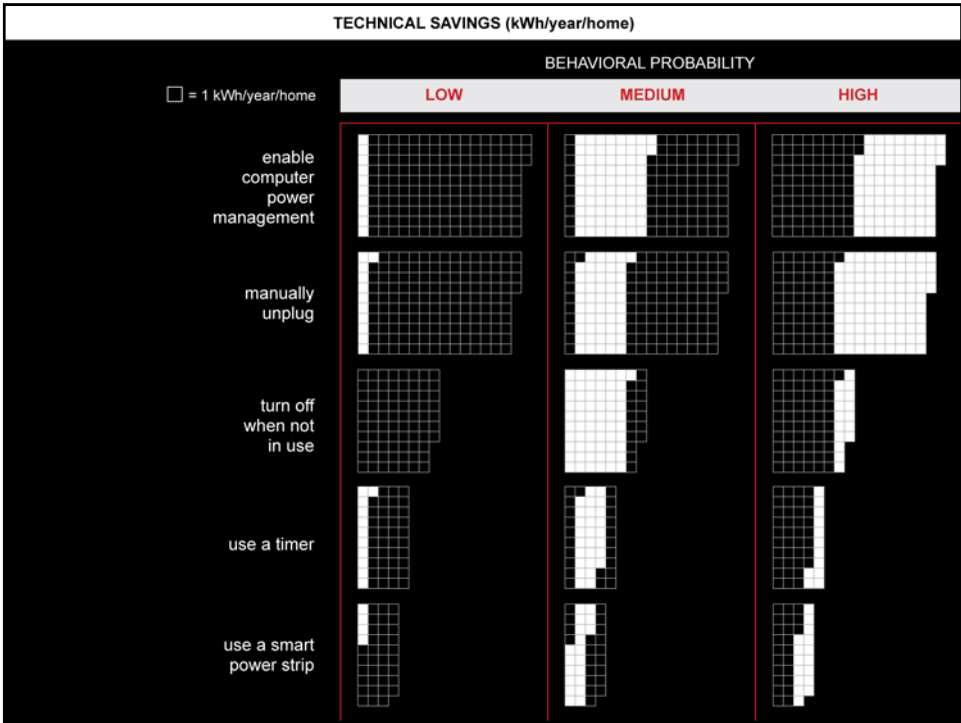


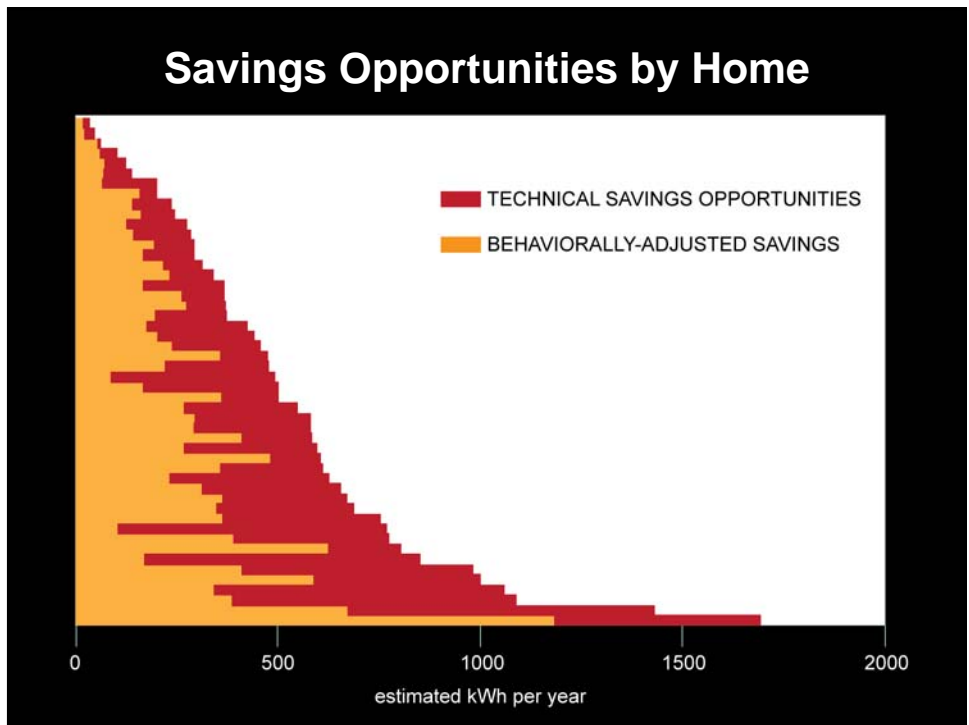
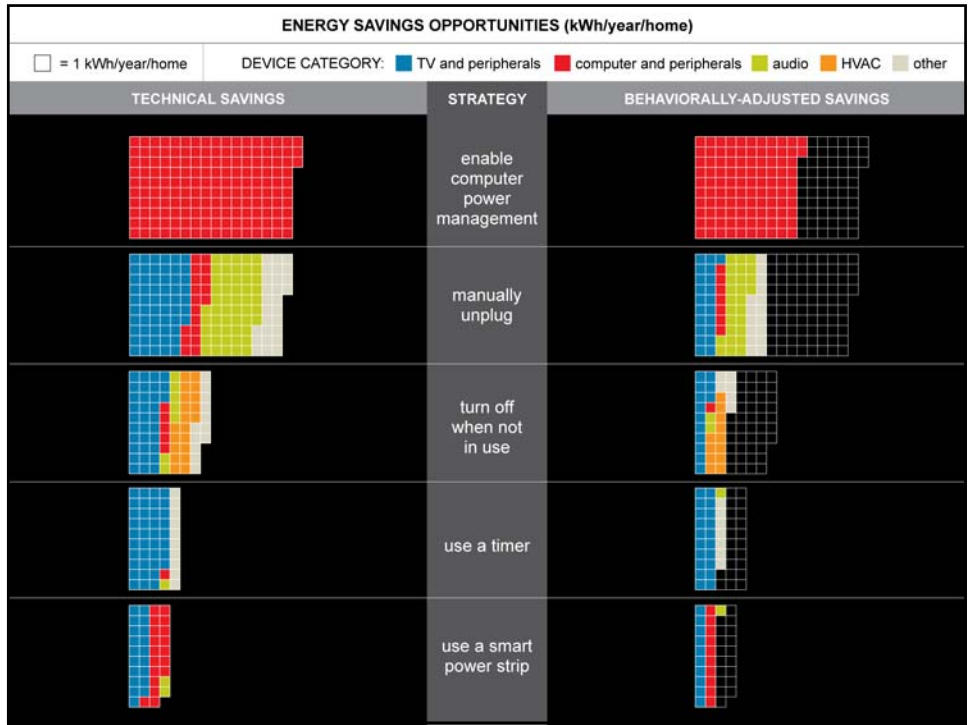
## Low/No-Cost Savings Strategies

- Considered 5 strategies
  - Enable computer power management
  - Manually unplug
  - Manually turn off
  - Use a timer
  - Use a “smart” power strip
- Looked for opportunities with 25+ kWh/yr savings

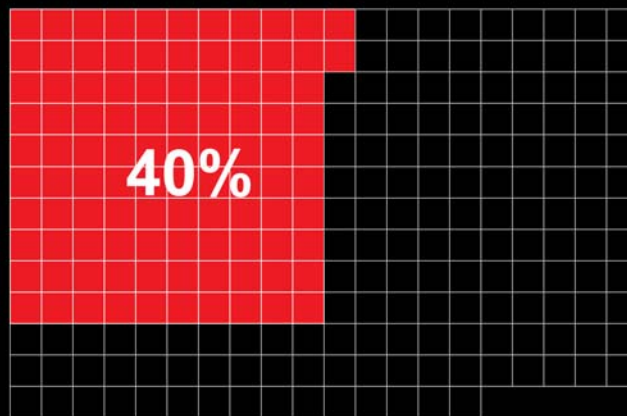


**Technical savings**  
**X**  
**Household interest (and habits)**  
**=**  
**Behaviorally-adjusted savings**





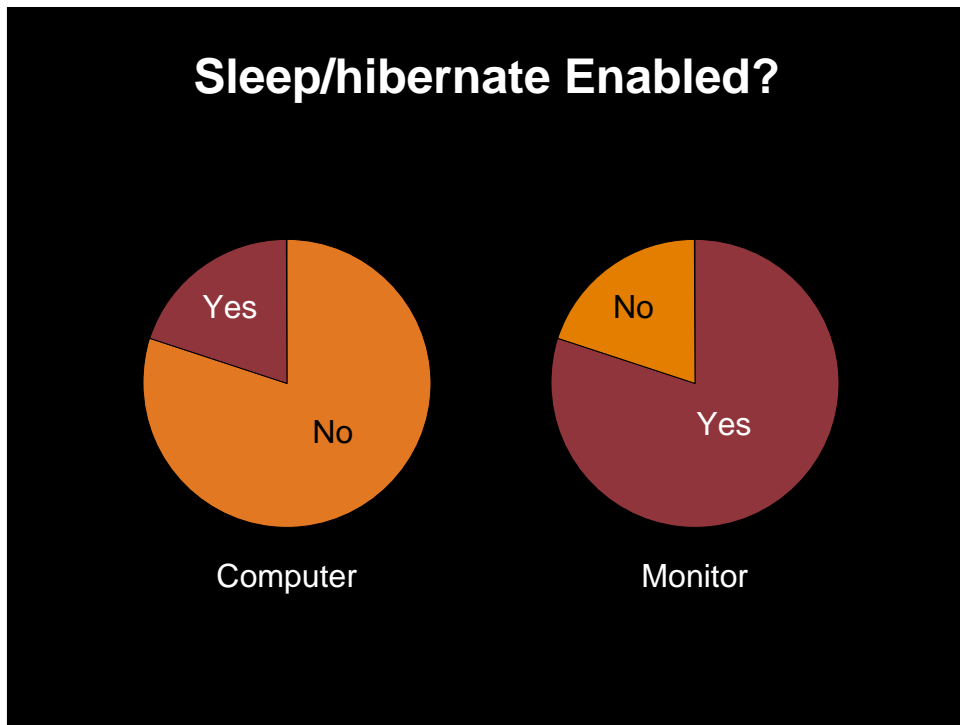
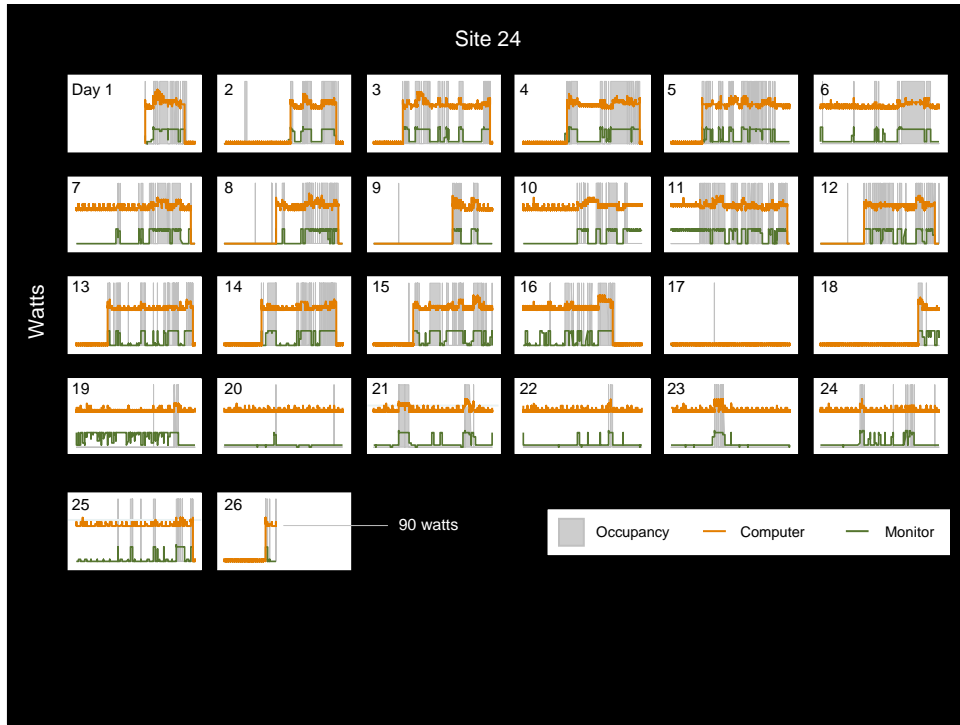
## Enable Computer Power Management



## Desktop computer use categories

- Always on (20% of computers)
- Long Idle Periods (40%)
- Off When Not in Use (25%)
- Not Used Much (15%)

(based on 42 of 47 desktop computers)



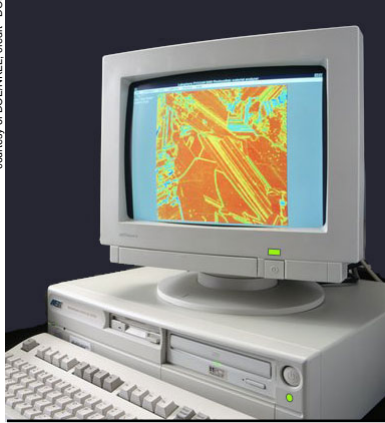
Power management enabled for monitor only

Power management enabled for monitor and computer

100w

100w

courtesy of DOE/NREL credit: DOE



Power management enabled for monitor only

Power management enabled for monitor and computer



Power management enabled for monitor only



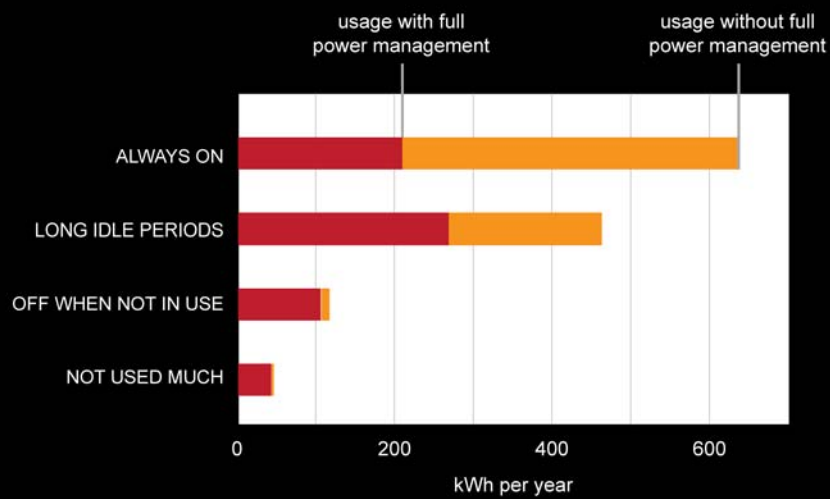
70w

Power management enabled for monitor and computer



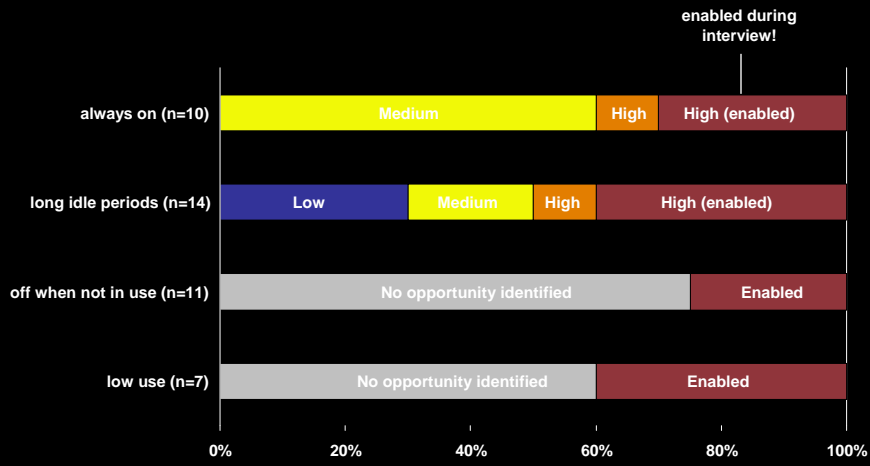
3w

## Desktop Usage and Estimated Savings

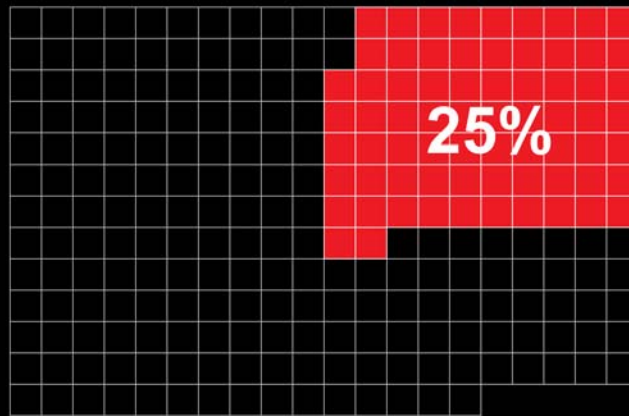


for 30-minute sleep/hibernate delay

# Willingness to implement



# Manually Unplug



## Mini Stereos

- Site 5
  - 23 watts when not in use
  - used 3x in a month for 2 hours total
  - 200 kWh/yr savings if unplugged when not in use



## Older TVs

- Site 6
  - 7 watts when turned off
  - used about 2 hours/day
  - 58 kWh/yr savings if unplugged when not in use



## Printers

- Site 31
  - 6 watts standby
  - used 5x in a month for 1 hour total
  - 43 kwh/yr savings if unplugged when not in use



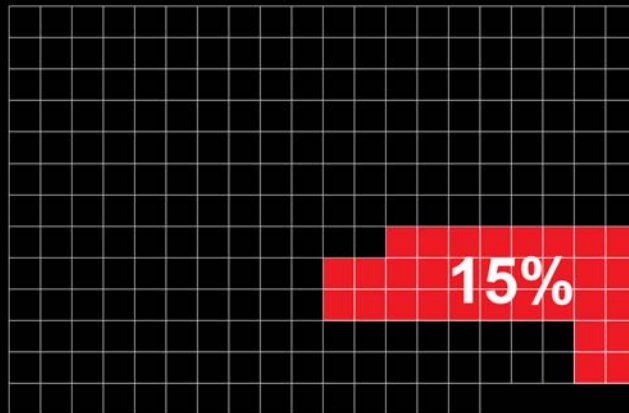
(sorry, no photo of this printer)

## Lonely TV Peripherals

- Site 7
  - DVD/VCR player
  - 7 watts when turned off
  - not used in a month
  - 59 kwh/yr savings if unplugged when not in use



## Turn Off

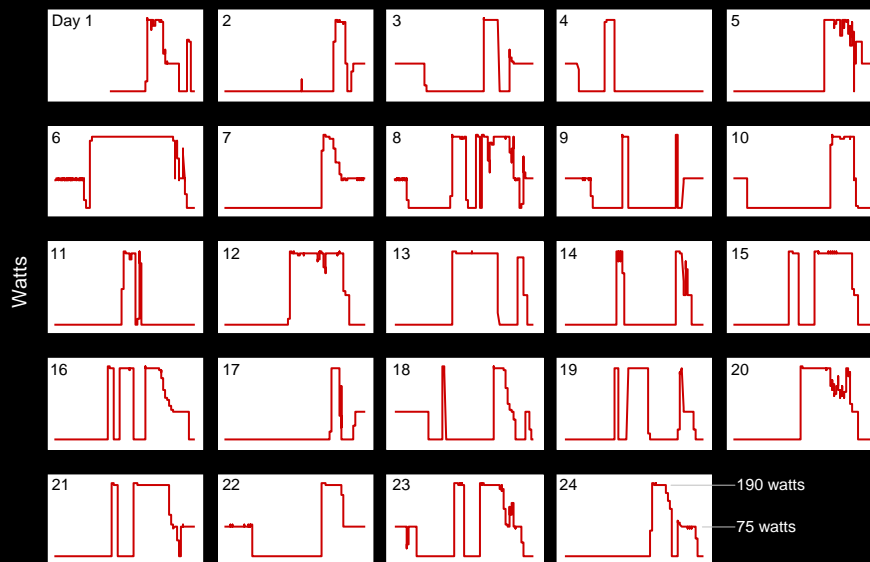


## TV routinely left on

- Site 35
  - 42" LCD TV
  - on overnight about 1/3 of the time
  - 41 kwh/yr savings if turned off from midnight to 6 am



### LCD TV with automatic brightness control (Site 35)



## Portable HVAC out of control

- Site 24
  - space heater in basement turned on by guest, and found running in late May
  - 200 kWh/month usage

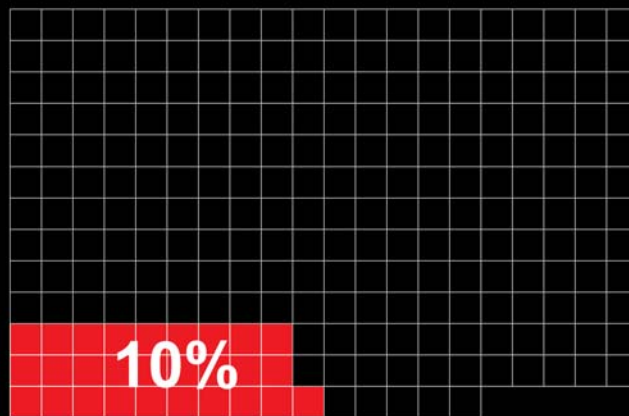


## Ad hoc “unplug” opportunities

- Site 20
  - shoe dryer left running year-round
  - uses ~700 kWh/yr



## Use a Timer



## Set-top boxes

- Site 31
  - Satellite box (no DVR)
  - TV not used between midnight and 6am
  - timer savings: 85 kWh/yr



## Use a Smart Power Strip

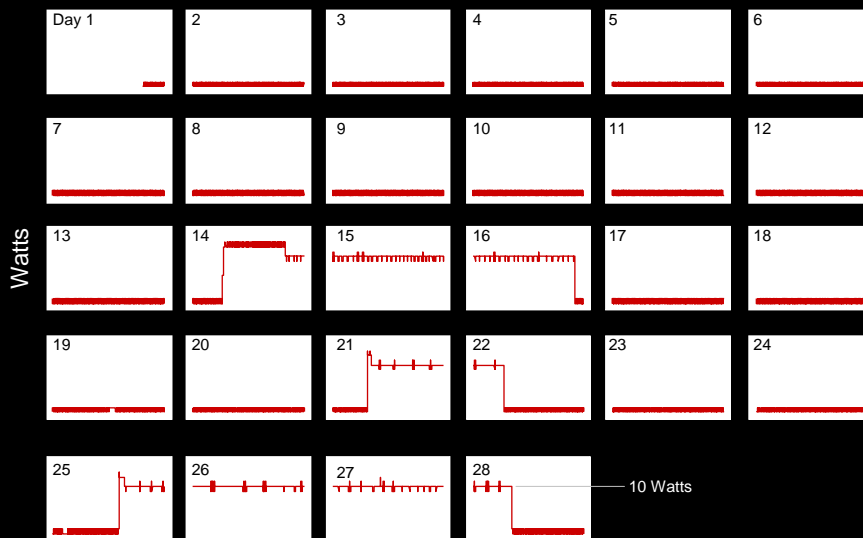














# TV Peripherals

- Site 6
  - DVD player left on several times
  - VCR also present (not used)
  - 55 kWh/yr savings



## DVD player (Site 6)



	High incidence	High savings per opp.	One-time solution	High willingness
Enable power management				
Unplug				
Turn off				
Use a timer				
Use a smart power strip				

## Program Strategies

- Common themes, but differences across opportunities
- Need to address existing barriers
- Range from low touch to high touch
- Promoting power management should be a high priority

## Power Management

*Don't know how much  
computers use*

*Not aware of feature*

*Don't know how to do*

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**Raise awareness**

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**Show how to implement**

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*Not aware of feature*

*Don't know how to do*

**Raise awareness**

**Show how to implement**

**Program Opportunity: Mass Education**

## **How we communicated about opportunities**

- **It looks like your computer uses more electricity than any other device we metered.**
- **Your computer uses half of its energy when you aren't even using it.**

\* This kind of messaging resonated across all opportunities.

## **What we did not say...**

- **You could save 20 dollars per year by turning off your computer when not using it or enabling power management.**

## Resources to help interested households

- Climate Savers Computing
- Google Gadget - Energy Saver
- Programs could build on this

(Note: Instructions vary by operating system)

## Unplug

*Don't know which devices  
make a difference*

*Hassle*

**Guidance on major culprits**

**Enable hhld detective work**

**Suggest alternatives to  
physical unplugging**

**Provide/subsidize power  
strips**

**Program Opportunity: Education plus  
providing technological aides**

## Turn off

*Don't know which devices  
make a difference*

*Habits are hard to form  
(and break)*

*Convenience*

**Guidance on major culprits** (difficult to address)

**Enable hhd detective work**      **Feedback to the motivated**

**Program Opportunity: Education plus  
providing technological aides (or appeals to  
values)**

## Timers / Smart Power Strips

*Habits are hard to form  
(and break)*

*Convenience*

*Don't know which devices  
make a difference*

*May not use effectively*

**Suggest timers and smart  
power strips as solutions**

**Guidance on major culprits**

**Usage guidance**

**Provide / subsidize**

**Program Opportunity: Providing  
technological aides plus education**

## Program Strategies Summary

- **Educate / inform**
  - focus willing hhlds on the major culprits & opportunities
  - raise awareness of power management
  - provide tips on how to do conveniently
- **Enable hhld investigation**
- **Provide technological aides**
- **Piggyback onto ongoing home visits**

## Share your feedback

- We are very interested in your feedback
- Visit the “links” icon to take a brief online survey



## Questions about plug load results?

Contact Information for Follow-up Questions:

**Scott Pigg**  
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608-238-8276 x138

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Project website: [www.ecw.org/mnenergystudy](http://www.ecw.org/mnenergystudy)



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## End of Webinar

**Thank you for joining in!**



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