The Home Energy Saver
Do-it-Yourself Survey
http://HomeEnergySaver.lbl.gov

Evan Mills - Lawrence Berkeley National Lab
Touchstone Meeting • San Antonio • May 16, 2006

Energy Efficiency Helps Utility Customers Offset Higher Prices
Highlights

• Technical
  – First web energy calculator; non-proprietary; fuel-neutral; transparent assumptions/methods; ~350 “weather” locations across the U.S.
  – Whole-house scope (and includes system interactions)
  – Uses actual electricity tariffs for many locales

• Deployment/Impact
  – Broad content offerings, in addition to calculations
  – Extensive media coverage
  – ~75% will return/recommend
  – 35% of surveyed users say they have acted on results
  – New alliance with Touchstone Energy Cooperatives

History and Uses

• Initiated development in 1996: Investment $2.3 M

• Clearinghouse for publicly-funded research, data, and consumer information

• 2.8 million visits to-date [60 million “hits”] (about 300 visits during the course of this talk!)
  – We have users from every state
  – 91% are homeowners or renters
  – Contractors, students, analysts as well….
Walkthrough

Simple Input Level Has Only ~12 Questions
User Gets First-tier Answers Rapidly

Ranked Retrofit Recommendations
Printable “Retrofit Report”
measure x measure

Ducts

<table>
<thead>
<tr>
<th>Economic Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating Annual Savings: $417</td>
</tr>
<tr>
<td>Estimated HVAC Energy Cost Savings: $2590</td>
</tr>
<tr>
<td>Return on Investment: 8%</td>
</tr>
<tr>
<td>Estimated time for ROI: 7 years</td>
</tr>
</tbody>
</table>

**Additional Benefits:** Sealing ducts can help improve comfort and avoid indoor air pollution problems, fire hazard, and moisture condensation during winter.

**Upgrade Description:** Have your ducts professionally sealed so that the duct leakage is not more than 15% (15% of your total home energy used). The average forced-air duct system leaks about 30% of the energy produced by the furnace or air conditioner in the course of distributing it to the rooms. This energy leak can be reduced by sealing duct joints with metal or high-quality duct tape, and insulating ducts in unconditioned spaces.

**Purchasing Tips:**
- To get the most out of air sealing, you’ll likely have to hire a certified professional.
- Use high-quality duct sealing materials, such as ZIPvent 
- Be sure to seal all ducts, not just those labeled for highflow duct systems.
- Make sure you hire a duct professional to do this well, so that you can see how much improvement has been made. See the ENERGY STAR specification for Ducts to see how to further improve your sealing.

**More Information:**
- [ENERGY STAR Duct Sealing Recommendations](https://www.energystar.gov)
- [American Council for an Energy Efficient Economy](https://www.aceee.org)
- [Energy Stardirect](https://www.energystar.gov)
- [Duct Sealing: The Long-Term Benefits of Sealed Ductwork](https://www.energystar.gov)
- [Duct Sealing: The Long-Term Benefits of Sealed Ductwork](https://www.energystar.gov)

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Detailed Results Available as Well

**Home Energy Saver**

**Making It Happen**

**Appliance and Water Heating Consumption**

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Energy per Year (kWh)</th>
<th>Cost per Year</th>
<th>Water Use (gal/day)</th>
<th>Energy per Year (gal/day)</th>
<th>Cost per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><em><strong>First Refrigerator</strong></em></td>
<td>851</td>
<td>$ 211</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td><em><strong>Stove</strong></em></td>
<td>33 thermes</td>
<td>$ 27</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td><em><strong>Oven</strong></em></td>
<td>210 VOM</td>
<td>$ 50</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td><em><strong>Clothes Dryer</strong></em></td>
<td>1456 VOM</td>
<td>$ 350</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td><em><strong>Clotheswasher</strong></em></td>
<td>981</td>
<td>$ 24</td>
<td>83 thermes</td>
<td>$ 83</td>
<td></td>
</tr>
<tr>
<td><em><strong>Dishwasher</strong></em></td>
<td>162</td>
<td>$ 40</td>
<td>6</td>
<td>24 thermes</td>
<td>$ 60</td>
</tr>
<tr>
<td><em><strong>Hot Water Tanks &amp; Faucets</strong></em></td>
<td>none</td>
<td>none</td>
<td>56</td>
<td>320 thermes</td>
<td>$ 181</td>
</tr>
</tbody>
</table>

**Total:**

- **Energy per Year:** 28,132 kWh & 33 thermes
- **Water Use:** 920 gallons & 326 thermes
- **Cost per Year:** $ 268 & $ 511

Appliance energy is the energy used by motors, heating elements, and burners inside your appliances. This number excludes the energy consumed by your water heater to supply hot water for appliances such as clothes washers and dishwashers.
Energy, Costs, Emissions

Home can be defined in great detail, if user wishes (inputs optional)
Many wall construction options

Lighting: two levels of detail

Lighting

Option 1: Based on the information you supply about the number of lighting fixtures, we can estimate the energy used by lights. This estimate will be based on typical hours of use and wattage from a study that measured lighting in homes.

Option 2: If you prefer, you can provide the exact wattage and average hours of use per day for each fixture. This information will then be used to calculate lighting energy use. It will probably take you a few minutes to collect the wattage for each fixture.

How many light fixtures do you have in the following rooms (include portable (plug-in) lamps)? Note: Multiple lights on a single circuit (switch) count as one fixture.
Extensive Coverage of “Misc.” Uses

<table>
<thead>
<tr>
<th>Home Office</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Please enter detail if you own the following appliances.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whenever there is more than one of a particular item, enter the average per unit usage for all units in the house.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do not select more than 24 hours in a day.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Computer CPU | One used 5 Hours per Day |  |  |
| Computer Monitor | One used 5 Hours per Day |  |  |
| Laptop/Computer Charger | None used 0 Minutes per Day |  | (Time should indicate time that laptop is plugged into the charger.) |
| Laser Printer | None used 1 Hours per Week |  | (Time should indicate time printer is actively printing.) |
| Inkjet Printer | One used 1 Hours per Week |  | (Time should indicate time printer is actively printing.) |
| Router/OBS/Cable Modem | One used 5 Hours per Day |  |  |
| Thermal Fan Machine | None used 4 Minutes per Day |  | Energy Star? Yes No |
| Inflatable Fan Machine | None used 4 Minutes per Day |  |  |
| Home Copy Machine | None used |  |  |
| Time Copying | 30 Minutes per Day |  |  |
| Time Left On but Idle | 0 Hours per Day |  |  |

Unique Tariff Module [~300 utilities]
(Tariff database funded by BT-Standards)
Calc’s Complemented with Extensive Decision-support Content

The Home Energy Librarian

- Newsletters, and Discussion Groups
- Product Information
- General Information
- Home Building
- State-by-State List of of Energy Savings Programs & Other Information

- Residential Energy Software
- Non-Profit and State Energy Resources
- Construction Standards
- Home Energy Rating Systems and Financing

Answer Desk

Support a Link

Financing

- Financing with Energy-Efficient Mortgages
- Details about Energy-Efficient Mortgages
- How to get Energy-Efficient Mortgages
- Home Energy Savings
- Mortgage Options
- Financing Resources
- Home Energy Software
- Utility Programs
- Energy-Rated Mortgage Links

NEXT STEP: Examples

Making It Happen

Cost Savings with an Energy-Efficient Mortgage

Compare the monthly housing costs of a remodeling EEM against those of a standard loan, both secured through the Federal Housing Authority.

Happily Ever After: Cash and Comfort

Mike and Debbie Smith decided to fix up the house they had been renting for five years. They added $3,250 onto their base mortgage to cover weatherization and other energy improvements.
EEER Information Center

The EEER Information Center answers questions on EEER's products, services, and its technology programs, refers callers to the most appropriate EEER resources, and refers qualified callers to the appropriate expert networks. Technical and programmatic information for the residential, commercial, institutional, industrial and transportation sectors is also immediately available through the EEER Web site.

Other ways to find the information you need include:
- Visiting the EEER Online Catalog
- Visiting the EEER Guide to Energy Efficiency and Renewable Energy Web site
- Searching EEER's Web site for prime resources
- Reviewing EEER's Technical Information, Tools and Publications

You may contact the EEER Information Center with questions on EEER's products, services, and its technology programs by calling 1-877-EEER-INF (1-877-337-3463) or by completing and submitting the form below. A customer service specialist or energy expert at the EEER Information Center will respond to your inquiry.

Fields with asterisks are required. Please note that we are only able to respond to inquiries from the United States.

```
First Name*: 
Last Name*: 
Title: 
Organization: 
Address 1*: 
Address 2: 
City*: 
State*: 
Zip Code: 
Phone: 
Fax: 
E-mail*: 
Professional*: Private Citizen/Nonbusiness/Consumer
Please input your question*:
```

Glossary of Energy Terminology

- Heating, Ventilation and Cooling Terminology
- Building Terminology
- Window Efficiency Terminology
- Water Heater Terminology
- Lighting Terminology

Heating, Ventilation and Cooling Terminology

- System Capacity
  - System capacity is a measurement of the total amount of heat or cooling your furnace, heat pump or air conditioner can produce in an hour.
  - Btu: short for British Thermal Unit is a unit of heat energy. One Btu is the amount of heat needed to raise the temperature of one pound of water 1°F. To get a rough idea of how much heat energy this is, the heat given off by burning one wooden kitchen match is approximately one Btu.
  - ARI: The ARI, or Annualized Fuel Utilization Efficiency, is the ratio of the total useful heat your gas furnace delivers to your house to the total value of the fuel it consumes. Click here to see a more complete description of ARI.

Heat Pumps

A heat pump is basically an air conditioner with a reversible valve that allows it to operate in reverse, removing heat from your house and supplying it outdoors in the summer, and removing heat from outdoor air and delivering it into your house in the winter. Because heat pumps do not simply create heat, they don't increase the total amount of heat in your home.
The Home Energy Saver Answer Desk

General

1. What is the typical energy use of household appliances?
2. What is the most common mistake people make in trying to save energy around the house?
3. We don't own a home; we rent an apartment. What can we do?
4. We have an older home. Should we do first insulate or replace the furnace?
5. My neighbor's bills are much lower than mine, even though we have children, and are home more than we are. Why are my bills so high?
6. What's the single biggest use of electricity in my home?
7. I'm trying to find an estimate of the expected savings of an ENERGY STAR New Home (NSF) Better than Model Energy Code versus an "average" existing home. If our estimates seem to be oriented towards retrofitting Energy Star equipment, as was clear once I got into the details. Have you also done, or do you have a reference on the savings with the Energy Star new home? That would presumably come out somewhat better than the full retrofit case.
8. How about energy savings in my car?
9. What are the benefits of energy efficiency besides saving energy?

Heating, Ventilation and Air Conditioning

1. How much energy can I save by using fans instead of my air conditioner?
2. Should I use portable room heaters to lower my energy bills?
3. What information can you give me on all-electric heat pumps for the home?
4. Does it pay to put a large duct from the outside of the house to the furnace to provide outside air for combustion? Contractors provided a passive supply of air along with the installation of our new furnace in St. Paul, Minnesota, and we are wondering if it is worthwhile with a Shroyer old furnace in Mascoutah, Illinois.
5. How can I tell if the contractor who is putting in a new furnace is gouging me on the price?
6. We have been very unhappy with our current heat pump and are wondering whether to install a new one or convert to natural gas. What factors should we consider?
7. I shut off my heater or air conditioner when I'm gone from the house, doesn't it cost more to heat or cool the house back to the right temperature when I come home?
Users
(feedback form respondents)

Non-household examples:
- Research
- Forecasting
- Air–Force: Housing developers required to document performance using HES
- Insulation Manufacturers: customer/contractor tools
- High Schools & Colleges: Energized Learning
- Utilities: customer service (linked or integrated into websites)

Accolades

- Yahoo!
- PC Magazine
- National Rural Electric Cooperative Association
- Lycos
- Medal of Or
- White House Innovation Council
  Energy 100
- Top 10 30 Days on the Internet
  Top Energy Sites
- Energy Savings Golden Excellence Award
**Local Papers (32+ states)** (partial list)

<table>
<thead>
<tr>
<th>State</th>
<th>Newspaper</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR</td>
<td>Searcy Daily Citizen</td>
</tr>
<tr>
<td>CA</td>
<td>Gilroy Dispatch</td>
</tr>
<tr>
<td>CO</td>
<td>Denver Rocky Mountain News</td>
</tr>
<tr>
<td>DC</td>
<td>Washington Post</td>
</tr>
<tr>
<td>DE</td>
<td>The News Journal</td>
</tr>
<tr>
<td>FL</td>
<td>Miami Herald</td>
</tr>
<tr>
<td>GA</td>
<td>Gainesville Times</td>
</tr>
<tr>
<td>IA</td>
<td>Quad-City Times</td>
</tr>
<tr>
<td>ID</td>
<td>Boise Weekly</td>
</tr>
<tr>
<td>IL</td>
<td>Chicago Sun Times</td>
</tr>
<tr>
<td>IN</td>
<td>Fort Wayne Journal Gazette</td>
</tr>
<tr>
<td>KY</td>
<td>Courier-Journal</td>
</tr>
<tr>
<td>MA</td>
<td>The Herald News</td>
</tr>
<tr>
<td>MD</td>
<td>Baltimore Sun</td>
</tr>
<tr>
<td>MN</td>
<td>Minneapolis Star Tribune</td>
</tr>
<tr>
<td>MI</td>
<td>Ann Arbor News</td>
</tr>
<tr>
<td>MO</td>
<td>St. Louis Post-Dispatch</td>
</tr>
<tr>
<td>MS</td>
<td>Daily Mississippian</td>
</tr>
<tr>
<td>MT</td>
<td>The Missoulian</td>
</tr>
<tr>
<td>NJ</td>
<td>Bergen Journal</td>
</tr>
<tr>
<td>NY</td>
<td>The Times Union</td>
</tr>
<tr>
<td>OH</td>
<td>Mount Vernon News</td>
</tr>
<tr>
<td>OR</td>
<td>The Register-Guard</td>
</tr>
<tr>
<td>PA</td>
<td>The Philadelphia Inquirer</td>
</tr>
<tr>
<td>SC</td>
<td>The State</td>
</tr>
<tr>
<td>TX</td>
<td>The Eagle</td>
</tr>
<tr>
<td>VA</td>
<td>Richmond Times-Dispatch</td>
</tr>
<tr>
<td>WI</td>
<td>Oshkosh N’western</td>
</tr>
<tr>
<td>WA</td>
<td>The Yakima Herald Republic</td>
</tr>
</tbody>
</table>
User Feedback

Ongoing e-survey with 3372 responses thus far:

- **Users** in every state (8% CA, 6% TX, 5% NY, 5% FL)
- **Return Visits**: 18% of users (45% of contractors)
- **Navigation**: 89% say “OK” to “very easy”
- **Required Input**: 84% “Just Right” or “Too Simple”
- **Content vs Calcs**: Equally important!
- **Will Return**: 72% “yes”; 22% “undecided”
- **Will Recommend**: 74% “yes”; 17% “undecided”
- **Implemented Efficiency Improvement based on site**:
  - 33% (owners); 29% (renters)
  - 71% and 60% of the upgrades were for equipment as opposed to behavior changes

Log Analysis

(excludes development team, robots, etc.)

- Median time on site: 19 minutes [minimum info 10 seconds; preliminary “run” 1 minute]
- Median number of pages viewed per session: 11
- Wide use of various end-use modules
- Flat content is broadly visited
- 80% of users do “simple” runs; 20% “detailed”
- 80 pages (!) of free-form comments
  [indicative of a very engaged user community]
“The Home Energy Saver is one of the government services that make paying taxes worthwhile.”

Nick Wilder
Homeowner
Wheat Ridge, Colorado

Early Co-op Adopters

- Clay-Union (SD)
- Polk-Burnett (WI)
- Jackson Electric (WI)
- Rappahannock Elec (VA)
- Community Energy (IL)
- Douglas Electric (OR)
- Hancock-Wood (OH)
- Iowa Lakes (IA)
- Red River Valley (MN)
- Ravalli Electric (MT)
- Pennyrille (TN)
Potential Collaboration with Touchstone/NRECA

1. Localize the tool (e.g. utility-specific tariffs for rural energy cooperatives; farm equipment; etc.)
2. New features (e.g. farm equipment; evaporative coolers....)
3. Information streams; decision-support
4. Training for co-op “help desk” staff; local home improvement contractors
5. Your ideas?

http://HomeEnergySaver.lbl.gov

Thank You

EMills@lbl.gov