The Home Energy Saver
Web-based Energy Audit Tools & Services

Home Energy Saver - Consumer

Home Energy Saver - Pro

Home Energy Scoring Tool

Evan Mills, Ph.D. • Lawrence Berkeley National Laboratory
Lawrence Berkeley National Lab

- National Lab of the U.S. Dep’t of Energy
- Founded 1931
- Managed by and located next to U.C. Berkeley
- ~500 people working on energy efficiency
“The Home Energy Saver is one of the government services that make paying taxes worthwhile.”

Nick Wilder
Homeowner
Wheat Ridge, Colorado
Home Energy Saver Mission

- Empower users to apply state-of-the-art research & know-how to reduce home energy use and greenhouse-gas emissions
- Offer an experience tailored to the individual user
- Serve diverse user communities and building types
- Define and remain on cutting edge of web tool technology
- Ensure objectivity, accuracy, transparency
- Partner with the private sector for deployment
The Home Energy Saver:

• Collects and stores home-description information.
• Computes a home’s energy use, cost, and carbon footprint on-line in a matter of seconds based on state-of-the-art models and data for any location in the United States.
• Estimates the relative importance of specific end uses (heating, cooling, water heating, major appliances, small appliances, and lighting).
• Generates a list of payback-ranked energy-saving upgrade recommendations.
• Transparently documented – no “black boxes”
• Provides extensive decision-support information to help users implement the recommendations.
Key Milestones

- HES Consumer tool founded in 1994 by Evan Mills
- Home Professional tool (HESPro) launched in 2009
- Launched asset-rating tool (Home Energy Scoring Tool) in 2010
- Partnership with the National Association of Rural Electric Cooperatives (NRECA) / Touchstone adopted HES as the official calculator for their ~30 million customers
- Licensing engine to third-party software developers (starting in 2009 with Microsoft)
- R&D100 award in 2010
- Launched Social Network for home performance pros in 2010
- Expansion to multifamily and Weatherization Assistance Program applications: 2010-2013
Value of HES

• **Free:** to all users
• **High impact:** 1/3 of surveyed users say they are implementing HES recommendations
• **Best tool out there:** especially for operational analysis and customizability to individual user conditions
• **Non-proprietary:** LBNL/DOE has no commercial interest - neutral, unbiased
• **Very cost-effective:** ~$0.10 per user visit to just maintain the tool (excluding new features).
• **Huge audience:** 1 million visits per year to all the websites; 600 other websites link to it.
• **Systematically reaches diversity of users:** Consumer - Pro - Score each serve different and complimentary audiences and market-enabling purposes
• **Effective tech-transfer conduit for DOE/EERE:** official, vetted methods and data
• **Enables private sector tool developers to innovate:** they can license for a small fraction of cost it would involve to build their own (e.g. to Microsoft)
• **DOE has control:** over development priorities, content, whereas private sector tools are uncontrollable
• **Transparency:** assumptions, methods extensively documented on public wiki
• **The tools are "interoperable":** i.e., session information can be migrated from one to another --> internal consistency
• **Powering WAP audits:** New collaboration with ORNL will greatly improve their existing tools, and extend analysis to multifamily buildings.
• **Hosts leading social media sites:** Home Energy Pros is #1 home performance social network
• **Frequent source of media coverage for DOE:** see [http://hes.lbl.gov/consumer/media-coverage](http://hes.lbl.gov/consumer/media-coverage)
• **Longevity:** We will likely be around longer than any given private company (already 16 years).
Sponsors: DOE <ARRA>, EPA, CEC, HUD, CARB, Touchstone

1. First and most advanced home energy/carbon web calculator
2. Leverages tens of millions of dollars in federally-funded energy efficiency R&D to make results usable by the public (researchers use it as well)
3. Comprehensive analysis; Whole-house scope (incl. interactions)
4. DOE-2 for HVAC; RECS data for benchmarking; water heating methodology from appliance standards analysis; actual tariffs; data for other sectors developed at LBNL and elsewhere
5. Technological and behavioral variables can be set by user
6. Broad decision-support offerings (e.g. DOE tip sheets, Energy Star appliances lists, Home Energy magazine articles, Social Media)
7. Growing demand from private sector for web services that can be used to build derivative websites. Licensed to Microsoft.
8. 6 million visits (>100 million hits); ~1 million/year [211 countries/territories]
9. Users from every state; 91% are homeowners or renters
10. 35% of surveyed users say implement some recommendations
Team

Founder and Project Leader - Evan Mills

CORE TEAM
Chief Engineer - Rich Brown
Senior Engineer - Norm Bourassa
Senior Engineer - Leo Rainer
Usability - Kath Straub
Research and User Support - Greg Homan
User Interface Programming - Sondra Jarvis and Vinit Jain
Graphic design and art direction - Anthony Ma, Eyespeak, and Karen Lee
Project manager - Chris Havstad

CONTRIBUTORS

Modeling
Heating/cooling simulation - Jeff Warner
Miscellaneous equipment - Marla Sanchez
Water heating - Jim Lutz
Ducts - Iain Walker
Electricity tariffs - Chris Bolduc, Richard White, Katie Coughlin

Data
Weather data - Joe Huang, Steve Konopacki, Robin Mitchell
Zip-code-to-weather-tape correlation - Jessa Cohen
Market research - Mithra Moezzi, Celina Atkinson
Utility tariffs - Hongjie Qu
Carbon emissions factors - Jon Koomen
Appliances - Peter Bliermayer, Judy Lai
Infiltration - Nancy Matson
Product characteristics - Celina Atkinson

Outreach
Social Media - Diane Chojnowski
Education - Rolland Otto, Mai Sue Chang, Eli Marienthal

IT and Software Engineering
Web application programming - Bighead Technologies

Testing
Infosys
uTest.com
35% of surveyed users say they have implemented energy-efficiency improvements based on results.
Daily Visits To Home Energy Saver Web Site:
July 2002 - April 2009

- Consumer Reports
- Kiplingers, Miami Herald, CNN Money
- Wall St Journal
- Earthlink E-News, LA Times, CNN Money
- Today Show
- NY Times, Yahoo! Green
- MSN Money
- Business Week

90-day moving average
Ultra-low Investment per Visit

Cumulative HES Investment
(~$0.50 per visit)

O&M
(~$0.10 per visit)

Highly cost-effective: O&M cost is < 0.3¢/kWh-% savings...
... compared with ~10 ¢/kWh electricity purchase price
## Resulting Actions to Save Energy

(N=8,284 responses as of 8/25/2008)

<table>
<thead>
<tr>
<th>Action Description</th>
<th>Home Owners</th>
<th>Renters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Took action to save energy based on experience at the site</td>
<td>33%</td>
<td>27%</td>
</tr>
<tr>
<td>of which: behavioral</td>
<td>29%</td>
<td>43%</td>
</tr>
<tr>
<td>of which: equipment</td>
<td>26%</td>
<td>56%</td>
</tr>
<tr>
<td>of which: both</td>
<td>46%</td>
<td>52%</td>
</tr>
<tr>
<td>Other actions (e.g. professional energy audit, called contractor, did more research)</td>
<td>14 % points</td>
<td>8 % points</td>
</tr>
</tbody>
</table>
User Feedback

Ongoing e-survey with 8300 responses thus far

• **Users** in *every* state (8% CA, 6% TX, 5% NY, 5% FL)
• **Return Visits**: 18% of users (~50% of non-households)
• **Navigation**: 87% say “OK” to “very easy”
• **Required Input**: 83% “Just Right” or “Too Simple”
• **Content vs Calculations**: Equally important!
• **Will Return**: 72% “yes”; 21% “undecided”
• **Will Recommend**: 73% “yes”; 18% “undecided”
• **Implemented Efficiency Improvement based on site**:
  – 33% (owners); 27% (renters)
    • 70% and 58% of the upgrades were for equipment as opposed to behavior changes
Extensive Media Coverage

Money
CNN
Business Week
Better Homes and Gardens
WOMAN'S WORLD
Living
Business Week
UTNE Reader
NATIONAL GEOGRAPHIC
The Wall Street Journal
The Washington Post
The New York Times
MSNBC
PBS
CBS NEWS
Los Angeles Times

The Makeover Issue!
NO-HUNGER shake!
Men's Health
New Green Building
Synthetic decking choices
Allav: Eyes of world on Iraq
USA Today
BOLD
Dinner party muffins
December cookie exchange
How to get a great job
In iPod America
High Tech
China
Is it a threat to Silicon Valley?

PAYING FOR COLLEGE
CAREFUL!
Your phone is watching you

Kiplinger's
HOME PRICES
IS YOURS SAFE?

Consumer Reports
Brand-name Ratings
How to go
Product Guide
Comparison

10016

PEN Makers' info

Dinner party muffins

December cookie exchange

How to get a great job

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How to get a great job

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China

Is it a threat to Silicon Valley?
<table>
<thead>
<tr>
<th>Energy Companies Linking</th>
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</thead>
<tbody>
<tr>
<td>(partial list)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Alameda Power</td>
</tr>
<tr>
<td>Allegheny Power</td>
</tr>
<tr>
<td>Alliant Energy</td>
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<tr>
<td>American Petroleum Inst.</td>
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<tr>
<td>American Public Power Assoc</td>
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<tr>
<td>Bluestem Electric Coop (KS)</td>
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<tr>
<td>British Petroleum</td>
</tr>
<tr>
<td>Central Electric Cooperative (PA)</td>
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<tr>
<td>Central Maine Power (ME)</td>
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<tr>
<td>Central Vermont Public Service Corporation (VT)</td>
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<tr>
<td>Columbia Gas (OH)</td>
</tr>
<tr>
<td>Commonwealth Edison (IL)</td>
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<tr>
<td>Connecticut Light and Power (CT)</td>
</tr>
<tr>
<td>Consumers Energy (IA)</td>
</tr>
<tr>
<td>Detroit Edison (MI)</td>
</tr>
<tr>
<td>Dominion Resources /Virginia Power</td>
</tr>
<tr>
<td>Douglas Electric Cooperative (OR)</td>
</tr>
<tr>
<td>Duke Power (NC, SC)</td>
</tr>
<tr>
<td>United Electric Cooperative, Inc.</td>
</tr>
<tr>
<td>First Energy</td>
</tr>
<tr>
<td>Florida Power and Light</td>
</tr>
<tr>
<td>Idaho Power Newsletter (ID)</td>
</tr>
<tr>
<td>Iowa Association of Municipal Utilities</td>
</tr>
<tr>
<td>Moorhead Public Service Co.</td>
</tr>
<tr>
<td>Muscatine Power &amp; Water</td>
</tr>
<tr>
<td>National Rural Electrical Cooperative Association</td>
</tr>
<tr>
<td>Nevada Power (NV)</td>
</tr>
<tr>
<td>PG&amp;E (CA)</td>
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<tr>
<td>Pennyrile Rural Electric Cooperative (KY)</td>
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<tr>
<td>Phillips Petroleum</td>
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<tr>
<td>Progress Energy</td>
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<tr>
<td>Public Service Co. of New Hampshire (NH)</td>
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<tr>
<td>Rochester Public Utilities (NY)</td>
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<tr>
<td>Seattle City Light (WA)</td>
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<tr>
<td>S. Minnesota Municipal Power Authority (MN)</td>
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<tr>
<td>Tallahassee Electric Operations Department (FL)</td>
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<tr>
<td>Tideland EMC</td>
</tr>
<tr>
<td>Toledo Edison (OH)</td>
</tr>
<tr>
<td>Turlock Irrigation Dist. (CA)</td>
</tr>
</tbody>
</table>
Example of Utility Link

Home Energy Saver

Energy prices are increasing and Swisher Electric is working hard to maintain costs and provide reliable, low cost power to its members. In order to lessen the impact of rising fuel costs, Swisher Electric and Touchstone Energy are introducing the Home Energy Saver.

The Home Energy Saver’s Energy Advisor calculates energy use and savings opportunities, based on a detailed description of the home provided by Swisher Electric members. Cooperative Members can begin the process by simply entering their zip code, and in turn receive instant initial estimates. By providing more information about the home the user will receive increasingly customized results along with energy-saving upgrade recommendations.

The Energy Advisor:
- calculates heating and cooling consumption
- calculates domestic water heater energy consumption
- connect users to "how-to" information resources throughout the Internet
- features extensive passages from the book No-Regrets Remodeling

Start saving on your home energy bill with the Home Energy Saver.
# Coverage in Local Papers

(34+ states) (partial list)

<table>
<thead>
<tr>
<th>State Code</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>
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<tr>
<td>DC</td>
<td>Washington Post</td>
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<tr>
<td>DE</td>
<td>The News Journal</td>
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<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>NC</td>
<td>NC Indep. Weekly</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>OK</td>
<td>Bartlesville Examiner</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>TN</td>
<td>Nashville City Paper</td>
</tr>
<tr>
<td>TX</td>
<td>The Eagle</td>
</tr>
<tr>
<td>UT</td>
<td>Tooele Transcript-Bulletin</td>
</tr>
<tr>
<td>VA</td>
<td>Richmond Times-Dispatch</td>
</tr>
<tr>
<td>WA</td>
<td>The Yakima Herald Republic</td>
</tr>
<tr>
<td>WI</td>
<td>Oshkosh N’western</td>
</tr>
<tr>
<td>WY</td>
<td>Wyoming Tribune</td>
</tr>
</tbody>
</table>
Awards
Deployment to Other Tool Developers

Available free to end users. Engine now being used by public- and private-sector entities with help from LBNL to power other energy/carbon-footprint calculators.

Web Services & APIs

HES: Auditor & Inspector Tool
www.microsoft-hohm.com

CoolCalifornia: Home & business carbon foot-printing
CoolCalifornia.org
What the Heck is an API?

Current licensees
- Microsoft
- CNT Energy
- CSL Energy
- Voltier Creative
- Energy Datametrics
- ICF
- Ennovationz
- MNCEE
- InterNACHI
- Spirit Technologies
- NREL
- California Air Resources Board
START (HES Consumer)

HOME ENERGY SAVER™

Save money, live better, help the earth!  Over 6 million visits!

Case studies
"Home Energy Saver helped me save thousands of dollars per year. It is one government service that makes paying taxes worthwhile."
—Nick Wilder
Wheat Ridge, Colorado

Energy NewsWire
• Have you used an electric meter to measure your energy use?
• I'd like to check out two books, one new, and one electrical meter, please.

— New Tax Credits for energy-efficient home improvements
— The President visits Home Depot to discuss home energy savings

How do you compare?
Do you program your thermostat?
• Yes
• No
• My thermostat is not programmable

What others say...
What's the impact?

More resources for: Teachers... EnergizedLearning • Professionals... HESpro • Help Implementing our recommendations... EnergyStar.gov
START (HES PRO)
HOUSE SHAPE AND SIZE

Providing more details will make your results more accurate.

Heated or cooled floor area (all stories combined)? 1800 square feet
Direction faced by house front door? North
Stories above ground level? 1
Interior floor-to-ceiling height? 8 feet
Describe the house shape/dimensions?

Choose the shape below that most closely matches the shape of the house:

Back S-shape
Since the house is not a simple rectangle, please enter the dimensions so that we can estimate the floor area.
HOME ENERGY SAVER™pro

WALLS

Providing more details will make your results more accurate.

Do all the walls have similar construction?  
- Yes  
- No

FRONT INSULATION

Darkness of exterior wall surfaces:

Please select the construction type, insulation level, and exterior finish of your house's walls.

Wood Frame

<table>
<thead>
<tr>
<th>Insulation Level</th>
<th>Wood Siding</th>
<th>Stucco</th>
<th>Vinyl Siding</th>
<th>Aluminum Siding</th>
<th>Brick Veneer</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-0 (no insulation)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>R-3 (1-2 inches)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>R-7 (2-3 inches)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>R-11 (3-5 inches)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>R-13 (5-6 inches)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>R-15 (6-7 inches)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>R-19 (7-9 inches)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>R-21 (9-10 inches)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Wood Frame with Insulated Headers
HOME ENERGY SAVER™ pro
Energy Assessment Tool for Home Professionals

START
DESCRIBE
COMPARE
UPGRADE
LEARN

DETAILED INPUT

Building ID:
Location:
Zip Code:
Session:

START

DETAILED INPUT

Overview
- general
- house shape & size

Heating & Cooling
- exterior shading
- air-tightness
- foundation & floor walls
- doors & windows
- skylights
- attic & roof
- ducts & pipes
- thermostat
- heating equipment
- cooling equipment

Water Heating

Energy Factor
Check the EnergyGuide label on the water heater.
The typical energy factor for propane water heaters sold in 1972 was 0.474.

Recovery Efficiency

Rated Input
Check the nameplate on your water heater.

Storage tank capacity (gallons)
Check the nameplate on your water heater.

Is an adult at home on weekdays?

Temperature Setting
Check the setting on your water heater.

Are you finished customizing this section?

PREVIOUS   NEXT   CALCULATE   SAVE & EXIT
### Lighting

Providing more details will make your results more accurate.

Select the number of fixtures per room for a quick estimate. For a more detailed estimate, select a radio button to complete the information for each fixture on a room-by-room basis.

#### How many light fixtures are in the following rooms (include portable (plug-in) lamps)

Note: Multiple lights on a single circuit (switch) count as one fixture. Click on radio button to provide optional details by room.

<table>
<thead>
<tr>
<th>Room</th>
<th>Number of light fixtures</th>
<th>More details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Dining Room</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Living Room</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Family Room</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Master Bedroom</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hall</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>All Bedrooms</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>All Bathrooms</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>All Closets</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Utility Room</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Garage</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Outdoor Lighting</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

#### Kitchen Details:

<table>
<thead>
<tr>
<th>Fixture</th>
<th>Bulb Type</th>
<th>Number of bulbs in fixture</th>
<th>Sum of wattages for all bulbs in fixture</th>
<th>Usage (Hrs/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchen</td>
<td>Incandescent</td>
<td>1</td>
<td>95</td>
<td>3</td>
</tr>
<tr>
<td>Kitchen</td>
<td>Halogen Tchier</td>
<td>1</td>
<td>95</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Compact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Florescent/LED</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Florescent tubes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td>Halogen Tchier</td>
<td>1</td>
<td>95</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Compact</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Florescent tubes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## MISCELLANEOUS KITCHEN EQUIPMENT

Providing more details will make your results more accurate.

Please enter detail if house has the following appliances.

Whenever there is more than one of a particular item, enter the average per-unit usage for all units in the house.

Do not select more than 24 hours in a day.

### ENERGY STAR Qualified? ○ Yes ○ No

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Number of Units</th>
<th>Average Per-unit Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Broiler</strong></td>
<td>0</td>
<td>1 hours per week</td>
</tr>
<tr>
<td>Coffee Machine - Drip</td>
<td>0</td>
<td>Brew Cycle 30 minutes per day</td>
</tr>
<tr>
<td>Coffee Machine - Percolator</td>
<td>0</td>
<td>Brew Cycle 30 minutes per day</td>
</tr>
<tr>
<td>Deep Fryer</td>
<td>0</td>
<td>Warms 1 hour per day</td>
</tr>
<tr>
<td>Electric Fry Pan</td>
<td>0</td>
<td>Warms 1 hour per day</td>
</tr>
<tr>
<td>Espresso Machine</td>
<td>0</td>
<td>Warms 1 hour per day</td>
</tr>
<tr>
<td>Microwave</td>
<td>0</td>
<td>Warms 1 hour per week</td>
</tr>
<tr>
<td>Slow Cooker</td>
<td>0</td>
<td>Warms 0 hours per week</td>
</tr>
</tbody>
</table>

This is a "plug-in" broiler, not the unit built into the stove.
**YEARLY ENERGY COSTS**

Providing more details will make your results more accurate.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Heating</th>
<th>Cooling</th>
<th>Hot Water</th>
<th>Large Appliances</th>
<th>Small Appliances</th>
<th>Lighting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Home</strong></td>
<td>$3,533</td>
<td>$2,775</td>
<td>$7</td>
<td>$164</td>
<td>$430</td>
<td>$0</td>
<td>$131</td>
</tr>
<tr>
<td><strong>With Upgrades</strong></td>
<td>$1,272</td>
<td>$876</td>
<td>$7</td>
<td>$36</td>
<td>$307</td>
<td>$0</td>
<td>$46</td>
</tr>
<tr>
<td><strong>Savings</strong></td>
<td>$2,261</td>
<td>$1,899</td>
<td>$0</td>
<td>$129</td>
<td>$0</td>
<td>$0</td>
<td>$85</td>
</tr>
</tbody>
</table>

*Important Note:* These are initial estimates only, and results may vary. If the owner has not already done so, we strongly recommend that they retain a professional energy auditor to develop a detailed work scope and budget for improving the home. We also recommend the Home Performance with ENERGY STAR program when considering home improvements.

Comparing Results to Home's Utility Bill
**COMPARE: Drill Down**

**YEARLY LARGE APPLIANCES AND WATER HEATING RESULTS**

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Total Cost</th>
<th>Equipment Energy</th>
<th>Water Heating Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Energy</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Use</td>
<td>Energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(gal/day)</td>
<td></td>
</tr>
<tr>
<td>First Refrigerator</td>
<td>$60</td>
<td>862 kWh</td>
<td>$60</td>
</tr>
<tr>
<td>Stove</td>
<td>$33</td>
<td>385 kWh</td>
<td>$33</td>
</tr>
<tr>
<td>Oven</td>
<td>$22</td>
<td>239 kWh</td>
<td>$22</td>
</tr>
<tr>
<td>Clothes Dryer</td>
<td>$132</td>
<td>1,456 kWh</td>
<td>$132</td>
</tr>
<tr>
<td>Clothes Washer</td>
<td>$137</td>
<td>98 kWh</td>
<td>$9</td>
</tr>
<tr>
<td>Dish Washer</td>
<td>$52</td>
<td>162 kWh</td>
<td>$15</td>
</tr>
<tr>
<td>Hot Water: Taps</td>
<td>$184</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Faucets</td>
<td></td>
<td>2,982 kWh</td>
<td>$271</td>
</tr>
</tbody>
</table>

Equipment 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 (which is included instead in the rows for those appliances).

What if my results don’t match my energy bill?
## YEARLY HEATING AND COOLING RESULTS

### Hide Details

<table>
<thead>
<tr>
<th>Cost</th>
<th>Total Cost</th>
<th>Heating Fuel Use</th>
<th>Heating &amp; Cooling Electricity Use</th>
<th>Air &amp; Water Circulation Electricity Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2,782</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td></td>
<td>2,775</td>
<td>$2,708</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>Central Gas furnace</td>
<td></td>
<td>$2,708</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>$7</td>
<td>$7</td>
<td>$7</td>
<td>$0</td>
</tr>
<tr>
<td>Cooling</td>
<td>No Cooling Equipment</td>
<td></td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>Ceiling Fans</td>
<td></td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>Total Energy</td>
<td>2,355 therms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>803 kWh</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Energy Use</td>
<td>2,355 therms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heating</td>
<td>733 kWh</td>
<td>0 kWh</td>
<td>733 kWh</td>
</tr>
<tr>
<td></td>
<td>Cooling</td>
<td>75 kWh</td>
<td>0 kWh</td>
<td>0 kWh</td>
</tr>
<tr>
<td></td>
<td>No Cooling Equipment</td>
<td></td>
<td>0 kWh</td>
<td>0 kWh</td>
</tr>
<tr>
<td></td>
<td>Ceiling Fans</td>
<td></td>
<td>0 kWh</td>
<td>0 kWh</td>
</tr>
</tbody>
</table>

### Potential Yearly Savings
- Money: $2,261
- Energy: 2790 kWh
- Emissions: 1748 Therms, 22916 lb CO₂

This reduction in greenhouse-gas emissions is like taking 4 car(s) off the road.

---

Will I make a difference?
Existing Home Configuration

---

You have visited 2 (3%) and completed 0 of the 23 possible forms.
BENCHMARK: Carbon footprint x ZIP
(click on pin to see details; zoom to see homes in your area)
### UPGRADE RECOMMENDATIONS SUMMARY

Visit [Recommendations](#) to see more information on each upgrade.

<table>
<thead>
<tr>
<th>Total for recommended upgrades</th>
<th>Yearly Savings</th>
<th>Estimated Added Cost</th>
<th>How Much is Too Much?</th>
<th>Simple Payback Time</th>
<th>Estimated ROI</th>
<th>Avoided Emissions (lbs. CO₂)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2261</td>
<td>$22610</td>
<td>$8192</td>
<td>4</td>
<td>27%</td>
<td>22916</td>
<td></td>
</tr>
</tbody>
</table>

**Important Note:** These are initial estimates only, and results may vary. If the owner has not already done so, we strongly recommend that they retain a professional energy auditor to develop a detailed work scope and budget for improving the home. We also recommend the Home Performance with ENERGY STAR program when considering home improvements.

### Upgrades Requiring Investment

1. Basement wall insulation
2. Electric clothes dryer
3. Thermostat
4. Duct Sealing
5. Indoor lights
6. Wall insulation
7. Gas furnace

### Other benefits that often come along with these energy-saving upgrades

- Well-insulated basement walls can make your home more comfortable and quieter, and guard against moisture problems and water pipe breakage.
- Natural gas clothes dryers reduce your home’s peak load on the power grid compared to an electric dryer.
- Programmable thermostats can help keep your home more comfortable.
- Having a professional seal your home’s air leaks can make your home more comfortable, reduce the risk of moisture damage, improve indoor air quality and fire safety, and help to prevent energy waste. (Some air leaks can be as big as a tennis ball.)
**UPGRADE RECOMMENDATIONS**

What efficiency level would you like to model for the initial selection of upgrades?  
EnergyStar

What simple payback period would you like to use for selecting upgrades?  
10

Rows that are dimmed are not included in the calculated values for the retrofit package.
To include them check their boxes and recalculate.

<table>
<thead>
<tr>
<th>Add/Remove</th>
<th>Upgrade</th>
<th>Upgrade Choice &amp; Description</th>
<th>Yearly Savings</th>
<th>Estimated Added Cost</th>
<th>How Much is Too Much?</th>
<th>Simple Payback Time</th>
<th>Estimated Return on Investment</th>
<th>Avoided Emissions (lbs. CO₂)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Check/Uncheck All Upgrades</td>
<td>Total for Selected Upgrades:</td>
<td>$2261</td>
<td>$3192</td>
<td>$22610</td>
<td>4</td>
<td>27%</td>
<td>22916</td>
</tr>
<tr>
<td>✓</td>
<td>Basement wall insulation</td>
<td>R-11</td>
<td>$530</td>
<td>$720</td>
<td>$5300</td>
<td>1</td>
<td>74%</td>
<td>5384</td>
</tr>
<tr>
<td>✓</td>
<td>Electric clothes dryer</td>
<td>Switch to gas dryer</td>
<td>$100</td>
<td>$160</td>
<td>$1000</td>
<td>2</td>
<td>62%</td>
<td>303</td>
</tr>
<tr>
<td>✓</td>
<td>Thermostat</td>
<td>ENERGY STAR-labeled programs</td>
<td>$150</td>
<td>$320</td>
<td>$1590</td>
<td>2</td>
<td>50%</td>
<td>1616</td>
</tr>
<tr>
<td>✓</td>
<td>Duct Sealing</td>
<td>Reduce leakage to 6% of total air</td>
<td>$403</td>
<td>$890</td>
<td>$4030</td>
<td>2</td>
<td>45%</td>
<td>4083</td>
</tr>
<tr>
<td>✓</td>
<td>Indoor lights</td>
<td>CFLs in high-use fixtures</td>
<td>$46</td>
<td>$88</td>
<td>$460</td>
<td>2</td>
<td>44%</td>
<td>846</td>
</tr>
<tr>
<td>✓</td>
<td>Wall Insulation</td>
<td>R-11 wall + R-5 exterior foam</td>
<td>$520</td>
<td>$1196</td>
<td>$5200</td>
<td>2</td>
<td>43%</td>
<td>5278</td>
</tr>
<tr>
<td>✓</td>
<td>Gas furnace</td>
<td>AFUE=90 ENERGY STAR</td>
<td>$370</td>
<td>$1126</td>
<td>$3700</td>
<td>3</td>
<td>33%</td>
<td>3757</td>
</tr>
<tr>
<td>✓</td>
<td>Clothes washer</td>
<td>MEF=1.42 WF=9.5 ENERGY STA</td>
<td>$59</td>
<td>$180</td>
<td>$590</td>
<td>3</td>
<td>32%</td>
<td>428</td>
</tr>
</tbody>
</table>
Have your ducts professionally sealed to reduce leakage

**Economic Benefits:**
- Estimate Yearly Bill Savings: **$403**
- Estimated Lifetime Energy Savings: **$8,060**
- Estimated Added Cost: **$890**
- Maximum Price for 10 Year Payback: **$4,030**
- Return on Investment: **45%**
- Upgrade Pays for Itself in: **2 years**

**Additional Benefits:**
Having a professional seal your home's air leaks can make your home more comfortable, reduce the risk of moisture damage, improve indoor air quality and fire safety, and help to prevent frozen water pipes.

**Upgrade Description:**
Have a qualified professional seal your home's air leaks. Leaky houses waste energy because heated or cooled air can easily escape. Older homes tend to be leakier than newer homes. Tightening up a leaky house will reduce the heating and cooling bills. Recent advancements in air-sealing technology allow specialists to go beyond the old techniques of caulking and weatherstripping around obvious places such as doors and windows. The biggest problems are usually hidden leaks in out of the way places such as attics, floors and walls, which are easily found and sealed by a specialist. Note: The annual bill savings and cost-effectiveness assume that your home's air leakage is reduced by 26%.

**Purchasing Tips:**
- To get the best results, hire a qualified contractor, preferably a "building performance contractor", or "energy auditor" to find out where the leaks are in your home's shell. Make sure the contractor uses a "blower door" test to find the air leaks. An infrared scan can be beneficial in addition to the blower door test. Check with your utility company; some offer no- or low-cost basic energy audits. However, the extra money you would spend to have the audit done by a home performance contractor is often well worth it.
- Make sure your contractor tests the leakage rate after completing the sealing, not only to determine the degree of improvement, but also to ensure that the ventilation in your home is adequate. If you don't already have proper mechanical ventilation, consider installing a ventilation system. Proper home ventilation will make your home healthier and more comfortable.
- Make sure your contractor performs a combustion safety test after sealing your home's air leaks. This test checks for backdrafting and carbon monoxide, and will help assure your home is safe.
- If you choose to do the work yourself, follow the guidance in ENERGY STAR's Do-It-Yourself Guide to ENERGY STAR Homesealing.
LEARN: Calc’s complemented with extensive decision-support content

TOOLS OF THE TRADE

A hammer and a saw used to be the key tools for home contractors. Today, the best-in-breed also use high-tech equipment while performing a professional energy audit or verifying that construction has been done correctly. Infrared cameras can “see” heat loss and find hidden energy savings opportunities. PFT tests or blower door tests measure a home’s air leakage and tell you when sealing has been successful. Combustion monitoring equipment and indoor-air pollution detectors ensure that a heating system is not only efficient but also not dumping dangerous pollutants into the home. All of these practices should be conducted with a mind towards whole-house system performance. Professional energy audits will bring many of these tools into play to help provide a very close look at how the house is built and operated.
HALL OF SHAME

In this section we bring you an array of images from the field, showing the kinds of issues encountered by home performance professionals in real homes. Each tells a story of how hidden (but fixable) problems in homes can cause high energy bills.

- **Missing wall insulation next to and below a window.** Source: *Home Energy* magazine (September/October 2008)
- **Heat losses short-circuit through uninsulated areas where wall framing sits.** Source: *Home Energy* magazine (May/June 2009)
- **Heat losses short-circuit a highly conductive aluminum door sill.** Source: *Home Energy* magazine (May/June 2009)
- **Loosely installed wall insulation satters over time, causing heat losses.** Source: *Home Energy* magazine
- **Absence of snow shows lack of attic insulation.** Malwater has frozen at the roof. Source: *Home Energy* magazine
- **Severe rooftop ice-damming due to excessive heat loss through ceiling.** Source: *Home Energy* magazine
LEARN: Case Studies

**CASE-STUDIES**

Add Mine | Search by: State **Entire US** | Zip code | or Keyword | Search

**Results**  Kermit Was Right

**Kermit Was Right**  Evan Mills, Mendocino, CA, 95460

**What I did**
- No-cost changes
- Efficient lighting
- Appliance upgrades
- Heating or cooling equipment upgrades
- Air sealing
- Improved ducts

**My story**

It's not easy being Green. Even if you have a Ph.D. on the subject. Kermit was right, but I'm on a mission to prove him wrong.

Moving to a new home in mid-2008 presented a great opportunity to walk the talk. The late-1970s house was an eco-basket-case. To put it more positively, it offered a lot of that proverbial low-hanging fruit: ancient heating system, incandescent lighting, inefficient appliances, you get the idea. This will be like shooting fish in a barrel, I assured myself.

What better way to start than to jump on Google and see what the best products are these days? Easier said than done. I quickly learned that any of the front-page options for doing this right these days is hogging too much of the...
LEARN: Polls

HOME ENERGY SAVER™ pro

WHAT OTHERS ARE DOING
Case-Studies
Polls
Put Yourself on the (Carbon) Map
Facebook

START
DESCRIBE
COMPARE
UPGRADE
LEARN

SMALL CHANGES MATTER | MAKING IT HAPPEN | DEEP RETROITS | WHAT OTHERS ARE DOING | READINGS & RESOURCES

POLLS

Poll questions
- How much would your typical customer be willing to pay for an uninstrumented home energy audit?
- How do you collect data in the field during your audits?
- If you’re an energy auditor or home performance contractor, do you use an IR camera?
- If you’re an energy auditor or home performance contractor, do you use a duct blaster?
- If you’re an energy auditor or home performance contractor, do you use a blower door?

If you’re an energy auditor or home performance contractor, do you use a duct blaster?

Yes
What’s a duct blaster?
No
Total responses

You can still participate...

How do you compare?
If you’re an energy auditor or home performance contractor, do you use a duct blaster?
- Yes
- No
- What’s a duct blaster?

What others say...
Asset Rating Tool

The Department of Energy’s Home Energy Scoring Tool allows qualified assessors to:

- Generate clear, credible home energy assessments at a reasonable cost;
- Recommend customized upgrades and other cost saving tips; and,
- Help consumers compare the energy use of different homes.

The Home Energy Scoring Tool is quick and easy to use. Qualified assessors can gather the information needed to assess a home in one short site visit. This low-cost, high value assessment can be provided as a stand-alone service or as an add-on to a home inspection or comprehensive energy audit.

For more information on how to become a qualified assessor or receive a home energy score, visit www.homeenergyscore.gov.

Video: What is Home Energy Score?
Watch this 3 minute video to learn about the DOE’s new Home Energy Score Program. Home Energy Score offers householders and home buyers an easy and economical way to get a credible, home energy audit, with customized advice on how to save energy in your home and money on your utility bills.
Home Energy Saver

Laptop computers use much less energy than desktop computers
http://ht.ly/4iC4K

As you go about setting up your home office with a new computer, printer, fax machine, and maybe even a copier machine, consider that this equipment is going to add to your electricity bills. A computer alone may not use more energy than your television, but once you’ve put it all together, an office

12 hours ago · Like · Comment · Share
Future Directions

• Deploying at scale through web services so that third-party developers (public/private) can create user interfaces “powered” by HES

• Building engagement through Social Media communities

• Differentiating HESConsumer and HESPro offerings

• Validating against actual home data

• Mounting new technologies, modeling techniques, and interfaces
Features in the pipeline

• Improved/updated defaults
• Expanded list of retrofit measures
• New technologies and end-uses
• Multifamily modeling
• Utility bill calibration
• Behavioral variables