NHSAVES 2019 Abbreviated Button Up

NHSaves
Your Source for Energy Efficiency

How to Improve the Energy Efficiency of Your Home
Energy Use and Savings Tips

Staying Warm and Reducing Heating Costs

Air Sealing A-B-C’s

Insulation Options

Addressing Health and Safety Concerns

Working with Professionals

NHSAVES Programs
We Spend a Lot on Energy!

NH spends over $6 billion per year on energy

Northern New England Household Residential Energy Costs, ~$3,600, 2014

- Space Heating 40%
- Water Heating 13%
- Refrigerators 7%
- Air Conditioning 3%
- Other 37%

Current NH energy fuel prices: www.nh.gov/osi/energy/
Get to Know Your Energy Bills

Know how much electricity you are using
And what is using it

Average NH Usage:
(residential bill -- varies widely)

Daily: ~20 kilowatt-hours (kWh)
Monthly: 600 kWh
Annually: 7,200 kWh

Bill source: Eversource
How much electricity do individual appliances use?

- Use a watt meter
  - Available from NH public libraries
  - Measures watts, time, and kilowatt-hours with appliance on or off

- Read the appliance name plate and determine how many hours it is on:  \( \text{Amps} \times \text{Volts} = \text{Watts} \)
# Major Household Electricity Uses

<table>
<thead>
<tr>
<th>Residential Electricity Use</th>
<th>Approximate Annual Kilowatt-hours</th>
<th>Potential for saving energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>1,200</td>
<td>***</td>
</tr>
<tr>
<td><em>Electric Water Heater</em></td>
<td>2,100</td>
<td>***</td>
</tr>
<tr>
<td>Refrigerators &amp; Freezers</td>
<td>1,050</td>
<td>***</td>
</tr>
<tr>
<td>Dehumidifiers</td>
<td>900</td>
<td>***</td>
</tr>
<tr>
<td><em>Electric Clothes Dryer</em></td>
<td>800</td>
<td>**</td>
</tr>
<tr>
<td>Entertainment Centers</td>
<td>650</td>
<td>*</td>
</tr>
<tr>
<td>Furnace Fans &amp; Boiler Pumps</td>
<td>400</td>
<td>*</td>
</tr>
<tr>
<td>Dishwasher &amp; Clothes Washer</td>
<td>350</td>
<td>**</td>
</tr>
<tr>
<td>Cooking</td>
<td>300</td>
<td>*</td>
</tr>
</tbody>
</table>

Electricity consumption varies widely from household to household. Energy savings come from efficiency and/or conservation.
Find and Control Energy Drips

Energy “drips” use power when the device is off

- These phantom loads include:
  - Plug in chargers
  - Anything with a clock
  - Anything with a remote
  - Anything with a light
  - DVRs and set-top boxes

- Control with a smart power strip:

   ![Image of a smart power strip]

   Available from the NHSaves Catalog
The LED Lighting Revolution!

- Any existing 60+ watt light bulbs?
  - *Easy $$ savings per year with LED bulbs*

- Lots of opportunities
  - Screw-in light bulbs
  - Outdoor lighting
  - Holidays lights
  - Can lights and linear lighting

- Look for:
  - Light color (2700° K = “warm white”)
  - Dimming and dimmer capability
  - “Suitable for enclosed fixtures”
  - “Suitable for damp locations”
Other Energy Efficiency Tips

Saving electricity and other fuels

- Low-flow showerheads and faucet aerators
- Hot water and heating pipe insulation: R-3 – R-5 best
- Smart plugs, hubs and switches
- Use ENERGY STAR labeled appliances and electronics
NHSAVES Rebates on ENERGY STAR Appliances

Rebates include:
- Electric Clothes Dryers $40 - $200
- Clothes Washers $25 - $50
- Dehumidifiers $25
- Refrigerators $40 - $75
- Room Air Conditioners $20

Also pool pumps, room air purifiers & lighting fixtures

And free haul-away + $30 for recycling an OLD refrigerators and freezers

www.energystar.gov lists appliance efficiency

NHSAVEES.com/rebates for appliance rebate forms
1. **Heat always moves from Hot to Cold.**
   - **Fact:** The heat inside our homes is always making its way through the building shell and heating the outdoors.
   - **Goal:** Slow this process down

2. **Heat moves via three methods:**
   - Conduction
   - Convection
   - Radiation
Building Science: Convection Causes Air Leakage

Warm air is more buoyant – rises and leaks out the top of a building

Cold air leaks in down low

Convective air currents = “Stack Effect”
   Stronger when colder outside

Quiz: Does “heat rise?”
   NO, but warm air does!
Air Sealing Priorities: A - B - C

- A – Attic (top of the building)
- B – Basement (bottom of the building)
- C – Center of the building
A - Attic Air Leak Reduction

Common air leaks at the top of a building.

- Attic hatches and pull-down stairs
- Chimney chases
- Pipe and electrical penetrations
- Recessed ceiling lights
- Bath fans
- Electrical boxes in the ceiling
Air Sealing Opportunities in Basements and Crawl Spaces

- Exterior doors
- Electrical, plumbing and other penetrations
- Box sill (rim joist) area
- Around old basement windows
More visible, but fewer air sealing opportunities

- Install or improve exterior door weatherstripping
  - “Q-lon” style door kits on exterior
  - Bottom of door sweeps
- Securely seal unused fireplaces
- Seal wall outlets with gaskets
- Seal around old pulley-hung windows
Air Sealing and Fresh Air

Fresh Air is needed for a healthy home

- For a typical home, about 1/3 of the home’s air should be exchanged every hour
- Many NH homes are 2 – 4 times too leaky!
  - Leaky homes are “nosebleed dry” in winter
“Seal Tight and Ventilate Right”

Control air leakage, and...
Provide measured fresh air flow
As simple as a high quality bathroom fan
Or a heat recovery ventilator (HRV)
With controllability
High and low air flow settings
Timers, occupancy sensors, CO\(_2\) sensors, etc.
Health & Safety - Indoor Moisture

**Sources of Indoor Moisture**

- **Eliminate, Isolate or Control:**
  - Wet basements and crawl spaces
  - Dirt basements and crawl spaces
  - Bath fans venting into attics
  - Bathrooms without bath fans
  -Disconnected clothes dryer vents

*Other indoor moisture sources:* Plants, humans, pets, open sump pits, cooking, leaky pipes, new construction materials, open basement windows in summer
Conduction

The movement of heat through materials
Conductive Heat Loss and Insulation R-Values

R-Values  The higher the R-value the better the insulation.

Approximate R-values:  (if installed properly)
• Fiberglass  R-3.7 per inch
• Cellulose  R-3.6 per inch
• Rigid foam board  R-4 - R-7 per inch
• Spray foam  R-6 - R-7 per inch
• Double pane window  R-3 (new windows)
• Softwood  R-1.3 per inch
• 8” concrete wall  R-1 (for 8”!)

Functional R-values may be affected more by install quality than the material used.
Installed R-Values

A new house built to the current 2009 NH Energy Code:

- Attic: R-38 to R-49
- Walls: R-20
- Basement walls: R-15 to R-19
- Doors and windows: R-3

Average NH House functional R-Values:

- Attic: R-10 to R-30
- Walls: R-3 to R-16
- Basement walls: R-1 to R-5

Quiz:

What is the average R-value of an attic with R-38 insulation covering 95% of the area?

Hint: It’s less than R-30…
If using blown insulation, cover attic with 12” – 16” AFTER air sealing!

Photo: blown-in cellulose insulation
Framed Wall Insulation

Densepack cellulose air seals & insulates empty cavities

During installation, densepack tube is inserted into each cavity.

Professional installation recommended.

Image courtesy of Vermont Dept. of Children & Families
Window Options

What about windows?

There are many reasons to replace windows…

…*Cost-effective* energy savings is rarely one of them

New windows ~R-3 – R-4

Old windows, with leaky sashes, can be replaced, *or*…

*Other options* include adding storm windows, indoor storms, cellular shades, or window quilts
Heating System Recommendations

- Test & clean regularly
- Seal and insulate ducts
- Replace furnace filters regularly
- Consider a more energy efficient replacement
Back-drafting flue gases into a home can poison occupants.

Seek combustion safety assistance from a home performance professional.

Make sure CO detectors are installed and functional.
High Efficiency Heat Pumps

Ductless Cold Climate Heat Pumps for A/C & Heat
- “Mini splits” heat and cool air
- “Cold climate” models
  - Can extract heat from -20° air!

Heat Pump Hot Water Heaters
- More efficient than regular electric water heaters

How it Works:
- Summer operation: Heat from outdoor air is extracted and used for cooling.
- Winter operation: Heat from the air is extracted and used for heating.

How Heat Pumps Work
Heating, Cooling & Hot Water Incentives

NHSaves rebates for efficient systems

- Mini-split cold climate heat pumps as well as a/c only
- Natural gas boilers, furnaces & hot water
- WiFi smart thermostats (w-heat pumps & natural gas)
- Heat pump hot water heaters

Go to NHSAVES.com for specific incentives

- Utility-specific
- Financing
- Funding availability
Next Steps

Are you feeling overwhelmed?
Energy Efficient NEW Construction

NHSaves ENERGY STAR Certified NEW Homes

- Incentives for builders
- Verified by a HERS Rater
- Energy savings, more comfortable and higher resale value

“Drive to Net Zero Competition” for home builders

- Net zero homes = no net usage of energy
- “Reduce then produce” - typically with solar PV
- Cash prizes for builders
Comprehensive, whole-house energy assessment

- Building envelope inspection & tests
- Combustion equipment efficiency & safety tests
- Written report with prioritized list of cost-effective improvements
Blower Door

- Measures *amount* of air leakage: CFM$_{50}$
- Identifies *sources* of air leakage
- Determines air ventilation rates
- Prioritizes air sealing opportunities
- Confirms amount of air sealing accomplished
Infrared Thermal Camera

- Visual images of hot and cold areas
- Helps sleuth insulation issues
- Used with a blower door to show air leakage pathways
Finding Qualified Energy Professionals

Look for -

- Certifications: BPI Building Analyst or RESNET Energy Rater
- Tools of the trade: blower door, infrared camera, combustion analyzer, etc.
- Experience, references, written energy assessment / proposal

Qualified contractor lists

- REPA - NH Residential Energy Performance Association vetted full member profiles [www.repa-nh.org](http://www.repa-nh.org)
- NHSaves qualified residential contractors
NHSaves.com/programs/energy-audits-weatherization

- Qualify with online “Home Heating Index” calculator
- Provides home energy audit for $100
  - Credited towards improvement work -- net cost: $0
- Pays for 50% of eligible energy improvements up to $4,000
- Low or no interest financing may be available
Save money and energy with Home Performance with ENERGY STAR®!

Home Performance with ENERGY STAR® is a comprehensive, whole house approach to improving energy efficiency and comfort at home, while reducing your energy costs and helping the environment. Installing energy efficient upgrades can save you up to 20% or more on your annual energy costs.

TEST YOUR HOME
## Test Your Home

### Step 1: Your Home

What is your zip code?  
03246

What is the conditioned square footage of your home?  
2000

### Step 2: Your Energy Use

Enter the amount of **fuel used to heat your home** for 12 months.

<table>
<thead>
<tr>
<th>Annual Usage</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td></td>
<td>kWh (Only if used for heating)</td>
</tr>
<tr>
<td>Natural Gas</td>
<td></td>
<td>Thems</td>
</tr>
<tr>
<td>Propane</td>
<td></td>
<td>Gallons</td>
</tr>
<tr>
<td>Heating Oil</td>
<td>800</td>
<td>Gallons</td>
</tr>
<tr>
<td>Kerosene</td>
<td></td>
<td>Gallons</td>
</tr>
<tr>
<td>Wood</td>
<td>2</td>
<td>Full Cords</td>
</tr>
<tr>
<td>Wood Pellets</td>
<td></td>
<td>Tons</td>
</tr>
<tr>
<td>Coal</td>
<td></td>
<td>Tons</td>
</tr>
</tbody>
</table>

[![Energy Efficiency Indicator](image)](image)
Home Heating Index Results: 8+  ✓

Your Home Heating Index: 11

Your home may be a good candidate for weatherization services.

Legend
0 - 3  Zero Energy Home
4 - 6  Energy Efficient Home
7 - 8  Code Compliant Home
9 - 15 Room for Improvement
15+  Inefficient Home

Sign-up for a Home Energy Audit - 2 Easy Steps!
1. Complete and print an enrollment form. For more information about our energy audits and weatherization program, click here.
2. Obtain 2 years of heating fuel bills. Send copies of bills with completed enrollment form to the address at the bottom of the enrollment form.
Income-Qualified Weatherization Programs

- **Weatherization Assistance Program & Home Energy Assistance**
  - Financial assistance that pays for energy reduction measures in a home
  - Contact:
    - County-based Community Action Programs (CAPs)
    - Your utility

- **NH Electric and Fuel Assistance programs**
  - Financial assistance with electricity and fuel bills
  - Same CAP and utility contacts
Summary

- Know about your energy use and savings opps.
- Air seal first: A-B-C
- Add insulation where you can
- Keep your home safe
- Utilize NHSAVES energy efficiency resources
Thank You

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Support future workshops …let your utility know

Visit www.plymouthenergy.org for a copy of the presentation