

Do-it-Yourself Mobile Home Energy Efficiency



**Simple tips to help Vermont's mobile home
residents save money, save energy,
and live more comfortably.**

Written and Produced by:

The Mobile Home Program (MHP) of the Coordinated Statewide Housing Services
division of the Champlain Valley Office of Economic Opportunity (CVOEO)

Design: Futura Design

Copyright ©2010

www.cvoeo.org/mhp

Second Edition, December 2017

Acknowledgments

The Energy Efficiency Initiative of the Mobile Home Program was funded by the American Recovery and Reinvestment Act (ARRA) CSBG funds. This guide draws extensively from the concepts contained in the U.S. Department of Housing and Urban Development (HUD) publication: *Manufactured Homes: Saving Money by Saving Energy*, 2005 and the Vermont Department of Public Service publication: *The Vermont Mobile Home Energy Book*. Special thanks to the CVOEO Weatherization Service in Hinesburg for their expert advice and input.

Notice

Follow all safety instructions from both this guide and the manufacturer. Before you attempt any improvement on your heating system, hot water system, under or around your home, make sure the area is safe. If you suspect that there may be a problem, contact a professional immediately.

Do-it-Yourself Mobile Home Energy Efficiency is produced by the Mobile Home Program (MHP) of the Champlain Valley Office of Economic Opportunity (CVOEO) and written by Logan Zingus, Energy Efficiency Coordinator for the MHP. The MHP is a program of the Coordinated Statewide Housing Services division of CVOEO. The MHP provides advocacy, education and housing assistance for mobile home park residents

To contact the MHP

Mail or in person to: 255 S. Champlain St., P.O. Box 1603,
Burlington, VT 05401

Phone: 802-660-3455 ext. 204

Web: www.cvoeo.org/mhp

Do-it-Yourself Mobile Home Energy Efficiency

Table of Contents

1. Introduction	2
2. Heating systems	3
3. Air sealing	4
4. Windows and doors	6
5. Lighting and appliances	8
6. Hot water	9
7. Insulation	11
8. Moisture control, ventilation and air quality	12
9. Safety	13
10. Resources	14

Top Priorities Guide

Professional furnace maintenance	3
Clean or replace furnace filter	3
Seal leaky ducts	4
Install interior storm windows	6
Install CFL bulbs	8
Insulate hot water tank and pipes	9
Insulate underbelly	11

1. Introduction

All homes are subject to wear and tear. Vermont's dramatic seasonal temperature changes, combined with wind, snow and sunlight, can open leaks in your home's shell, ductwork, windows and doors. Leaks allow warm air to escape, while cold air is drawn in. Heating and cooling systems also lose efficiency after years of use, and must be cleaned and maintained properly. Although your home was built to the energy standards of the time, tremendous improvements have been made in housing technologies and our understanding of home energy use. Mobile homes require special weatherization solutions because they are exposed on all sides, including the underbelly, and are often made of lighter, less durable materials. As energy prices continue to rise, it is especially important to consider the efficiency of your home.

By reading this manual, you are taking the first step to making your mobile home more energy efficient. The following tips and techniques are compiled from multiple sources and first hand experience to present the easiest and most cost-effective ways to save energy. It should serve as a guide to be read through once a year, and to be consulted as specific problems arise. In general, the first measures are the most important. **The most cost-effective measures are indicated by asterisks.***

BE SURE TO FOLLOW ALL SAFETY INSTRUCTIONS

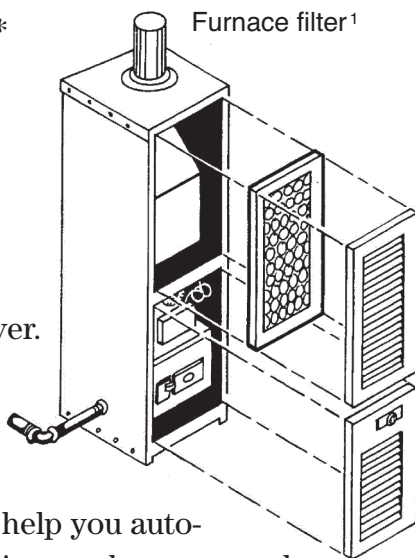
2. Heating Systems

Professional furnace maintenance*

Have a heating professional service your furnace once a year so it can run at maximum efficiency. Beware of contractors who take short cuts. Try to use an independent heating contractor.

Clean or replace furnace filter*

The furnace filter can be found clipped to the interior of the furnace door and can be easily removed and either vacuumed, washed or shaken out. Keep an extra filter on hand—they are reusable, but they don't last forever.



Use a programmable thermostat, keep it set appropriately and clean

A programmable thermostat will help you automatically adjust the temperature in your home according to time of day, although it's not a necessity. Lower the temperature before going to bed and during the day if no one is home. A 5° reduction in temperature for 8 hours every day results in a 5% saving of the annual heating cost.

Vacuum furnace registers, ensure they are free of blockages

You should also leave all registers open to allow enough air to return back to the furnace. It may seem like a waste to have open registers in unused rooms, but closing registers can starve the furnace of air and cause it to short cycle, which could damage the heat exchanger and destroy the furnace.

Keep bedroom doors slightly ajar

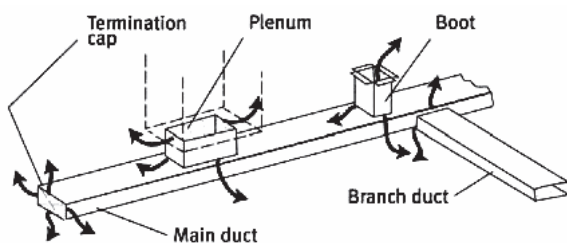
Your furnace is built to a specific size to heat your entire home. It recirculates the warm air to run efficiently. By sealing off rooms, the furnace can't get enough return air to circulate, so it has to work harder to heat the home. Unless there is at least a one inch gap between the floor and door, try to keep the bedroom doors ajar to allow enough air to circulate.

***Allow sunlight to come through windows on cold days,
close the blinds at night***

3. Air Sealing

Seal leaky ducts*

Sealing leaky ducts produces some of the highest energy savings relative to cost of any technique. The first places to seal are the seams around supply boots (connecting piece between the main duct and each floor vent). Remove the floor vent top plate (register) and look at the connection. If there is no sealant around the joint, use acrylic mastic (available at most hardware stores) to cover the seams of the connection. Check every register. The next best places to seal are the duct ends (termination caps), which you will find near the last registers at the far ends of the home. You may need to use a mirror and flashlight to see the duct ends.



Air conditioners

Remove window air conditioners in the winter, as air leakage will occur through the unit and around its perimeter. If you are unable to remove it, cover both the interior and exterior of the unit with specially designed covers, which can be found at most hardware stores. You can also use heavy duty garbage bags.



Air conditioner cover

Ventilation

Check the vents of your bathroom fan, range hood and dryer. They should all lead to the outside of your home with a sealed pipe. They should not exhaust into the crawlspace or attic. The vent damper should seal well to the vent, and be able to open when the fan is in use. If the vent is cracked or not functioning properly, you can easily install a new vent. Simply unscrew the old vent on the exterior of you home and screw in the new one. Choose a metal vent with a screen for animals for the bathroom and range hood vents. A dryer vent should not have an animal screen because it can trap lint.

Other leaks

Often times you can feel cold drafts entering the home. Seek out the leaks—you can use a lit cigarette or incense on a windy day to pinpoint the source of a draft. The best places to check are: plumbing areas (under sinks and bathtubs), gaps around light fix-



Small leak in cabinet sealed with foam

tures, joints around the main structure and add-ons, electrical lines and service panel boxes, and where the furnace vent meets the ceiling (use high-temp caulk). Leaks that are smaller than a quarter inch can be filled with latex caulk—rope caulk works well for sealing windows, doors and other long gaps. Larger leaks may need expanding foam. Only use expanding foam on covered areas (such as underneath sinks) and make sure it's fire retardant (many are not). Very large gaps may require a piece of material similar to the material of the surface being patched. Adhesive should be applied to the patch and remaining gaps should be sealed with caulk. Always ventilate the area when using expanding foam as it is toxic. If you plan on painting over caulk, make sure it's paintable.

Air sealing is not permanent

The large differences in temperature in Vermont cause materials to expand, contract, and shift, which means seals can break. Check your home for leaks every year.

4. Windows and doors

Plastic wrap windows or install interior storm windows*

Many people look to replacing their windows to increase their home efficiency and stop drafts, however it's usually more cost effective to air seal existing windows by using an 8 mil thick plastic wrap. Look for the *Tyz-all* brand, they're easy to install and have a reusable frame. While more costly, insulating window panels are an even better solution. They are easy to install and have the air sealing qualities of plastic wrap while adding a layer of insulation over the existing window. Look for *Advanced Energy Panels* in upstate New York. Jalousie windows may require special storm windows due to their crank, or the cranks can be removed for the season. Check with your local fire department to learn their policy on plastic window wraps before installing.

Jalousie windows should be fitted with jalousie snap-fasteners

Jalousie windows are notoriously leaky because it's very difficult to form a good seal between the slats. Depending on the condition of your jalousie windows, it may be cost-effective to replace them with new storm windows.



Jalousie window

Jalousie window snap-fasteners will lock the slats in place over winter months. Remove each screw that holds in the window, attach the snap-fastener, and replace the screw in the same hole. Do this one at a time to avoid removing the whole window.

Thermal window blankets

For extra window insulation, or for a decorative approach, consider making your own window blankets. You can easily convert unused quilts or comforters into window blankets by sewing a Velcro strip to the fabric and a strip on the window. Moisture may collect between the window and blanket, wash regularly.

Window locks

Window locks are used to fasten windows which no longer form a good seal. They can be attached to the side of the window or on the top, depending on the window type.

Caulk around windows and/or replace window weather stripping

Leaks may form around the perimeter of the window, so use a paintable silicone caulk or rope caulk to seal the gaps. If the weather stripping is in poor condition, replacing it with a high quality vinyl weather strip will decrease airflow around the window.

Replace door weather stripping and install a door sweep or use a draft snake

While it may seem minor, poorly fitting or worn weather stripping will allow for significant air leakage. Choose a quality vinyl weather strip. A door sweep or draft snake will help stop drafts through the bottom of the door. To make a draft snake, simply fill a stocking leg with rice, dry beans or potpourri, tie off the end, and lay it along the base of the door.

5. Lighting and appliances

Unplug electronics

Many home electronics use power just by being plugged in, even when they're not turned on, so unplug them when they are not in use. To make this task easier, plug appliances into a power strip and switch off the power strip when it's not needed.

Install LED bulbs*

Light-emitting diodes (LEDs) use $\frac{1}{4}$ of the energy and last 25 times longer when compared to incandescent bulbs. LEDs also are free of mercury making them much safer than CFLs. A 40 watt incandescent light can be replaced by a 4-6.5 watt LED for the same amount of light. Even though LEDs use less energy, they should still be turned off when they aren't needed.

Clean light fixtures

A clean light fixture will allow more light output. You may be able to use a lower wattage bulb and have the same amount of light.

Choose Energy Star appliances

Energy Star products are certified with the highest federal efficiency standard and are a great option when choosing new appliances. For example, Energy Star televisions use about 30% less energy than a standard unit.



Energy Star logo

Refrigeration

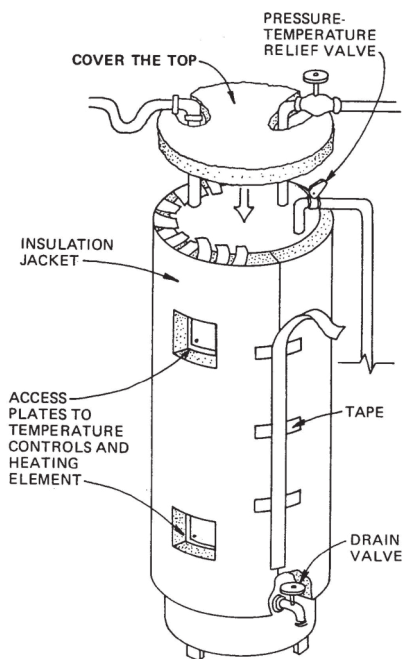
The refrigerator is one of the most costly home appliances. An old inefficient refrigerator can add up to \$13 a month to your electricity bill. Although new refrigerators are expensive, it may pay for itself in energy savings throughout its life. The cheaper option is to make your current refrigerator run more efficiently. The temperature should be kept between 38°F and 40°F. Check the seals. The door should be able to hold a dollar bill when closed. If it can't, the seal is not effective and it's wasting energy. Make sure the unit is level. You may have to replace the seal. Keep the back of your refrigerator clean and free of dust. Leave space for coils to cool. Manually defrosting your freezer will allow it run more efficiently. Refrigerators and freezer keep coolest when they are full. Fill up empty space with water jugs to increase efficiency.

6. Hot water

Insulate electric hot water heater and the first few feet of pipes*

Many hot water heaters are already insulated and should not be fitted with more insulation as they can overheat and potentially start a fire. **BE SURE TO READ THE SAFETY INSTRUCTIONS ON THE HOT WATER HEATER.** Gas and oil burning hot water heaters should not be insulated. Electric hot water heaters can be insulated with either a pre-made hot water insulation jacket or a piece of fiberglass batt insulation. Cover the sides and top

of the unit, cut holes for the electrical element, thermostat and warning labels. Some hot water heaters advise against covering the top of the unit, so read safety instructions carefully. Unless stated otherwise, you can also insulate all accessible hot water pipes. Use a foam sleeve, slit lengthwise and fasten with electrical tape or wire. Insulating the pipes can raise the temperature at the tap by 2–4°F, which allows you to turn the thermostat down.



Insulated electric hot water tank¹

Install low flow shower heads and faucet aerators*

These can as much as halve the amount of hot water your household uses, and will probably pay for itself in just a few months.

Set hot water thermostat between 120 and 140°F (usually between low and medium)

If you are going away, you can turn the temperature down even lower.

Clean the tank

Once a year drain at least gallon of water from the spigot on the tank to remove sediment.

Wrap main water pipe with heat tape

Mobile homes are particularly prone to freezing water pipes. The most vulnerable section is the main water pipe which runs from the ground, through the crawlspace and into the home. Heat tape is relatively cheap, easy to install, and is the best method to prevent your pipes from freezing. If your pipes already have

heat tape, make sure it's working properly. New heat tape kits can be purchased from your local mobile home supply store or hardware store. A typical heat tape kit for a mobile home will cost less than \$50.

7. Insulation

*Insulate the underbelly**

Remove a section of skirting from your mobile home and look at the underside. If insulation is falling out of the underbelly, the wrapping which holds in the insulation will need to be patched or replaced. To patch the underbelly, first be sure to wear protective clothing—face mask, gloves, and safety glasses. Push any fallen insulation back in, if possible, and add more fiberglass insulation. If you have a soft-belly (plastic wrap holding in the insulation), clean the area surrounding the hole and stick underbelly tape over the opening. If you have a hard belly (plywood holding in the insulation), screw in a piece of plywood to patch the hole.

NOTE: *Be sure not to cover your furnace's combustion vent, a small metal vent which extends out directly below the furnace into the crawlspace.*

If there are large areas of damaged underbelly, it can be difficult to fix. This type of project should be undertaken by someone with experience. Use silicone to stick rolls of fiberglass insulation to Tytar or other underbelly tarp, or plywood if it's a hard belly. Fasten the underbelly material to the home using strips of wood screwed into the floor joists. You may have to cut holes in the material sheet to allow for wires and pipes to connect to the home.

It's possible to insulate and air seal the skirting to improve the home's thermal barrier. A wooden frame may have to be made around the interior of the skirting, and rigid insulation fastened

to the frame. It's important to air seal the insulation with foam or caulk and to have operable vents in the skirting to allow moisture to escape. The skirting vents should be open in the warmer months and closed during the heating season. If your furnace has a combustion air intake duct, it must be vented through the skirting.

8. Moisture control, ventilation and air quality

Check your vents

To check if your vents are working properly, turn on the bathroom fan and range hood, then go outside and look at the exterior of the vent (you may have to use a ladder). The vent damper should open with the pressure from the fan. If the damper isn't functioning properly, humid air and pollutants are being trapped in your home. The vent should be replaced with a new metal fixture which is fairly inexpensive. You should also check the dryer vent the next time it's running.

Use your vents when it makes sense

You can purchase a simple digital humidity gauge for under \$10 from any hardware or home goods retailer. Try to keep the home at a relative humidity of between 30–50%. Use fans during bathing, cooking and other moisture producing activities to maintain this level. You may have to leave them on for a short time after as well. Vents also draw out pollutants and carbon monoxide, which can be trapped in your home, especially after air sealing.

Cover the ground directly underneath your home

Water vapor from the ground is one of the largest sources of moisture in the mobile home. Unless your home sits on a concrete slab, the ground beneath it should be fully covered by thick plastic. If it isn't covered, or the cover is inadequate, you will need to cover the ground with some heavy duty plastic

sheeting, such as polyethylene, at least 6-mil thick. This is a difficult procedure. The space you will be working in is usually only one to two feet high, but a careful worker should be able to complete the task. Remove at least one section of the skirting to gain access to the crawlspace. Cover all the exposed earth with plastic; you will have to cut out holes to make room for foundation and ground wires. The joints in the ground cover do not need to be sealed, but make sure they generously overlap.

9. Safety

SAFETY SHOULD BE THE PRIORITY WHEN UNDERTAKING ANY HOME IMPROVEMENT

Fire safety

Always use heat resistant mastic on ductwork. If you are adding an interior storm window to an emergency exit, it should be able to slide open in the event of an emergency. For more information on fire safety, visit *www.dps.state.vt.us/fire*

Fit your home with carbon monoxide detectors and smoke detectors

Air sealing your home allows more pollutants to build up, so effective mechanical ventilation and carbon monoxide detectors are especially important. If you are only installing one CO detector, place it at least 15 feet away from fuel burning appliances and close to a bedroom.

10. Resources

• **Vermont Weatherization Programs**

Vermont's Weatherization Program offers financial and technical assistance for low-income Vermonters to make their homes energy efficient. It's available to homeowners and renters, provided they are in the eligible income group.

To apply, visit <http://dcf.vermont.gov/benefits/weatherization> or contact your local community action agency:

- **Bennington-Rutland Opportunity Council Weatherization and Energy Conservation (BROC).** Bennington: 802-447-7515; Rutland: 800-717-2762 or 802-775-0878
- **Capstone Community Action Weatherization Program.** Lamoyille, Orange and Washington: 802-479-1053/1 or 800-639-1053
- **Champlain Valley Weatherization Service (CVOEO).** Franklin, Chittenden and Addison: 802-891-9697
- **Northeast Employment and Training Organization Weatherization Program (NETO).** Caledonia, Essex and Orleans. St. Johnsbury: 802-748-8935; Newport 802-334-7378
- **Southeastern Vermont Community Action Weatherization (SEVCA).** Windham and Windsor: 800-464-9951 or 802-722-4575

Home Heating Fuel Assistance Program

Fuel assistance can help pay some of your heating bill if you are in the eligible income bracket. It's best to apply before August 31st, but applications are accepted until the last day in February. It's available to homeowners and renters, whether you pay for your heat or it's included in your rent. To apply, call 1-800-479-6151, or visit <http://dcf.vermont.gov/benefits/fuel-assistance>

The Mobile Home Program

The MHP offers advice, information, referral services, and advocacy for mobile home residents in Vermont. For general questions, call 802-660-3455 ext. 204.

Efficiency Vermont

Efficiency Vermont offers technical assistance and financial incentives to reduce energy costs such as coupons for Energy Star appliances and links to Energy Star Certified contractors. Visit *www.encyvermont.com* for more information.

¹ Used with permission from the Missouri Department of Natural Resource publication *The Energy Efficient Manufactured Home*, developed by the New Mexico Research and Development Institute Communications Office at the University of New Mexico. Design and illustration by Marj McMinn. Retrieved from: *<http://www.dnr.mo.gov/pubs/pub1208.pdf>*

² Used with permission from the HUD publication *Manufactured Housing: Saving Money by Saving Energy*. Retrieved from: *http://www.huduser.org/Publications/pdf/SaveEnergy_SaveMoney.pdf*

NOTES

Other Publications by the Mobile Home Program

Do-it-Yourself Mobile Home Energy Efficiency DVD

An instructional DVD to help you learn how to weatherize your mobile home.

A Guide to Your Rights: Information for Residents Living in Vermont's Mobile Home Parks.

This guide provides a detailed and easy to understand summary of the specific Vermont laws that are intended to protect mobile home park residents.

Residents Working for Safe and Healthy Mobile Home Parks

Offers specific health and safety information for mobile home park residents.

Other Services available from the Mobile Home Program

The Mobile Home Program operates a resident rights hotline and one-on-one housing counseling. Our staff is available to answer questions about specific situations or challenges you are facing. We are experts in mobile home park law and will help you understand what your rights and responsibilities are. The Mobile Home Program can help you work through various mobile home related issues such as:

- *Park sales and closures*
- *Lot rent increase mediation*
- *Community organizing and resident associations*

We also actively work to break down stereotypes and stigmas related to mobile homes through public education and advocacy. We encourage public discussion of issues facing park residents, advocate for the development of programs and services for park residents, and provide workshops and training on various mobile home issues. We also advocate for mobile home residents whenever legislation is being considered that might affect you.



Our Mission:

To give mobile home park residents greater control over their housing, through organizing and education, in order to protect and improve their housing rights and living conditions.

To contact the MHP: Mail or in person to:

255 S. Champlain St., P.O. Box 1603, Burlington, VT 05401

Phone: 802-660-3455 ext. 204

Web: www.cvoeo.org/mhp