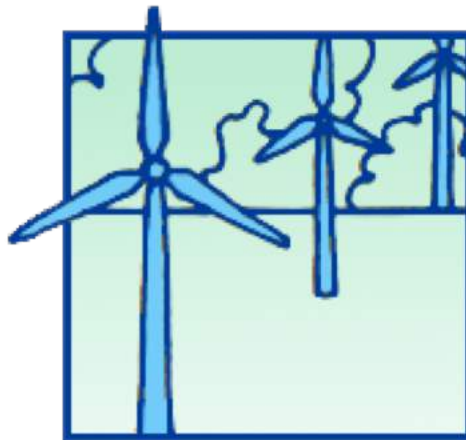


2. Energy

TRANSITION



STREETS



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Transition Streets

2.1 ENERGY

The Practical
Action Plan

The facts

As you may have experienced, energy prices usually go up rather than down. So using less electricity, gas, or oil in your home will save you money. We can waste a lot of energy without even realizing it, but significant savings are often possible if we look. Each action in this section of the workbook has a “Potential Savings” section that will give you an idea of the money you could save.

But it’s not just your wallet that will benefit. Using less energy will also reduce the amount of CO2 emitted from fossil fuels as they are burned, either in your home’s furnace/boiler and water heater, or in a power station that generates your electricity. We all need to work on reducing our CO2 emissions if we want to minimize the impacts of climate change that we are already seeing in communities across the globe. Every action we take to reduce our carbon footprint will have positive impact on our planet.

Sharing information and resources, and taking carbon-cutting action with friends, neighbors, and local government will not only make our transition to a more energy-efficient future easier, it will also build stronger, more resilient communities and neighborhoods.



Photos from flickr. Left photo by Sarah Gilbert, right photo from Transition Northfield. Licensed under Creative Commons

Each of the following actions has the potential to reduce the amount of energy your household uses. Some will cost you little or nothing; some will cost you money up front, and some of that cost can be offset by utility rebates, tax rebates, or a reduction in your energy bill.

- **Know how much energy you use** (2.3)
- **Electronics and appliances** (2.7)
- **Reduce your standby power load** (2.10)
- **See the light** (2.12)
- **Keeping it cool** (2.14)
- **Control your heat** (2.16)
- **Insulating water heater and pipes** (2.18)
- **Weather-stripping** (2.21)
- **Air sealing** (2.22)
- **Attic insulation** (2.24)
- **Wall insulation** (2.26)
- **Other energy saving options** (2.28)



Photo from flickr by Community Environmental Center. Licensed under Creative Commons

In your group, have a brief discussion about each of these actions and then decide which ones you want to tackle and when. Record your personal action plan on page 2.31.

The actions listed above are the basic, but most cost-effective things you can do in your home. Section 2.28 includes several other actions you may wish to consider once you've done the basics.

For all sections the following estimates are used for...

Costs / savings (dollar savings imply related CO2 savings):

Low	/	Less than \$25
Medium	/	Less than \$150
High	/	More than \$150

Effort (estimates based on a 3-bedroom home):

Low	Less than 2-3 hours
Medium	About a day
High	A day +

Cost: none

\$ Savings: med

Effort: low

CO2 saved: med

Challenge

Many people know how much money they are paying the utility company, but few people know how much energy they actually use. Frequent price changes confuse the picture, as your bill could go up even though you are using less.

What takes more energy: heating or air conditioning? If we don't know how much energy we use, it is difficult to plan how to use less or to measure the effects of our conservation and efficiency efforts.

When you look beyond the dollars on your electricity and gas bills, you will encounter “kWh” (kilowatt-hour), which measures electric energy, and “therm” or “cu ft” (cubic foot) which measure natural gas energy. Understanding these terms is a key part of saving energy.

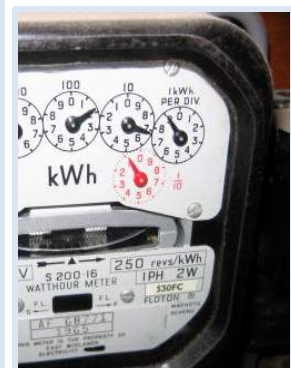
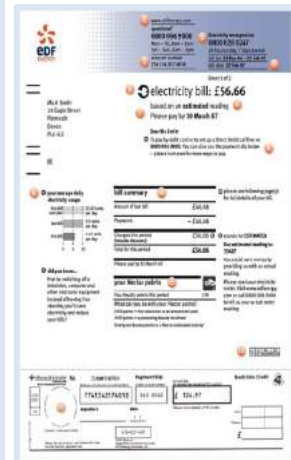
Solution

The first step in lowering energy use is learning how much we use.

1. Read your monthly electric and natural gas bills. Look for how many kWh of electricity and how many therm or cu ft of natural gas were used in the month. Use this info to make month-to-month and year-to-year comparisons. You can also read your own electric and gas meter(s). Keep a record (see next page).

2. Use an electricity monitor. You can use a plug-in monitor to measure the energy use of one appliance at a time. You can borrow a monitor (in some communities the public library loans them), or you can buy one. You can also buy a whole-house monitor that attaches to your electric meter. Other whole-house monitors clip onto the wires from your electric meter, but if these wires are in a conduit or in a cable, you should have an electrician clip onto wires inside the fuse box or circuit breaker panel where dangerous voltages exist (see section 2.5).

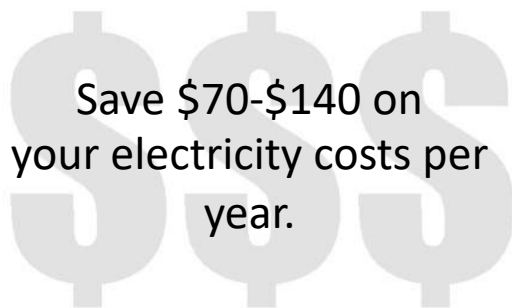
3. Compare your energy bills with your neighbors’ and share ideas for saving energy.



2.4 KNOW HOW MUCH ENERGY YOU USE

Savings and benefits

Studies have shown that people who monitor their energy use typically see reductions of 5-10% per year (\$70-\$140), just by being aware of when things are on and how much each device uses.^[1]



Notes:

Next steps, hints & tips

How to read your gas and electric meters

- If it's not clear how to read your meter(s), call your utility company or check their website.
- Read numbers from left to right.^[2]
- Record your meter readings at the same time each day, week or month.
- Subtract the previous reading from the new one to see how many kWh, therm, or cu ft you have used (see 2.6).
- Compare it to previous periods. Consider why it may have changed. Your bill may provide a hint by telling you if temperatures were higher or lower during this period.
- Complete this online Home Energy Saver for your home: <http://hes.lbl.gov/consumer> to get a personalized report of potential savings. Be sure to note your "Session #" so you can return to your report.

I can't read my meters. Your utility bill includes your energy usage per month so you can track a month's usage on your bill. Your utility company may also provide your past usage online.

I'm a renter. If your energy bill is included in your rent, ask your landlord if you can see the bill from the utility company. They might be motivated to share this by the potential for energy savings, and might even want to implement some of these changes themselves. Be aware, however, that this is only possible if energy for individual units are tracked separately (with separate meters).

You can buy an electricity monitor, or your library or local Transition group may have a plug-in monitor you can use. You may want to buy a monitor as a group and use it for a week each, in turn. This gives you time to find out how much each appliance, lamp and electronic device uses, and your typical daily use. Then, when you don't have the monitor, you can simply read your electric meter to see your consumption every week, or check your electric bill every month.

When you first use your electricity monitor, you'll probably wander around the house turning things on and off, and marveling at the information at your fingertips!

Some whole house electricity monitors:^[3]

- PowerCost Monitor (about \$110)
- Efergy Smart Meter (about \$115)
- The Energy Detective (\$300)
- Sense Energy Monitor for phone and computerized tracking (\$300)

Plug-in electricity monitor

- Kill-A-Watt (about \$25)

How do I use a plug-in monitor? Plug the monitor into a wall outlet and plug your device into the monitor. Write down how much power each device uses when switched on and switched off. You will be able to see which devices are using energy when they are off. This is called "standby" power.

Do this for each device in your house that uses electricity. With up-to-the-minute information, you will have a much better idea of which devices are using the most energy (and generating the most CO₂ emissions).



Efergy is an example of a home energy monitor.

2.6 KNOW HOW MUCH ENERGY YOU USE

Sample meter reading record

Date	Electricity Meter Reading	Usage
8/01/2018	1037	n/a
8/08/2018	1097	60
8/15/2018	1199	102
8/22/2018	1287	88

Understand how to measure energy use

Kilowatts (kW) measure electric *power* – the rate at which we use energy.

Kilowatt-hours (kWh) measure electrical *energy* consumed.

Power is akin to speed, and energy is akin to distance—as we all know, the faster you go, the more quickly you cover a given distance. Similarly, the more power you use, the faster you consume a given amount of energy. So, if you use electricity at a rate of 1kW, you will have consumed 1kWh of energy after one hour. Your electricity meter measures kWh. (For older electric meters each digit on the smallest dial is one kWh.)

Standby: Approximately every 40W of electric power a device uses in standby mode (left on 24 hours a day) consumes 1kWh a day, which costs about \$40-60 a year. Many houses typically use 200W on standby, or about \$200-\$300 a year.

Gas meters measure the volume of gas. They either measure in 100 cubic feet per step of the meter (normally called a CCF or therm), or 1,000 cubic feet. Call your gas company and ask what kind of meter you have.

To compare gas to electric usage you can convert:

100 cubic feet (one therm) = 29.3 kWh

1,000 cubic feet = 293 kWh

Cost: low

\$ Savings: med

Effort: low

CO2 saved: med

Challenge

Modern homes are filled with appliances and electronics: fridges and freezers (often two), dishwashers and ranges, coffee makers, microwaves, printers, scanners, game systems, sound systems... the list is long. Each and every one of these appliances and electronics uses energy, often when it's not even in use!

Sadly, much of the energy efficiency gains we've seen in recent years has been cancelled out by more usage of ever more electronics and appliances.^[4] A whopping 90% of homes have at least one desktop computer, laptop, tablet or smartphone; 79% have more than one. Many large homes have two refrigerators.^[5]



Solution

When trying to reduce our energy consumption for appliances and electronics, we've got several effective options that range from free to moderately costly:

- Use devices less; and use non-electric options when that makes sense.
- Turn them off (and even unplug them) when not in use.
- Ensure appliances are performing optimally.
- Use the most energy-efficient model.

Yes, but ... My computer has a screen saver. Isn't that saving energy? Very likely, no, you are not saving energy. In fact, it may take more energy to use a screen saver. Your computer's power-down feature may not work if you have a screen saver activated.

Transition Streets

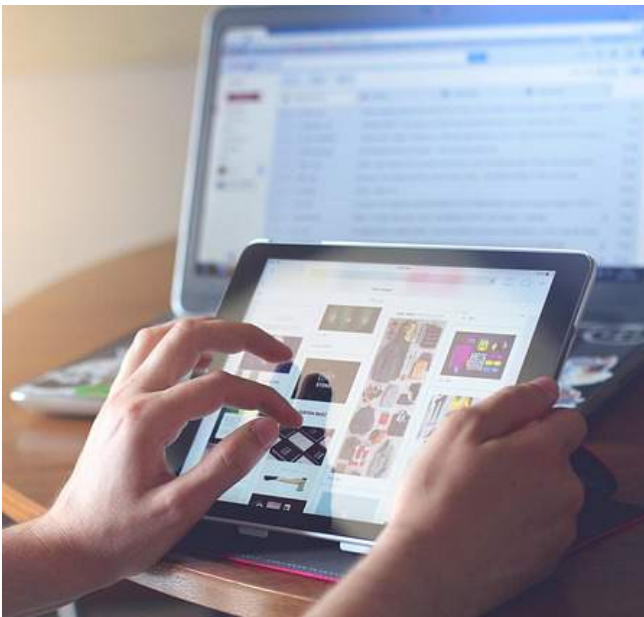
2.8 ELECTRONICS

The Practical
Action Plan

Savings and benefits

ENERGY STAR® office products use about half the electricity of standard equipment, and as little as one quarter for some products. ENERGY STAR® computers use 30%-65% less energy than computers without this designation, and ENERGY STAR® monitors use 1 watt or less when off.^[6]

**Saves \$50 off an
average electricity
bill per year.**



Next steps, hints & tips

- As a general rule, turn off the monitor if you're going to be away from your PC for more than 20 minutes.
- Turn off the computer and monitor if you're not going to use it for more than 2 hours.
- Use a power strip to turn off your monitor, printers and other accessories every night. Some power strips also provide surge protection.
- Use rechargeable batteries. Studies have shown they are more cost effective than disposable batteries.
- If you currently use a desktop computer, consider a laptop computer the next time you buy. Laptops use much less energy.
- ENERGY STAR® monitors consume two watts or less in sleep mode and 1 watt or less when off. Follow the instructions for your particular model so your monitor automatically goes into sleep mode.
- An ENERGY STAR® TV uses 3 watts or less of power when switched off, as compared to a conventional TV, which use up to 12 watts. Replacing an old, inefficient TV saves you both money and a big carbon footprint.^[7]

Transition Streets

2.9 APPLIANCES

The Practical
Action Plan

Savings and benefits

Your savings will vary depending upon which appliances you are using and their energy efficiency. See below for a resource to estimate the efficiency of your current appliances.

Could save \$100s off
an electricity bill
over the life of an
appliance.

The screenshot shows a web-based calculator with a green header 'APPLIANCE ENERGY CALCULATOR'. It has five input fields, each with an icon and a dropdown arrow: 'My appliance' (lightbulb icon) set to 'Aquarium equipment', 'Wattage' (lightning bolt icon) set to '24', 'Utility rate' (dollar sign icon) set to 'US Average \$0.12/kWh', 'Hours used per day' (clock icon) set to '0', and 'Days used per year' (calendar icon) set to '0'. At the bottom, a blue box contains the text 'ENERGY USE AND COST PER YEAR'.

Get an energy estimate at <https://www.energy.gov/energysaver/save-electricity-and-fuel/appliances-and-electronics/estimating-appliance-and-home>

Next steps, hints & tips

- Keep your range-top burners and reflectors clean. Vacuum the coils on your refrigerator. Clean the lint trap on your dryer. Proper maintenance improves performance.
- Making a small meal? Use a toaster oven to save one-third to one-half the energy.
- Better yet, learn to solar cook and use the energy of the sun.
- Switching from hot to warm water when washing clothes can cut the energy use of that load in half.
- Save money on drying clothes with an old-fashioned clothes line or drying rack. The sun and wind do the work for free with much less wear and tear on the fabric.
- When it's time to replace an appliance, always take a look at the ENERGY STAR® options. They can save you hundreds of dollars over the life of your appliance.
- Most appliances have an EnergyGuide label, which tells you about how much it will cost to operate that appliance for a year and how it compares to the most versus the least energy efficient model.^[8]

Transition Streets

2.10 REDUCE YOUR STANDBY POWER LOAD

The Practical
Action Plan

Cost: none

\$ Savings: med

Effort: low

CO2 saved: med

Challenge

Leaving lights, TVs, computers and radios on when no one is in the room is an obvious waste of money and energy. But even when we switch things off some devices go into standby mode, which can still consume a lot of energy. Even phone chargers, if left plugged in, will use a little energy, whether or not you're charging your phone.

An individual device uses relatively little standby power, but a study of California homes by the National Resource Defense Fund found that the average home had 65 devices constantly drawing power. That amounted to 23% of residential electricity use and cost an average of \$165 a year.^[9] Consumer electronics were responsible for half of that standby load.

An electric toothbrush, a phone charger, a DVD player, a microwave, a printer, a game console, a digital radio – if you have a lot of equipment on standby, turning them off can add up to significant savings over a year.



Solution

Turn things off when you leave the room for more than a few minutes. Turn them off at the plug when not in use.

You can buy a “smart power strip” for as little as \$25, which cuts power to all connected devices with the press of a single button. Some strips can be remote controlled.

If you need to leave lights on at night, such as an outside light, use an energy-efficient bulb.

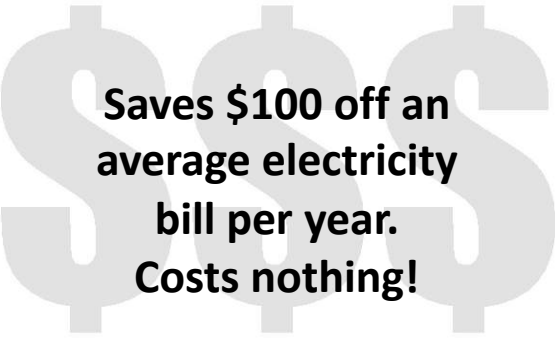
Yes, but ... I can't turn off my TV's set-top box. Boxes set to record programs must be left idling around the clock, costing you up to \$25 per year. Integrated digital TV sets, or more expensive models, generally use less energy on standby.

Savings and benefits

In a typical home, turning devices off, rather than using standby power, can save \$100 off your annual electricity bill.^[9]



Next steps, hints & tips



**Saves \$100 off an average electricity bill per year.
Costs nothing!**

- You can use an energy monitor to see exactly how much power each item is using when on and when in standby mode (see page 2.5).
- Buy a smart power strip to turn multiple devices off at the same time when not in use.
- Talk to everyone in your home about turning devices off. Try a friendly competition to help motivate them.
- Keep a scoreboard on the fridge for every time someone finds a light or TV on when no one is in the room.
- Motivate your kids with a share of the savings!
- Try using electricity-powered devices less often: dry clothes in the sun not the dryer, turn lights off in the daytime, only wash full loads, etc.

Notes:

Transition Streets

2.12 SEE THE LIGHT

The Practical Action Plan

Cost: med

\$ Savings: med

Effort: low

CO2 saved: med

Challenge

A majority of the light bulbs in U.S. homes today (71%) are *STILL* inefficient incandescent bulbs, which cost much more to operate and use 90% of their energy to create heat, not light!^[10] Changing out your inefficient light bulbs for energy-efficient LED bulbs is the easiest, and possibly the cheapest thing you can do to see immediate savings.

Solution

The average American home uses 50 light bulbs. Replacing incandescent bulbs in those fixtures with the most energy efficient LED light bulb will immediately save you money, and that savings continues over the lifetime of that bulb. Just take a look at the cost savings in the table below.

And what will that savings cost you? The most commonly used LED replacements for 40 and 60 watt incandescent bulbs can be purchased for \$1-\$2. Many local utility companies offer rebates or have partnerships with local retailers to offer LED bulbs at a discount to help you make the switch. Check your utility company website for deals.

It's worth buying reputable brands, such as Philips or GE, rather than discounted brands, which may burn out faster. Bulbs come in "warm" and "cool." A big DIY store like Home Depot or Lowes will usually have bulbs on display so you can see what the light looks like.

LED or CFL—which should you choose? CFLs are a big step up from incandescent bulbs and most homes in America have some but if you are purchasing new bulbs, go with LEDs, which are more efficient and last two to three times longer. That saves you even more money.



Transition Streets

2.13 SEE THE LIGHT

The Practical
Action Plan

Savings and benefits

Replacing one incandescent bulb with one LED bulb can save you \$6 a year in a light that's on 2-1/2 hours a day. An average home has 30 incandescent bulbs. If all were replaced and used often, this could save up to \$180 a year.^[10]

Switching out an incandescent with an LED can save up to \$6 per light bulb per year.

Recycling bulbs

CFL bulbs contain trace amounts of mercury (less than 1/100th the amount of a mercury thermometer). If a CFL bulb breaks, refer to EPA guidelines for safe disposal:

<http://www2.epa.gov/cfl/cleaning-broken-cfl#instructions>).

LEDs and CFLs are recyclable. Research local CFL recycling sites and share that information with your group members.

Next steps, hints & tips

- Go through your house, room by room, looking at each light fixture. Starting with the brightest bulbs, and those used the most, consider replacing incandescent and halogen bulbs with an LED.
- **A caution about halogen bulb replacement in low-voltage track lighting:** Many people are tempted to simply put an LED bulb into a halogen fixture. There are electrical limits on how many LEDs you can use. Learn more at <https://www.lightbulbs-direct.com/article/replacing-12v-halogen-mr16s-with-leds/>.^[11]
- When a bulb goes out, see if you can live (safely) without replacing it at all.
- Most hardware stores and home improvement stores carry a range of efficient bulbs. You may need to go to a lighting specialty store to find a special bulb. Or you can look online.
- Be sure to check your utility company's website. They may have an online store, too.

Yes, but ... I have dimmer switches. You can buy dimmable energy-saving light bulbs. There are even candle-shaped bulbs to fit into chandelier light fixtures.

Cost: low

\$ Savings: med

Effort: low

CO2 saved: med

Challenge

The share of homes in the United States with air conditioners – central air, window units or portable units – reached 87% in 2015.^[5] It should not be a surprise, then, to learn that 5% of all electricity produced in the U.S. is used for air conditioning.

Very few people adjust the temperature settings on their AC unit so they are wasting that cool air when away from home. Air conditioners become less efficient as they age. If your AC unit is 10-12 years old, you could save 20-40% of your cooling costs by buying a newer, more efficient model.^[12]

Your air conditioner isn't the only cooling cost in your home. Almost every American house has at least one refrigerator: 30% of American households have a 2nd refrigerator or freezer.^[5] These are often older models that are very inefficient.

ENERGY STAR® refrigerators use 15% less energy and models with top-mounted freezers use 10%-25% less energy than side-by-side or bottom-mount units.^[13]

Solution

You can reduce your cooling costs in a wide variety of ways: by using the most efficient appliance properly sized for your needs, by making lifestyle changes, by landscaping to discourage summer heat from entering, and by weather-stripping to discourage cool air from leaving your living space.



Yes, but ... I need the air conditioning to help with my allergies. It's true that air conditioning also provides a filtering function for people who suffer from seasonal allergies. In that case, look for the most energy-efficient air conditioner you can find and consider a HEPA air filter. ^[14]

Transition Streets

2.15 KEEPING YOUR COOL

The Practical
Action Plan

Savings and benefits

By properly recycling your old refrigerator and replacing it with an ENERGY STAR® refrigerator, you can save more than \$270 over the next 5 years. Check with your local electrical utility company about rebates for ENERGY STAR® appliances, and check with your city or township about disposal of old refrigerators. Some utility companies are offering incentives for households that get rid of an old, second refrigerator or freezer.^[15]

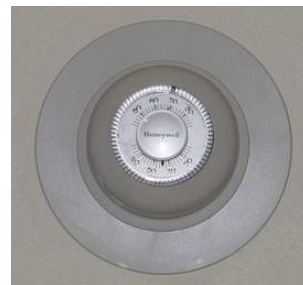
An ENERGY STAR® central air conditioner uses 8% less energy than a new conventional unit.

Save more than \$100 a year with an energy-efficient refrigerator and air conditioner.

Notes:

Next steps, hints & tips

- Test the seal on your refrigerator door. Put a dollar bill against the door frame and close the door. You should feel tension when you pull on the dollar bill.
- Clean the coils behind or under your refrigerator to ensure it is running most efficiently.
- Consider getting rid of a second refrigerator.
- When you come home and turn on the AC, don't set the thermostat at a colder setting than normal. It won't cool your home any faster and it could wind up costing you money.^[16]
- In the summer, keep your house warmer when you are away, and turn the thermostat down to no lower than 78°F only when you are at home and need cooling.
- Set your thermostat as high as comfortably possible and control for humidity with a dehumidifier.
- Use landscaping to save on home cooling (and heating). Trees, shrubs and vines can all provide cooling shade, when properly places.^[17]



Transition Streets

2.16 CONTROL YOUR HEAT

The Practical
Action Plan

Cost: none

\$ Savings: med

Effort: low

CO2 saved: med

Challenge

Space heating and water heating account for 63% of the energy used in the typical American home.^[18] Changing the settings on furnaces, boilers and water heaters just a little can have a big impact. However, many of us don't know how to effectively change heating settings. Mastering them can make a big difference to our wallets.

Solution

A programmable thermostat can help you save as much as 10% off your heating bill if you turn down the heat at night or when you aren't home.^[19] Surprisingly few homeowners manually reset their thermostat or use a programmable thermostat to automatically adjust the heat. They are passing up easy savings.

Take a little time to learn how to change the heat settings on your furnace/boiler and water heater. Refer to the instruction manuals that came with them. If you don't have any manuals, copies can usually be downloaded from the manufacturer's website. (See 2.30 for a Heating Controls summary.)



Image above from <http://greengroundswell.com/7-ways-to-stay-warm-indoors-in-the-winter-and-be-green/2012/12/03/>

Yes, but ... I like being cozy at home. You can achieve the same effect by wearing more clothes, like thermal underwear.^[20] You could also try weather-stripping, air sealing, and adding insulation to your home to keep the heat inside.

Savings and benefits

For every degree you turn your thermostat down, just at night, you can save about 1% of your total heating bill. If you use a programmable thermostat, it could save you 10% of your heating bill.^[19]

When replacing a furnace, boiler or water heater look for ENERGY STAR® models. An ENERGY STAR® furnace can save you up to \$75 a year in northern states and up to \$25 in southern states^[20]; a water heater from \$5 to \$25 a year.^[21]

Save up to \$150 a year with programmed thermostat and ENERGY STAR® furnace/boiler and water heater.

Notes:

Next steps, hints & tips

- You can upgrade to a programmable thermostat for \$25 to \$150, depending on features.
- Try setting your thermostat so most rooms in your house are 65°F (depending on the location of your thermostat, you may need to set it above 65°F to warm other parts of the house adequately).
- Set the heating to come on 20 minutes before you get up or get home from work, and to go off 15 minutes before you leave home or go to bed.
- Setting the night-time temperature slightly lower (60 to 67°F) can promote better sleep, but too cold makes for poor sleep.^[22] For infants and toddlers, the recommended temp is 65 to 70°F.
- Heat the rooms you use most, rather than the whole house. Close vents or radiator valves. Use space heaters.
- If you have old radiators, consider installing TRVs (thermostatic radiator valves) to control the heat output of a single radiator.^[24]
- Turn down the heating temperature when on vacation or away for the weekend.
- Keep curtains and furniture away from vents and radiators to let heat circulate.

Transition Streets

2.18 INSULATING WATER HEATER AND PIPES

The Practical
Action Plan

Cost: med

\$ Savings: med

Effort: med

CO2 saved: med

Challenge

Many home hot water heater tanks are not sufficiently insulated. This means that heat is continually being lost, and your water heater has to work harder to keep the stored water at the desired temperature.

Heat is also lost from pipes that carry hot water around your house.



Solution

Both tank insulation and pipe insulation will keep your water hotter for longer by reducing the amount of heat that escapes. This reduces your fuel bill and saves you money. Wrapping hot pipes in foam sleeves stops them from losing heat through contact with cold air. Both tank insulation and pipe insulation are cheap and easy to fit, so this is a DIY option even if you're renting.

In many cases, you can reduce your hot water heater setting to 120°F (factory setting is usually 140°F). This reduces the risk of scalding, saves energy, and reduces corrosion and mineral build-up in your pipes. You may not want to do this if your dishwasher does not have a booster heater, or if someone in your household has a suppressed immune system or chronic respiratory disease.^[25]

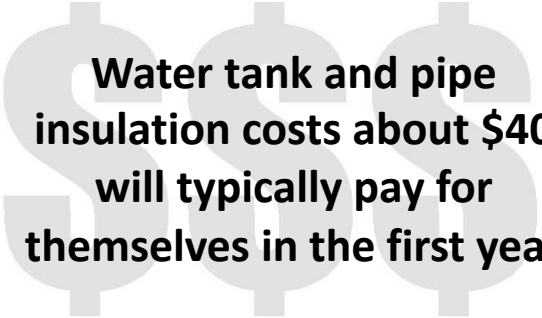
Visit <http://www.energy.gov/energysaver/projects/savings-project-lower-water-heating-temperature> to learn more about health and safety risks.

Yes, but ... I can't access most of my hot water pipes. If you can afford it, get professional help. Otherwise, just do the ones that you can easily reach.

Savings and benefits

Insulating your water tank could reduce standby heat losses by 25% to 45% and save you about 4% to 9% on water heating costs.^[26] A hot water heater jacket costs about \$25 and pays for itself in a year.

Insulation for hot water pipes will cost about \$10 to \$15 and save you around \$10 - \$15 a year.^[27]



Water tank and pipe insulation costs about \$40 will typically pay for themselves in the first year

Next steps, hints & tips

- If your tank is new, it's likely that it's already insulated.
- If you have an older tank, check to see if it is warm to the touch. If so, it needs an insulating jacket.
- Measure and write down the tank size (diameter, height, gallons).
- Fit an insulating jacket (3 inches or 75mm thick) around your hot water tank.
- Feel your water pipes and consider insulating those that are hot. Buy foam tubes and fit to pipes.
- Insulation should be at least 8 inches away from a gas flue. If pipes are within 8 inches, use unfaced fiberglass and secure with wire.
- For DIY guides, see <http://www.energy.gov/energysaver>.

Notes:

Transition Streets

2.20 WEATHER-STRIPPING

The Practical
Action Plan

Cost: med

\$ Savings: med

Effort: med

CO2 saved: med

Challenge

If you can feel cold air coming in around the windows and doors in your home, it means warm air is escaping. Sitting in a draft doesn't just give you a chill. In a typical home small air leaks add up to the equivalent of having one window open every day.^[28]

Save up to 15% off your heating and cooling costs per year by weather-stripping, sealing air leaks and insulating your attic.^[28]



Solution

A drafty window or door is quickly and cheaply remedied by a visit to the hardware store. Weather-stripping seals gaps around windows, doors, attic hatches and other movable parts of your home, and decreases the amount of cold air leaking in. Once it's snug, you'll start saving cash, and CO₂, as well as feeling more warm and comfortable.

There are several types of materials available from DIY stores, including brushes, foams and sealants, strips, and shaped rubber or plastic. Check the quality of the products. Metal, silicone and rubber are the longest lasting, while vinyl and foam are the shortest lived.

Yes, but ... doesn't my house still need to breathe? Once the drafts are plugged, it's important that the house is still ventilated. You might need to add a ventilation fan in kitchens and bathrooms if condensation becomes a problem.

Next steps, hints & tips

- Find out where the drafts are coming from: older windows, door frames and attic hatches are all easy to check and remedy. On a windy day, hold a stick of lit incense or a match near these openings and watch the smoke for signs of drafts.
- Measure external doors and windows and buy seals from the hardware store. Seals are usually made from self-adhesive foam, rubber, or brush material.
- Get a brush-style draft stopper for your mail slot or seal it up and use an external mailbox.
- Seal unused chimneys with a solid plug or a chimney balloon. Remember to take them out again should you decide to use your chimney.
- In winter, draw the curtains at dusk to minimize cold radiating from the windows. Charity shops often have cheap curtains. Curtains wearing thin? Sew a layer of heavy lining material inside them or pay someone to do it for you.
- Windows still drafty, but can't afford new ones? Cover them in a clear plastic film that tightens over the pane when heated with a hairdryer. This is easy to do and doesn't damage window trim.
- Low-e storm windows are an affordable alternative to window replacement, creating another layer of dead air between the outside and inside. The low-e coating keeps heat in and hot sun out.^[29]
- Research and share local resources related to weather-stripping refunds, grants and classes using Local Resources Section 2.33.
- See <http://energy.gov/energysaver> for tips on weather-stripping doors, windows and more.

Notes:

Transition Streets

2.22 AIR SEALING

The Practical
Action Plan

Cost: high

\$ Savings: high

Effort: med

CO2 saved: high

Challenge

Often the largest air leaks are hidden in the attic and basement, which makes them harder to find. Large holes around chimneys, plumbing pipes, or over kitchen cabinets can let heated air rise into the attic and pull cold air in through leaks into the basement.

Solution

Air leaks can be found and sealed, resulting in a much more comfortable home and lower energy bills. A good air sealing job in the attic and basement stops air from circulating, reducing cold drafts. Air sealing stops air from blowing through existing insulation, making the insulation much more effective.

You can hire a professional to do air sealing (low effort, higher cost) or find and seal those leaks yourself (higher effort, medium cost) with the help of DIY guides. (Try searching “air sealing” at: <http://energy.gov/energysaver/energy-saver>.)



Save up to 15% off heating/cooling costs per year by weather-stripping, air-sealing and insulating.^[28]

Yes, but ... Is my furnace or water heater getting enough air? Most houses leak plenty of air. After air sealing, an energy auditor can conduct a combustion safety test to ensure your gas furnace and gas water heater are getting enough air and not leading carbon monoxide into your home.

Disclaimer: Do not try any major DIY project without guidance. It could lead to unnecessary costs or irreparable damage to one's home. Home energy retrofits like air sealing and wall insulation are most feasible as part of a larger remodeling project.

Transition Streets

2.23 AIR SEALING



Next steps, hints & tips

- A professional energy audit can help you find air leaks in your attic or basement.
- If you hire professional help, make sure they do a blower door test with infrared camera to look for air leaks before and after they finish air sealing. There should be a dramatic reduction in the air leakage rate. They can also make sure your furnace and water heater are getting enough air. For more information on professional home energy audits, visit <https://www.energy.gov/energysaver/home-energy-audits/professional-home-energy-audits>.
- Your utility company may offer rebates or incentives for home energy audits. Check their website.
- Sewer vent pipes and plumbing running from the basement to the attic are common locations for air leaks. Holes drilled for electrical wires are a path for air to move through walls and from the basement to the attic.
- Check that all recessed light fixtures under unheated spaces are caulked and sealed. Where a fixture protrudes into an attic, it should be boxed in to avoid contact with insulation.
- Common locations for air leaks are rim joists of basement walls and the top of walls where they meet an unheated attic.
- For detailed instructions on finding and closing air leaks, see “A Do-It-Yourself Guide to Sealing and Insulating with ENERGY STAR®.” It is excellent for its pictures and tips, plus helpful advice on when to bring in professional help. Available at http://www.energystar.gov/ia/partners/publications/pubdocs/DIY_Guide_May_2008.pdf?8de2-b8ac
- For a more technical guide, see “Attic Air Sealing Guide and Details,” which has excellent diagrams and instructions: <https://buildingscience.com/documents/guides-and-manuals/gm-attic-air-sealing-guide/view>
- If you live in a cold climate, see “Home Envelope Guide” for DIY help with air sealing and insulation: <https://structuretech1.com/wp-content/uploads/2014/10/Building-Envelope-Guide.pdf>
- Research and share local resources related to grants, classes, and recommended contractors for air sealing and other energy-efficiency upgrades using section 2.28.

Transition Streets

2.24 ATTIC INSULATION

The Practical
Action Plan

Cost: high

\$ Savings: high

Effort: med

CO2 saved: high

Challenge

Attic insulation keeps your house warmer in winter and cooler in the summer. In an uninsulated home, a quarter to a half of your heat is lost through the roof.

Insulating your attic is a simple and effective way to reduce your heating bills and you can even do it yourself. Already have insulation? Current insulation recommendations may be higher than when your home was built or insulated. Many older homes can save quite a bit by adding more. (Be sure you've done your air sealing first to protect your insulation from moisture.)



Solution

Insulation acts as a blanket, preventing heat from rising from the house below. It also keeps summer heat in the attic from entering the home. Insulating material can simply be laid over the floor of the attic, between and over the joists, if they are visible. If there is flooring in the attic, it may be blown in under the floor boards.

Attic insulation can be a DIY task (high effort, medium cost) or can be done by a professional with medium effort on your part but at a higher cost. Your utility company or local or state government may have rebates and incentives available to help you pay for insulation. Research and share information on local resources for attic insulation.

Yes, but ... I don't know which materials to use. Each type of insulation material has its own strengths and weaknesses. Their suitability will depend on the nature of your attic space, but all of them are better than not insulating at all. Learn more at <http://energy.gov/energysaver/articles/insulation-materials>

Transition Streets

2.25 ATTIC INSULATION

Your savings

Even if you already have some attic insulation, the DOE estimates weather-stripping, air sealing, and insulating your attic can save up to 15% off your heating and cooling costs (or 11% of your total energy bill) in both warm and cold climates.^[31]

Save up to 15% off heating/cooling costs per year by weather-stripping, air-sealing and insulating.^[28]

Notes:

Next steps, hints & tips

- Always perform attic air sealing before adding insulation, because insulation will not stop air leaks and air leaks can ruin insulation.
- Check your existing insulation level. How does it compare to the ENERGY STAR® suggested insulation level for your area?^[31]
https://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_insulation_table
- Do not insulate if you have old knob and tube wiring.
- Decide whether you want to install it yourself or get a professional to do it. Consider which material you prefer.
- Check with your utility or insulation contractors for financial incentives and rebates.
- Always wear protective masks, eyewear, and clothing when handling insulation.
- Remember to protect recessed lights on the the top floor ceiling. See the DIY guide below for necessary steps.
- Read this “Attic Insulation Project” DIY guide for detailed instructions and advice to see if you want to do it yourself:
https://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_attic_insulation

Transition Streets

2.26 WALL INSULATION

The Practical
Action Plan

Cost: high

\$ Savings: high

Effort: med

CO2 saved: high

Challenge

In most houses in the U.S., the external walls are stud walls with a cavity between studs. If the cavity is empty, your home has uninsulated walls, and a considerable slice of your energy bills will be spent heating (or cooling) the air outside. In fact, about a third of all the heat lost in an uninsulated home is lost through the walls.

Solution

Wall insulation is a fantastic way to make your home feel more comfortable and significantly reduce home heating costs.

Filling the wall cavity between the studs and the inside and outside finished surfaces with an insulating material significantly decreases the amount of heat that escapes through the walls. It will help keep the temperature in your home even, prevent condensation on the walls and ceilings (which can lead to mold), and reduce the amount of heat building up inside your home during summer hot spells.

Insulation can be installed during remodeling, or from the outside through holes drilled in the wall. It's a simple process for a professional installer and is normally completed without damage or mess to your house or garden. Be sure to choose a reputable installer who offers a long-term guarantee.



Yes, but ... why invest in wall insulation when I'm going to sell my house in the next few years? Wall insulation will increase your home's efficiency, potentially adding value to your home.

Transition Streets

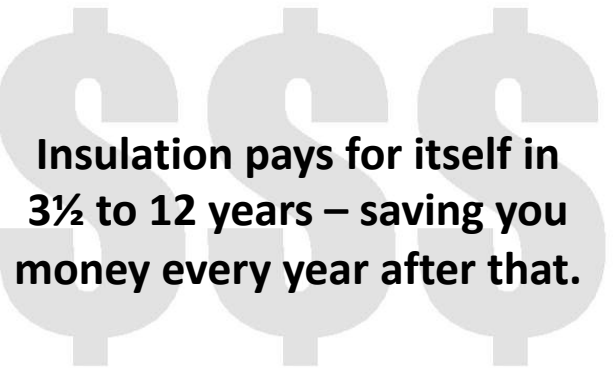
2.27 WALL INSULATION

The Practical
Action Plan

Savings and benefits

Wall insulation can significantly cut both heating and cooling bills. Savings vary with climate and local energy costs, but the Department of Energy found that adding insulation can pay for itself in 3½ to 12 years.

Notes:



Insulation pays for itself in 3½ to 12 years – saving you money every year after that.

Next steps, hints & tips

- Most houses have a wall cavity that can be insulated. Drilling a small hole in an interior wall can help you see if the wall already has insulation.
- Many utilities or local and state governments offer rebates, grants, loans, and other incentives for adding wall and ceiling insulation.
- Research and share information on local resources for wall insulation using section 2.34.
- Dense pack cellulose/foam helps restrict air movement and creates a more airtight house. It can even be blown into wall cavities with older, damaged fiberglass batts.
- See “A Consumer’s Guide to Home Energy Upgrades” for advice on choosing air sealing and insulation options.

<https://www.energy.gov/articles/living-comfortably-consumer-s-guide-home-energy-upgrades>

Transition Streets

2.28 OTHER ENERGY SAVING OPTIONS

Overview and where to go for more information

You may want to explore these actions **once you've done the basics** outlined in this workbook. These projects tend to take more effort and/or more investment and have a longer payback period. However, they can further reduce your energy use and your carbon footprint.

Buy new, high-efficiency heating and cooling equipment

Heating and cooling accounts for more than 50% of a home's energy use. New high-efficiency equipment will significantly cut your home's CO₂ emissions and could save as much as \$200 a year, depending on what climate you live in. In a cold climate, consider a high-efficiency condensing furnace or boiler and improved heating controls. A heat recovery ventilator can recover 90% of the heat of the air it exhausts outside while bringing in fresh air. In a hot climate, you could reduce your cooling energy by 20% to 40% with a new high-efficiency central air conditioner. See:

<http://energy.gov/energysaver/articles/furnaces-and-boilers>

<http://energy.gov/energysaver/articles/air-conditioning>

Replace your windows

Windows account for 30% of a typical home's heat loss. New windows with double panes and a low-e coating (low-emissivity) cut drafts and heat loss in cold climates and cut undesirable heat gain in warm climates. Triple pane windows are now a popular way to replace windows, and may be worth considering. For more information and advice, see <http://energy.gov/energysaver/articles/energy-efficient-windows>.

Recapture heat

It takes energy to heat water and air, and once used, that energy disappears as hot water goes down the drain and warm air cools or escapes from our homes. But there are heat recovery technologies that are geared for home use. A heat exchanger is one such technology. New systems can recovery up to 90% of the heat from the air to recirculate back into the home.^[30]

A hot-water heat recovery system like Ecodrain [<https://ecodrain.com/en/>] is another technology for new buildings or remodeling projects. This technology pulls the heat from the water after it goes down the drain.

Transition Streets

2.29 OTHER ENERGY SAVING OPTIONS

Overview and where to go for more information

Plan carefully for basement wall insulation

In climate zone 3 and colder, basement wall insulation increases comfort and saves energy. But solve any water intrusion problems – whether from rain or melting snow – before insulating. Then use only rigid or sprayed foam that is not damaged by water. Don't use fiberglass batt or cellulose in a basement. For more information and advice, see: <http://www.greenbuildingadvisor.com/blogs/dept/musings/how-insulate-basement-wall>.

Switch to a renewable/green energy provider

Many utilities offer a renewable energy option. This might cost a little more each month, but as more people sign up the utility has to increase its renewable sources.

If you can, switch to a renewable energy supplier to reduce demand for fossil fuel and to create demand for renewable technologies. This supports new jobs in the the green energy industry, which is so critical to dealing with climate change.

Install your own renewable energy

Renewable energy systems are effective alternatives to fossil fuels and will help you meet your own energy requirements as well as reduce your home's CO2 emissions.

In an unshaded spot on your lot or your house, you could install a solar PV array to generate electricity, a solar thermal system to heat water, or a solar hot air system for space heating. A creek on your property might provide hydroelectric power. A large open area with few obstructions could provide an opportunity for a wind turbine. However, these systems can be expensive. For more information, see

<http://energy.gov/energysaver/articles/planning-home-renewable-energy-systems>.



Look for rebates

You can find information on each states' incentives and policies that support renewables and energy efficiency at <http://www.dsireusa.org>.

Transition Streets

2.30 HEATING CONTROLS

Overview

What is a room thermostat?

This constantly measures the air temperature of a space to control when your furnace, boiler or AC unit turns on. You can set it for whatever temperature suits you best. When the temperature falls below (or above) that setting, the thermostat switches on the heating or cooling. Once the room reaches the set temperature, the thermostat switches the heating or cooling unit off. Thermostats are usually located in halls, stairs or landing areas.

What is a programmable thermostat?

A programmable thermostat lets you choose the times you want your home to be heated or cooled and the temperature you want it to reach. In other words, it allows you to heat/cool to different temperatures at appropriate times of the day and week. By heating/cooling your home only when necessary, you can save energy and money.

What are thermostatic radiator valves (TRVs)?

TRVs sense the air temperature around them and regulate the flow of hot water to keep a set temperature in a specific room served by a radiator. They can save money and energy by allowing different temperatures in some rooms than in others, turning off heating in rooms that are not used.



Transition Streets

2.31 YOUR ENERGY ACTION PLAN



Reminder

Possible actions

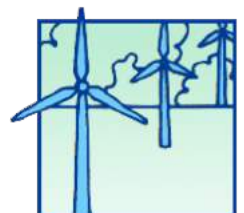
- Know how much energy you are using (2.3)
- Electronics & appliances (2.7)
- Reduce your standby power load (2.10)
- See the light (2.12)
- Keeping your cool (2.14)
- Control your heat (2.16)
- Insulating water heater and pipes (2.87)
- Weather-stripping (2.21)
- Air sealing (2.22)
- Attic insulation (2.24)
- Wall insulation (2.26)
- Other energy use options (2.28)

**What other ideas does your group have that aren't covered above?
Add them below if you think they are relevant for you.**

My actions	Previously done	When I'll do this	Notes

Group actions

How can you help each other in your group? List group actions here (with named person and due date).



Transition Streets

2.32 ENERGY: THE BIG PICTURE

Questions for discussion

There are many different actions that you can take to save energy. Taken together, all these actions play a significant part in saving you money, as well as reducing your energy consumption — which means fewer fossil fuel power stations being built to supply us with energy, be they coal, nuclear, oil or gas-fueled.

- What are the real reasons for us continuing to use energy unssustainably?
- How can we share this information about energy conservation with others in our lives and make a bigger change in our communities?
- When does it make sense to buy an energy efficient appliance if you already have a functioning older model? (After all, it takes energy to make new products and to dispose of old ones.)

Notes:

Transition Streets

2.33 LOCAL RESOURCES

Where to go for local information

Add your own information about local resources, grants, contractors, etc. for each of the energy-saving actions below.

Electric meter and electricity monitor:

Gas meter:

Light bulb samples:

CFL recycling:

Refrigeration:

Energy audit:

Weather-stripping:

Air sealing:

Attic insulation:

Renewable energy resources, programs, & incentives:

Transition Streets

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