CITY OF FREDERICTON

HOME ENERGY KIT

Fredericton

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INTRODUCTION

Thank you for borrowing this Home Energy Toolkit. The aim of this guide is to help Fredericktonians to lower their environmental impact and make their homes more comfortable while saving money on their energy bills. It's often confusing to know what needs to be done to make a building more energy efficient. This easy-to-use, DIY kit provides tools and information to help you understand your household's energy use. It will guide you through an energy evaluation of your home, providing quick and easy access to powerful visual information about home energy efficiency and next steps to conserve energy and save on your utility bills.*

*This home energy evaluation will not qualify you for current rebate programs. You are simply doing your own assessment of your home's energy use to understand opportunities to conserve energy.
An EnerGuide home energy evaluation is an extensive audit performed by a trained professional that provides your home with a rating and label and is required to qualify for the current rebate programs. Learn more at **www.nrcan.gc.ca/energy-efficiency**

SCAN HERE TO LEARN MORE

SAFETY DISCLAIMER

Should you decide to do all or part of the renovations yourself, do not forget about health and safety. Be careful when working with tools and products and follow the manufacturer's safety information and directions. Wear appropriate protective equipment and clothing. You should also take steps to protect the rest of the house from dust, debris and contaminants that could pose a problem for others.

Find out about the necessary precautions to take before working in areas that contain vermin droppings, mold, lead, asbestos, and vermiculite insulation that may contain amphibole asbestos or other hazardous products. If you decide to hire a contractor, ask for quotes in writing and insist on a written contract before you start any work.

The City assumes no responsibility for any injuries that occur when using this manual.

REMEMBER

You have the power to save.
Every small change counts!

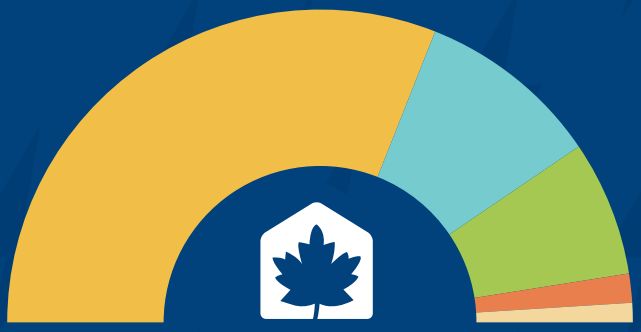
What is a Home Energy Retrofit?

A home energy retrofit is an upgrade or renovation that makes your home more energy efficient and comfortable. Retrofits can involve small changes like insulation, caulking and weatherstripping but they can also be bigger changes like replacing windows and doors or improving the heating or cooling systems. You can help address climate change and save money by making your home as energy efficient as possible.

Understanding Your Energy Use

Over 50% of New Brunswick homes are heated with electricity. A typical New Brunswick household uses about 2,014 kilowatt hours (kWh) of electricity per month for heating and 750 kWh per month for appliances. On average, a household that uses electricity for their energy needs might spend $4,418 per year to heat their homes and power their appliances. (Source: NB Power)

The chart below shows how energy is used in a typical Canadian home. Your home heating system is usually the biggest energy user, accounting for about 62% of your total home energy use. For the biggest savings, focus on reducing your heating demand and look out for high energy-using appliances such as older fridges, freezers, or clothes dryers.



DISTRIBUTION OF RESIDENTIAL ENERGY USE IN CANADA

* total is not equal to 100% due to rounding.

- **Space Heating** (62%)
- **Lighting** (3%)
- **Water Heating** (19%)
- **Space Cooling** (2%)
- **Appliances** (14%)

With this toolkit, you can find out how efficiently you use energy in each of these key areas, explore ways to save money and learn about strategies to shrink your energy footprint.

This kit & instruction manual was produced in partnership with: ↓

WHAT IS IN YOUR TOOLKIT?

1 Imaging IR (Infrared) Thermometer

To measure the temperature of areas, objects, and surfaces.

2 FLIR C5 Thermal Imaging Camera

To see heat loss in buildings and identify sources of energy loss.

3 Flow Meter Bag

To measure the water flow rate of your shower head and tap.

4 Stopwatch

To measure the duration of an event.

5 Watt Meter

To measure the energy demand of an electric appliance.

6 Fridge Thermometer

To measure the temperature of fridge and freezers during use.

7 Light Meter

To measure the amount of light in a room.

Please return equipment to the Fredericton Public Library when finished.

**The kit contains instruction manuals for each device.*

Heating and Cooling

We can save energy used for heating and cooling by replacing doors or upgrading our central heating system; but simple changes can also add up to significant savings.

In older houses or those that are poorly insulated, heat is lost through the walls, windows, and doors. This increases the amount of time a furnace or heater must run.

Everything around you either emits or reflects heat energy. To improve your heating energy efficiency, you need to know where heat is escaping and where cold air is coming in. The Infrared (IR) Thermometer and Thermal Camera are both used to detect heat loss. Both tools work on the same principle: they detect infrared radiation and translate it into temperature readings.

*If you do not have access to a smartphone, use the Infrared Thermometer for similar results.

Note: For best results, there should be at least a 10˚C temperature difference between the inside and outside of your home.

TOOL TO USE

Infrared (IR) Thermometer

DID YOU KNOW?

Air leakage can be responsible for up to one-third of a building's heating cost.

US Department of Energy, Improving the energy efficiency of existing windows. 2008

1. Set the temperature change threshold using the slider. For e.g., to detect small temperature changes, move slider to 0.5˚C (1˚F).
2. With the unit off, point the thermometer at an interior wall or area of average home temperature. This will be your reference temperature.
3. Turn the unit on and point the thermometer at potential heat-loss spots such as doors, windows, outlets, and exterior walls. The detector compares the reference temperature and the scan temperature.
4. If the scanned temperature is hotter than reference temperature, the light will turn from green to red. If the scanned temperature is colder than the reference temperature by more than the threshold, the light will turn from green to blue.

   GREEN (*Good*)

   RED (*Gaining Heat*)

   BLUE (*Losing Heat*)
5. Record your results on the worksheet.

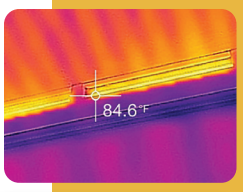
Areas to focus on with the IR Thermometer and Thermal Camera:

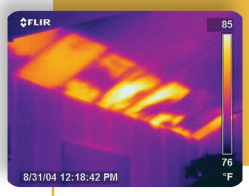
- Windows
- Doors
- Walls
- Baseboard, outlets, and switches on exterior walls
- Attic
- Exhaust fans
- Recessed lights
- Pipe and wire penetrations
- Basement
- Fireplace
- Joints between types of construction like the chimney and the wall

TOOL TO USE

FLIR C5 Thermal Imaging Camera

* Camera connects to a smart phone.





These images taken from an infrared camera show examples of a home with poor insulation and air leaks. The yellow spots in the picture are areas with no or little insulation. These are areas of heat loss in the house.

You can also visit the FLIR ONE website **www.flir.ca** to learn more about the devices and its application to detect moisture, leakage, and electrical faults.

1. Download the FLIR ONE app from the Apple App Store or Google Play Store. Charge the camera before use.
2. Insert the camera into the charging port on your phone with the lens facing away from you. Adjust the wheel for a secure fit. You may need to remove your phone case.

   PURPLE *(Cold)*

   RED *(Moderate)*

   YELLOW *(Hot)*

   * The colour spectrum can be changed in the app
3. Open the app and press the power button on the bottom of the camera. If connected properly, you should see an image in 3 colours, based on the temperature of objects. The camera also displays a numerical temperature in the image.
4. Tap the white circle to save a screenshot directly to your phone gallery. You can also record a video. Access the gallery using the icon at the top right.
5. See the table at the top of this page for suggested areas to focus on and record any problem spots on the worksheet.
6. Turn off the camera with the bottom button when finished.

Energy
SAVING TIPS

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LOW/NO COST

1. Apply weatherstripping to seal the gaps around windows and doors.
2. Use an insulator sheet on your windows to prevent any leakage.
3. Draw blinds or curtains to avoid overheating in summers and stop drafts in the winter.
4. Apply caulking to seal off leaks and keep out moisture.
5. Use draft snakes or fabric tubes under windows or doors to prevent cold air from sneaking in.
6. Don't block air vents with furniture or rugs.
7. Lower your thermostats while sleeping or when you are away.
8. Switch off baseboard heaters at the circuit breaker at the end of the heating season.
9. Vacuum your baseboard heater fins at least once a year.
10. Shut the damper and glass doors on your open-hearth fireplace when fire is out.
11. Clean or replace your furnace filters every 3 months.

DIY TIPS:

How to do V-Seal Weatherstripping → **How to do Foam Tape Weatherstripping**

www.youtube.com/watch?v=fy6SCl7iKgE

HIGHER COST

1. Install a smart or programmable thermostat that lowers heat when you are not home or at night.
2. Seal and insulate your unused open-hearth fireplace.
3. Seal and insulate all supply ductwork and ensure distribution system is appropriately sized.
4. Insulate your basement and attic, which may account for 25% of heat loss.
5. Get your central heating system checked serviced by a professional at least once a year.

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DID YOU KNOW?

For every 3° lower, you can ***SAVE 6%*** *on your electric heating bill* (Source:NB Power)

Water Heating

Domestic water heating can consume a large amount of energy. In an average Canadian household, water heating consumes up to 17 % of the energy bills. Canadians use an average of 75 litres of hot water for everyday use such as dishwashing, laundry, cleaning, or bathing. (Source: NRCan, 2019).

This exercise will help you figure out the rate at which water flows through your taps and showerheads.

1. Take the flow meter bag provided in the kit and follow the instructions on the bag – this exercise is easier with two people!
2. Measure the amount of water in the bag in LPM and record this on your worksheet.
3. Repeat to confirm your result.

TOOLS TO USE

Flow Meter Bag

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Stopwatch

DIY TIP: If your tap flow rate is higher than 6 L per minute, then you may want to install an aerator delivering a stream of both water and air but if your shower flow rate is higher than 12 L per minute, you may want to install a low-flow shower head.

How to install a faucet aerator :
www.youtube.com/watch?v=yvldvq-nY00

IDEAL FLOW RATES

Bathroom Faucet	Kitchen Faucet	Shower
5-6 L per minute	5-6 L per minute	7-8 L per minute

DID YOU KNOW?

NB Power and World Health Organization recommend leaving your hot water thermostat at 60°C (140°F). This temperature is safe for human consumption and protects against harmful bacteria build up inside the water heater. By doing this you can also reduce your water heating costs.

To check your hot water temperature, let the hot water run for 5 minutes, then use a meat/candy thermometer to check the temperature.

Water
SAVING TIPS

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LOW/NO COST

1. Soak or rinse pots in cold water before washing them.
2. Do not leave hot water running while you do other tasks.
3. Take a short (<10 min) shower instead of a bath.
4. Do not pre-rinse dishes if using a dishwasher and wash full loads.
5. Use cold water for laundry and you can save up to 75% of the energy per load.

DID YOU KNOW?

Cold water preserves color better and reduces fading. It is gentle on your clothes and does not cause shrinking

HIGHER COST

1. Install aerators on taps to reduce flow.
2. Install low-flow toilets (<4.8L/flush) and showerheads (<7.6 L/minute).
3. Insulate your water heater with a lagging jacket. You could save 7-16% of your energy bill if you have an older model.
4. Insulate hot and cold-water pipes by covering the first few meters in foam sleeves or insulating wrap with a minimum of RSI 0.7 (R-4). Leave a 15 cm (6-inch) clearance between insulation and vent pipes on fuel-fired water heaters. Do not insulate the relief valve.
5. Install a drain-water heat recovery unit. You could recover enough heat to save 15-20% of the energy required for hot water.
6. Fix leaks as soon as possible.

DIY TIPS:

How to install a showerhead

https://www.youtube.com/watch?v=vkdnGf5XYWI

CHECK OUT the water heater guide by NRCan

https://www.nrcan.gc.ca/energy-efficiency/products/water-heaters/13735

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Home Appliances

Despite low individual energy costs, cumulatively all the appliances in your home can add significantly to your energy bills. Appliances such as fridges, freezers, dishwashers, and washing machines account for up to 14% of a household's energy use (NRCan, 2019). Some of your appliances continue to use electricity even when you aren't using them?. This is known as a phantom or standby load. The energy used to run the clock on your coffeemaker, keep your computer on standby, and even your cellphone charger that is plugged in but not connected can collectively make up 5-10% of your electric bill. Any device with a remote, a clock, that is programmable, connected to a network (smart), or has a light consumes electricity even when it's not in use.

Though we all love to be connected, plug your devices into a power bar and turn it off when not in use to avoid wasting energy. Follow the tips on the next page to save more energy.

TOOL TO USE

Watt Meter

1. Plug the watt meter in an outlet, then plug an appliance into the meter. If there are saved values. Press the reset button.
2. The first row of the screen shows the timer (how long the device is connected to power). Press the function button to see different measurement values such as Watt (W), cumulative electrical quantity lower case k (KWh), voltage (V), and current (A) of the device.
3. Measure the wattage and kWh consumed on various settings for e.g., low versus high setting on the hair dryer, or battery saving mode on your computer.
4. On the worksheet, record the power (W) and energy consumed (kWh) by a device and how long you used it. Use the formulas to calculate how much powering this appliance costs you every month.
5. Reset the device between appliances and when you're finished.

Reference Video

https://www.youtube.com/watch?v=gYtVvzCRqk8

DIY TIP:

If you are planning to buy a new appliance, check out the mandatory EnerGuide label to compare the energy efficiency of similar models.

https://www.nrcan.gc.ca/energy-efficiency/energuide-canada/energuide-label/13609

DID YOU KNOW?

The ENERGY STAR® symbol is a consumer icon in the Canadian marketplace. It instantly identifies products and homes that have been certified as energy efficient. ENERGY STAR appliances use less power and water than standard appliances.

TOOL TO USE

Fridge Thermometer

Your fridge and freezer use lots of energy since they are always running. The colder the interior temperature, the more energy being used. The recommended refrigerator temperature is 3°C and the freezer temperature is -18°C.

1. Hang the thermometer in the fridge or freezer overnight.
2. Record the temperature on your worksheet.
3. Adjust your appliance using the built-in thermostat if necessary.

Energy
SAVING TIPS

LOW/NO COST

DISHWASHER

1. With the right dishwasher and detergent, there is no need to pre-rinse. Just scrape the food and load dishes.
2. Ensure that the dishwasher is always full before using.
3. Use 'eco-mode' on your dishwasher if there is one.
4. Use the air-dry setting rather than heat-dry setting.

REFRIDGERATOR

1. Position your fridge away from heat sources such as ovens, dishwashers, heating vents and direct sunlight.
2. Set fridges between 1.7°C and 3.3°C (35°F and 38°F) and freezers at -18°C (0°F) for maximum efficiency and food safety.
3. Keep the door seals clean and tight.
4. Clean the condenser coils regularly for better airflow.
5. Defrost your freezer annually.
6. Cool hot food before putting it in the fridge.

WASHER & DRYER

1. Wash with cold water and a full load. (Note: Be aware of your machine's limits.)
2. Pre-soak dirty items to avoid double washing.
3. Clean the dryer lint trap to increase airflow.
4. Choose high speed or extended spin settings to get more water out of your clothes before using the dryer.
5. Skip the dryer and hang your clothes outside in the sun or inside on a drying rack.

OTHER APPLIANCES

1. Unplug rarely used devices like the guest room TV or printer.
2. Use your microwave to reheat food rather than your oven, it is more efficient.
3. Unplug as many appliances and devices as you can if you are going on holiday.
4. Cook multiple meals at once.
5. Use lids on pots and pans to save energy.
6. Use power bars on home entertainment or computer systems and switch everything off when not in use.
7. Avoid running your dishwasher or washing machine at peak energy demand times (6-9 am and 4-8 pm). Use the delay function if you have one.

Home Lighting

Your light switch is one of the most underrated energy-saving devices. It is important to choose both energy efficient bulb and fixtures and use the correct amount of light depending on the room. Switch to LED bulbs which are more energy efficient and longer lasting than incandescent or CFL bulbs.

Remember to turn off the lights when a room is not occupied. On a sunny day, there is nothing better than using the sun's energy to heat and light up your house. Simply keep your blinds open in the winters and close them in summer to block the heat.

WHY SHOULD YOU SWITCH TO LEDS?

Light-emitting diodes (LEDs) super-efficient light bulbs that create a lot of light but use very little energy. They roughly use 10 percent of the energy used by an incandescent bulb and last as long as up to five years.

TOOL TO USE

Light Meter

1. Take the cover off the sensor and press the power button.
2. Press the R button once to select LUX as the unit (LUX should appear on the screen).
3. Measure various locations in your home with the sensor facing towards the light source. (If the light is bright and "1" appears on the screen, press R to change the order of magnitude (10x, 100x) but ensure you multiple by the same factor when recording the results.)
4. To hold or save a value press DH. Press DH again to exit Hold Mode.
5. Record your readings on the worksheet. When finished, replace the cover and turn off the device.

RECOMMENDED MINIMUM LUX

ACTIVITY	LUX
Entertaining & dining	**100-220**
Casual reading & grooming	**220-550**
Kitchen, laundry (general light)	**220-550**
Kitchen (food preparation), prolonged reading or studying, workshop activities, sewing	**320-640**
Office work	**550-1,100**
Sewing (dark coloured fabrics) & hobbies involving fine detail	**1,100-2,200**

Once you have your current lux rating for each room in the house, compare it to the table above. If you have too much light in an area, you can remove or replace one or more bulbs to reduce energy use, referred to as delamping. If your lighting is not bright enough, you can replace existing bulbs with brighter, efficient LED bulbs.

Energy
SAVING TIPS

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LOW COST

1. Use task lighting in office or bedrooms to focus light where you need it.
2. Open curtains and shades to utilize natural light during the day.
3. Clean light fixtures for maximum light at minimum energy use.

HIGHER COST

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1. Install dimmer switches or motion sensors to reduce light use.
2. Invest in LED festive lighting to reduce energy bills.

DID YOU KNOW? *In New Brunswick, ten dollars will power 100 LED strings compared to 11 incandescent ones.* (Source: Canada Energy Regulator)

Clean Energy Incentives and Rebates

1

PROVINCIAL GRANTS

In New Brunswick, NB Power currently administers several clean energy incentive programs. Visit **www.saveenergynb.ca** to check your eligibility and learn more about current programs.

2

FEDERAL GRANTS

The Government of Canada also provides grants to help you make energy efficiency retrofits to your home. To know more about the current programs, visit: **https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/23441**

Renter's Energy Saving Checklist

If you are a renter, big upgrades to save energy may not be an option for you; but, can still save money and lower your carbon footprint.

Talk to your landlord: Ask if they are willing to make changes to your apartment such as installing a smart thermostat or weather stripping windows. You could also inquire about being reimbursed for making upgrades.

Check out these tips below to save money on your energy bills.

1. **Seal any gaps or cracks**: Seal the gaps around windows, vents and exterior doors with caulking. You can also use foam gaskets under switches and outlets to keep the heat in.
2. **Set your thermostat to energy efficient temperatures:** Turn your thermostat lower while you're away from home or sleeping. Lower the heat and close doors to less used rooms.
3. **Unplug your devices:** Unplug small appliances such as coffee makers, microwaves, food processors, game systems, chargers etc. when not in use. Use a power bar and turn it off when you aren't using your devices.
4. **Opt for LED:** When replacing light bulbs or buying holiday lights, opt for LED. They last up to 25 times longer than traditional and use less energy, saving you money.

Follow additional low-cost tips in our Home Energy Kit Guide to save money as a renter.

Final Steps

Now that you've used the toolkit and started your energy efficiency journey, your next steps could be:

1. Consider a professional home energy evaluation, which will qualify you for current rebate programs.
2. Thinking about going solar? Check out our solar potential map at **https://solar.myheat.ca/fredericton/.** But remember that energy efficiency steps should be taken first so that you don't buy an oversized system.
3. Spread the word about home energy efficiency.
4. Enjoy the savings from your home energy actions!

RETURN THE TOOL KIT TO THE FREDERICTON PUBLIC LIBRARY!

Make sure that all tools (listed on page 5), user manuals and charging cables are in the kit before returning it.

GLOSSARY

Ampere:
A measure of electrical current.

Carbon footprint
Total greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organization, event, or product.

Caulking:
A waterproof seal used in repairs and building work.

Current:
The flow of electricity.

Heat loss:
Loss of heat in a building from indoors to outdoors, typically through the roof, walls, windows, doors, and floor.

Kilowatt-hour (kWh):
The use of 1,000 watts over one hour.

Lux:
A measure of light intensity or illumination.

Volt:
A unit of electrical potential.

Watt:
The standard unit of power..

Weatherstripping:
Flexible strip of rubber, metal, or wood to seal any openings around windows, doors, etc. to prevent heat loss.

Was this kit **useful**? Have **suggestions**?

Please let us know at **environmental.leadership@fredericton.ca**
Visit our website for a digital version of this handbook.