

HOME ENERGY TOOLKIT MANUAL



**CHANGE
HOMES
FOR
CLIMATE**



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The Home Energy Toolkit was developed in partnership with:



and supported by a grant from:



INTRODUCTION

Thank you for borrowing this Home Energy Toolkit. It provides tools, tests and information to help you understand your household energy use. The Home Energy Toolkit will also help you identify some ways to save energy and money, and reduce your carbon footprint.

By taking some simple, affordable steps to understanding energy use and greening your home, you're helping to reduce Edmonton's impact on the environment.

There are both economic and environmental benefits to reducing energy use in Edmonton. Currently, over 50% of Alberta's energy comes from burning coal. Some of the negative impacts associated with coal-fired power plants include water and air pollution. Coal-fired plants also create large quantities of toxic wastes like ash and sludge.

In addition, coal produces more carbon dioxide per energy unit generated than either oil or natural gas. Residences currently account for 20% of emissions in Edmonton. By making your house more efficient and reducing your energy consumption, you are reducing the amount of coal burned in Alberta, and therefore reducing greenhouse gas (GHG) emissions.



It is important to understand that you are not undergoing a home energy evaluation. An EnerGuide home energy evaluation is an extensive series of tests conducted by a trained professional that provides you with a rating and label for the total amount of energy your home uses in a year. You are simply doing your own assessment of your home's energy use to understand opportunities to conserve energy.

Before you start your assessment, please learn about the EnerGuide home evaluation: nrcan.gc.ca/myenerguide

BUILDING, BUYING OR RENOVATING?

The Home Energy Toolkit is designed to be used in an existing home. If you are planning on buying or building a home or considering major renovations in your current one, the building materials and design you select will have an impact on how energy efficient your home will be.

The City of Edmonton's Change Homes for Climate Guide offers detailed information about energy-saving green ideas. The *Change Homes for Climate Guide* can be found in this toolkit and at changeformclimate.ca/guides



TOOLKIT



Kill-A-Watt Meter [\$18]

Measures the energy demand of an electrical appliance.



Imaging IR (Infrared) Thermometer [\$400]

Measures the temperature of areas, objects and surfaces.



Stopwatch [\$18]

Records accurate time for shower or tap flow rate test.



Light Meter [\$22]

Measures the amount of light in a room.



LED Lightbulb [\$15]

Use with Kill-A-Watt meter to see the difference in energy use compared to conventional incandescent or compact fluorescent lightbulb (CFL).



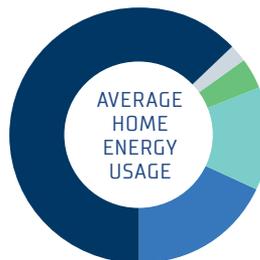
Battery Charger [\$45] Rechargeable Batteries [\$3.50 to \$15.00 each]

Batteries for each tool and a charging station to recharge them.

All items must be returned with the toolkit.

AVERAGE HOME ENERGY USAGE

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 roughly 63% of your total home energy use. For the biggest savings, focus on reducing your heating demands. Also watch out for high energy-using appliances such as older refrigerators and freezers, hot tubs, heat lamps and aquariums.



63% SPACE HEATING
2% SPACE COOLING
4% LIGHTING
13% APPLIANCES
19% WATER HEATING

SOURCE: NRCAN 2015



NEED HELP?

If at any point you require help while using the Home Energy Toolkit, or if you would like more advice about conserving home energy, please contact the City of Edmonton:
changeforclimate@edmonton.ca

HEATING AND COOLING

We can conserve energy used for heating and cooling by making physical upgrades to our houses, like adding insulation and replacing windows. But we can also decrease household heating and cooling energy use by just making simple changes to what we do in our homes each day.

For general tips on how to heat and cool your home for less, go to page 24 in the *Change Habits for Climate Guide* or page 24 in the *Change Homes for Climate Guide* [changeforclimate.ca/guides].

TOOLKIT



Use the INFRARED THERMOMETER to check room temperatures. See page 12 for instructions.

Check the temperature in a few places around your house, focusing on windows, doors, baseboards and electrical outlets along exterior walls, heating vents, where the walls meet the foundation and the walls themselves.

Make note of any places that seem to show a large temperature change, indicated by green or blue on the screen.

Take readings in several locations in your room and house to see if your home is at an even temperature or if there are significant differences.

If you are seeing temperature differences between the top and bottom of your walls, this could indicate your insulation has settled. Consider getting an official home energy evaluation, or asking your landlord or condo board to provide one for you. For more information on home energy evaluations, see page 11 of this guide.

Regardless of whether you rent, own a condo or are a homeowner, there are several low cost options to fix the problems you might find.

Apply weatherstripping

Weatherstripping allows you to seal the gap around windows and doors. It will make your home feel warmer, while also saving money on your energy bills.

It is generally inexpensive and there are several types available. Talk to someone at your local

hardware store to find the best type for your specific needs.

Use plastic wrap on windows

You can buy a window insulation kit from a hardware store or make your own using plastic wrap or drycleaner bags that are free of holes and double-sided tape. Ensure the plastic stretches across the window frame with about one inch of excess on all sides.

For further insulation, spray the glass lightly

with water and apply bubble wrap before putting up the plastic.

Be sure to leave one window in each room uncovered as a fire escape.

Safety Warning: *plastic can lead to suffocation. Be careful when using this material around children.*

Put up heavy or layered curtains

Use heavy fabrics or layer curtains over windows to keep out drafts.

These can be matched to your home décor and also help to block out light.

Apply caulking

Caulking is used to seal off air leaks and keep out moisture.

There are several types of caulking available. Talk to someone at your local hardware store to ensure you make the right choices for your home.

Use draft snakes

These are fabric tubes placed under a window sill or door to prevent cold air from sneaking in.

They can be made by sewing a tube of fabric to fit the width of your window or door and filling it with rice.

Install a programmable thermostat

A programmable or smart thermostat lets you set the furnace to turn down automatically at times when you don't typically need as much heat (for example, at night or during work or school hours) and to turn it up when you require heat. A smart thermostat provides more convenience by allowing you to control your home's temperature with an app on your smartphone. It can also learn your preferences and routines and automatically adjust the temperature. Smart thermostats also create

energy reports to help you track your energy savings and costs.

You can also change or clean your furnace filter monthly during the cold season to improve efficiency. For better air flow and heat distribution, make sure that furniture is not blocking your heat vents.

And instead of turning up the heat when you feel a little chilly, consider grabbing a blanket, or putting on a sweater and maybe slippers or extra socks too!

Use a fan instead of air conditioning

Air conditioning uses a tremendous amount of energy. Fans can provide comfort and air movement on hot summer days, and they use far less energy than air conditioning. To maximize the use of your ceiling fan make sure you have it turning in the correct direction.

During the warm weather months, you want your ceiling fan to be rotating counter clockwise (looking at it from below), this will push the air down towards you. You will be able to tell that the fan is turning in the right direction if you stand under the fan and feel the air moving. Set it to medium or high for maximum effect. Better yet, if there is a cool breeze, open a window instead.

During the cooler weather months, change your ceiling fan's direction so that it is rotating clockwise (looking at it from below). When the ceiling fan is rotating clockwise it will help circulate the warm air throughout the room. A low fan setting should be enough.

WATER

Heating water is expensive. When you use hot water at home, you are paying for both the water itself and the energy used to heat it.

One way to reduce your GHG emissions related to water is to use a rain barrel for outdoor use, such as watering gardens. Other ways include taking shorter showers, only running your dishwasher and washing machine with full loads and turning off the tap when brushing your teeth. A 20% reduction in water use can save a family up to \$128/year and reduced greenhouse gas emissions by 80kg. Using the cold water setting for laundry also saves energy.

For more tips on how to save money on water heating, see page 28 in the *Change Homes for Climate Guide*.

TOOLKIT



Use the STOPWATCH to measure your shower and tap flow rate. For instructions, go to page 13.

This activity is best done with two people. You will also need a bucket and a large measuring cup.

Turn on the shower or tap to full capacity. Start the stopwatch as you put the bucket under the water.

Collect all the water coming out of the shower head for ten seconds.

Measure the amount of water in litres.

Multiply the number of litres by 6 to give you a flow rate per minute. If you collected two litres in ten seconds, the flow rate is 2 litres X 6 = 12 litres per minute.

If you see a shower flow rate higher than 15 L per minute, you should consider installing a low-flow showerhead.

If your tap flow rate is higher than 6 L per minute, you may want to install an aerator, which screws onto your faucet head, delivering a stream of both water and air. Most newer homes will already have aerators, but they may need replacing over time.

Flow Rate Chart

	Bathroom Faucet	Kitchen Faucet	Shower
Low	5–6 L per minute	5–6 L per minute	7–8 L per minute



Insulate hot water pipes

Insulating hot water pipes keeps the water in the pipes warmer. That way, less water needs to be heated to bring hot water to a faucet. Pipe insulation can be found at your local hardware store.

Toilet leak test

In just minutes, you can find out if your toilet is wasting thousands of litres of water due to a leak.

Here's how:

1. Remove the tank lid, then flush.
2. After the flapper/tank ball drops and the tank refills, add several drops of dark food colouring.
3. Wait at least 20 minutes without flushing.
4. After the 20 minutes, look in the toilet bowl. If any trace of colour appears, there is a leak.

Leaks often occur at the flapper valve, which is simple and inexpensive to replace. Your local hardware store can recommend the best valve for you.

Source: EPCOR Water

OTHER APPLIANCES

Although individual appliance energy costs may be low, when you add up all the appliances in your home, they can contribute significantly to your energy costs.

Always try to use the right appliance for the job. Heating up something small? Consider using the toaster oven instead of the full-size oven. Smaller appliances such as toaster ovens, microwaves and slow cookers use less energy than the stove, even if cooking takes longer. Matching pots and pans to the right size of burner and using lids also saves energy.

There is no need to keep that fridge cooler than the suggested setting or to use the heat-dry setting on your dishwasher. If possible, run appliances only when there is a full load, maximizing energy efficiency. Some appliances even come with eco-setting suggestions. These settings will help you use less energy.



When you need to replace an appliance, look for the Energy Star[®] symbol. Energy Star is a voluntary labelling program to identify and promote energy efficient products.

TOOLKIT



Use the **KILL-A-WATT METER** to check how much energy is used by appliances in your home when they are in use, when they are on a different setting (e.g. eco-setting) and on stand-by. See page 14 for instructions.

Take a bite out of vampire power

Phantom or vampire power is electricity used by a device when it is turned off. This wasted power is responsible for up to 10% of home electricity use. An easy way to avoid this problem is to plug your devices into a power

bar and turn the bar off when not in use. Some power bars can leave one or two items fully powered while automatically shutting off the others when not in use.

TOOLKIT



Use the **INFRARED THERMOMETER** to measure your fridge and freezer temperatures by pointing the thermometer at the inside of the appliances. See page 12 for instructions.

It is important to keep your fridge and freezer at the correct temperature. According to EPCOR, the ideal temperature for maximum efficiency and food safety is 3°C (38°F) for the refrigerator and -18°C (0°F) for the freezer temperature.

Maintain your appliances

Basic maintenance ensures your appliances are working as efficiently as possible. For example, consider vacuuming the coils at the back of your fridge and draining sediment from the bottom of your hot water tank.

And ensure doors seal properly. Keep fridge, freezer and oven door seals clean. Wipe them regularly and check the condition of the sealing strip. Inspect it for sections that are brittle, cracked or pressed out of shape.

The door seal should be strong enough to grip a piece of paper. Place a piece of paper between the door and the seal and gently pull it. If the paper comes away, the seal needs to be replaced. It is a good idea to check several places around the door.

Time for a new fridge?

It is important to think about the life of your appliance from the time you bring it home through to its disposal.

Take all household hazardous waste, electrical items and big bulky items to an Eco Station for recycling and safe disposal. Electronic waste (anything with a cord or a battery) and household hazardous waste can be dropped off for free. Taking these items to an Eco Station



BEWARE OF OLD FRIDGES AND FREEZERS!

Appliance efficiency has increased significantly in recent years. If your fridge or freezer is more than ten years old, it may be costing you more to run than you realize. Be sure to check your extra freezer in the basement too.

Consider reducing the number of fridges and freezers in your home, or buying newer, more efficient models. While buying new appliances can be expensive, they will use less energy and save you money long-term.

enables reuse and recycling of some parts, and suitable disposal or treatment of hazardous materials. For example, used oil and paint are made into new products.

Fridges, freezers and air conditioners are also accepted at Eco Stations, but there is a small fee to drop off these items.

Visit edmonton.ca/ecostations for up-to-date fees, locations and hours.

LIGHTING

MAXIMIZE YOUR USE OF SUNLIGHT

You can use the sun's energy to heat and light up your house when it is cold and block it from your house when it is warm and bright. Simply open your blinds on winter days and close them on summer days.

TOOLKIT



Use the **KILL-A-WATT METER** to check how much energy is used by plug-in light fixtures in your home, both when they are in use and on stand-by. See page 14 for instructions.



After using the **KILL-A-WATT** for a day or two, try switching an incandescent or compact fluorescent light (CFL) to the **LED** light provided to compare energy use. Be sure to return the **LED** to the toolkit before returning it to the library.

Save energy through lighting

The best energy-saving device is the light switch. Try to get into the habit of turning off the lights when a room is not occupied. Consider replacing with LEDs, which are more energy efficient and longer lasting than incandescent or CFL bulbs. Also, think about how many bulbs you actually require in a room. Task lighting, such as a reading lamp, can focus light only where you need it. Lighting controls such as automatic timers, motion sensors and dimmer switches can also help reduce electricity usage.

Measure light

There are several terms used to reference how much light is present at any one time. The most common unit for measuring light intensity is lux. 1 lux is equal to the illumination of a surface one metre away from a single candle. Some common lux readings include:

- 50,000 – summer sunshine
- 5,000 – overcast sky
- 400 – sunrise/sunset with a clear sky
- 5 – typical side road lighting
- 1 – moonlight



TOOLKIT



Use the **LIGHT METER** to measure your light availability and compare it to your task needs See page 13 for instructions.

How much light do you need?

Once you have your current lux rating for each room in your house, compare it to the table below to determine how much light you actually need. The process of rightsizing your lighting has been referred to as "delamping". If you have too much light in an area for the tasks that are commonly done in that area, you can remove or replace one or more of the bulbs and reduce energy use. If you find your lighting is not bright enough, consider replacing bulbs with brighter, high efficient ones such as LEDs.

The numbers presented below are given as a range, as some people prefer brighter lighting while others prefer dimmer lighting. Age can also have an impact on the amount of light one needs, with older individuals requiring more light than their younger counterparts.

RECOMMENDED MINIMUM LUX	
Activity	Lux
Entertaining and dining	100–220
Casual reading and grooming	220–550
Kitchen, laundry (general light)	220–550
Office work	320–640
Kitchen (food preparation), prolonged reading or studying, workshop activities, sewing (medium coloured fabrics)	550–1,100
Sewing (dark fabrics) and hobbies involving fine detail	1,100–2,200

ADDITIONAL INFORMATION

EnerGuide Home Evaluation

EnerGuide^(TM) is Canada's energy rating and labeling system that certifies the energy efficiency of products and homes. An EnerGuide home evaluation will provide you with a full assessment of your home's energy performance and expert advice on how to make it more efficient. For more information on EnerGuide see pages 8–11 in the *Change Homes for Climate Guide*.

Change Homes for Climate

Through the City of Edmonton Change Homes for Climate program, you can learn more about available incentives and rebates on EnerGuide Home evaluations, solar energy, and energy efficiency products and upgrades. Learn more at: changeformclimate.ca

Understanding your energy bill

The average apartment in Edmonton uses 200–500 kWh each month. Compare this to the average condo at 500–700 kWh, house at 800–1,200 kWh and mobile home at 1,000–1,500 kWh.

For more information on understanding your energy bill, go to: <https://www.epcor.com/account-billing/Pages/understanding-your-bill.aspx>

USING THE BATTERY CHARGER

If the tools are not working, try recharging the batteries.

1. Open lid and place batteries in charger, matching the polarity marks (+ and –).
2. Plug transformer into a standard outlet.
3. Charge the batteries based on the recommended times in the table below.
4. Unplug charger when charging is complete and return all materials to toolkit.



Safety Warning

- It is important to charge only the included batteries. Charging other types of batteries may cause them to leak, rupture or explode.
- Use the charger only in dry locations. Keep away from rain, snow or excessive moisture.
- Never plug battery chargers into an extension cord.
- Do not operate the charger if damaged. Instead, email: changeformclimate@edmonton.ca
- Do not disassemble, modify any part of the charger or attempt to use the charger as a power source.
- The charger is not a toy and should not be used by children without adequate supervision.



When charging the AAA batteries, a minimum of two AAA batteries are required for the charger to work.



BATTERY CHARGING TIMES

Battery Size	Number of batteries	Estimated charging time
AA	1-4	3 hours
	5-8	6 hours
AAA	2-8	3 hours
9V	1	6 hours



USING THE STOPWATCH

Count down timer settings

1. To reset, press MIN and SEC (grey) buttons at the same time to reset to zero.
2. Press the START/STOP (red) button once and the timer will start to count down at one second intervals.
3. Stop alarm at 10 seconds by pressing the START/STOP (red) button.
4. To pause, press START/STOP (red) button once. Press again to continue counting.
5. To clear display, press MIN and SEC (grey) buttons together. Display will now show "00:00".

Count up timer settings

1. When timer is in reset stage (see step 5 above), press START/STOP (red) button once to activate count up feature. The timer will count up in one second intervals.
2. To pause, press START/STOP (red) button once. Press again to continue counting.
3. To return the count up timer to zero, first press START/STOP (red) button, then press MIN and SEC (grey) buttons together.

Batteries required: one AAA battery

Return to page 5 (Water).



USING THE LIGHT METER

1. Take the cover off the sensor.
2. For most rooms, the sensor will need to be switched to the '2,000' mark, meaning the range the meter will measure is from 1-2,000.
3. Move the switch to the 'ON' position.
4. Put the sensor and meter on a table in the room you want to measure.
5. When the meter becomes somewhat stable, record the number and compare it to the table on page 15 (Recommended Minimum Lux).
6. When finished with the light meter, be sure it is powered off and replace the cover.

Batteries required: one 9 volt

Return to page 9 (Lighting).

USING THE INFRARED THERMOMETER



To prevent dropping the thermometer, please remember to use the handstrap.



Having problems understanding the thermometer? Watch the home energy audit video: https://www.edmonton.ca/city_government/urban_planning_and_design/energy-audit-video.aspx

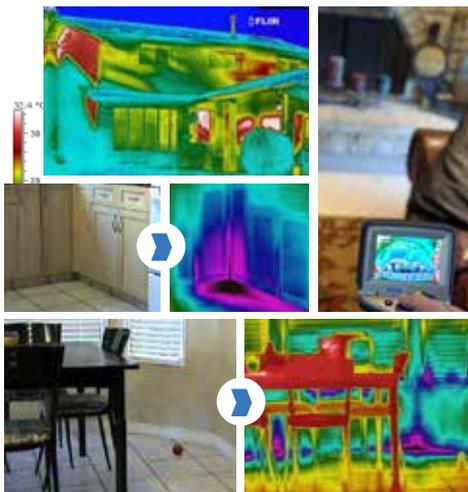
Using the infrared thermometer laser

Press the trigger and a red dot will appear on the surface of what the thermometer is pointed at.

Batteries required: none – use thermometer plug-in to recharge.

Return to page 3 (Heating and Cooling) or page 7 (Other Appliances).

An example of what you might see:



Charging the infrared thermometer

1. Plug the provided cable into the charging box labeled **INFRARED THERMOMETER**.
2. Lift the flap on the top of the thermometer, revealing a micro USB port.
3. Plug the cord into the micro USB port.
4. Allow it to charge for four to six hours before use.

Using the infrared thermometer

1. Press and hold the power button for a few seconds to power on or off. If the screen goes black, it has likely timed out. Just press and hold the power button again.
2. The centre of the screen will show an infrared image, while the top left corner shows the temperature at the centre of the image (in the white square).
 - Greens and blues represent cooler temperatures.
 - Yellows, oranges, reds and whites represent warmer temperatures.
3. Pull and release the trigger to take a photo.

Note: *The image will automatically delete in 5 seconds. If you want to keep a photo, use a camera or smartphone to capture the image on the thermometer screen.*
4. Pull the trigger again to return to real-time imaging.



Safety Warning

Do not point the laser in people's eyes. This can lead to blindness. Children should be supervised when using the infrared thermometer.



USING THE KILL-A-WATT METER

1. Plug the Kill-A-Watt meter into a standard wall outlet. An outlet higher up on a wall is preferred for ease of reading.
2. Plug any device into the Kill-A-Watt meter.
3. The LCD shows all meter readings: Volts, Current, Watts, Frequency, PF (power factor) and VA (volt-ampere). The unit will start to accumulate kWh and powered duration time (hour) after power is applied.
4. The “KWH/Hour” (purple) button is a toggle function button. Press it once to show the cumulative energy consumption since power was applied to the unit. Then press the button again to display the cumulative time since power was applied to the unit.
5. Consumption will be displayed in kilowatt-hours (from 0.01 kWh to 9,999 kWh). Time will initially be displayed as Hours:Minutes (from 00:00) and switch to Hours (to 9,999). Counters will recycle to zero when they reach their maximum. To reset, remove power from unit momentarily.

Definitions

Ampere: a measure of electrical current

Current: the flow of electricity

Kilowatt-hour(kWh): the use of 1,000 watts over an hour

Volt: a unit of electricity

Watt: a measure of electric power

For more definitions, check out:

<https://energyiq.canadiangeographic.ca/main/glossary>

Other meter readings

Other readings are available on the meter but are beyond what is required for the energy tests in this kit.

Batteries required: none

Return to page 7 (Other Appliances) or page 9 (Lighting).

RECOMMENDED READING

The Edmonton Public Library has graciously provided books and DVDs to supplement the information in this guide. Please take a look at these resources for further ideas on greening your home.

You can also check out the recommended titles below.

ADULTS

DeGunther, R. *Energy efficient homes for dummies*. Hoboken, N.J.: Wiley, 2008.

Findley, D. *Do-it-yourself home energy audits: 140 simple solutions to lower energy costs, increase your home's efficiency, and save the environment*. New York: McGraw-Hill, 2010.

Harley, B. *Cut your energy bills now: 150 smart ways to save money & make your home more comfortable & green*. Newtown, Conn.: Taunton, 2008.

Provey, Joseph. *300 home-improvement tips for working smarter, safer, greener*. Upper Saddle River, N.J.: Creative Homeowner, 2010.

Scheckel, P. *The home energy diet: How to save money by making your house energy-smart*. Gabriola Island, BC: New Society, 2005.

Scheckel, P. *The homeowner's energy handbook: Your guide to getting off the grid*. North Adams, MA: Storey Publishing, 2013.

Sunset Books Editors. *136 best ways to save on your home energy*. Menlo Park, California: Sunset, 2010.

Vasil, A. *Ecohome: The greenest, cleanest and most energy-efficient information under one (Canadian) roof*. Toronto: Vintage Canada, 2009.

TEENS*

Anderson, T., & Taudte, J. *Our Planet: Change is possible*. New York: Collins, 2008.

Savedge, J. *The green teen: The eco-friendly teen's guide to saving the planet*. Gabriola Island, BC: New Society, 2009.

Scott, J. *Green career\$: You can make money and save the planet*. Montréal, Quebec: Lobster Press, 2010.

Sivertsen, L., & Sivertsen, T. *Generation green: The ultimate teen guide to living an eco-friendly life*. New York: Simon Pulse, 2008.

*Although these books are aimed at teens, many of the concepts and activities are also engaging for adults.

KIDS

Berenstain, J., & Berenstain, M. *The Berenstain Bears go green*. New York: Harper Festival, 2013.

Cole, J., & Degen, B. *The magic school bus and the climate challenge*. New York: Scholastic Press, 2010.

Dalgleish, S. *Saving water*. Philadelphia: Chelsea House, 2003.

Davila, C. *Luz sees the light*. Toronto: Kids Can Press, 2011.

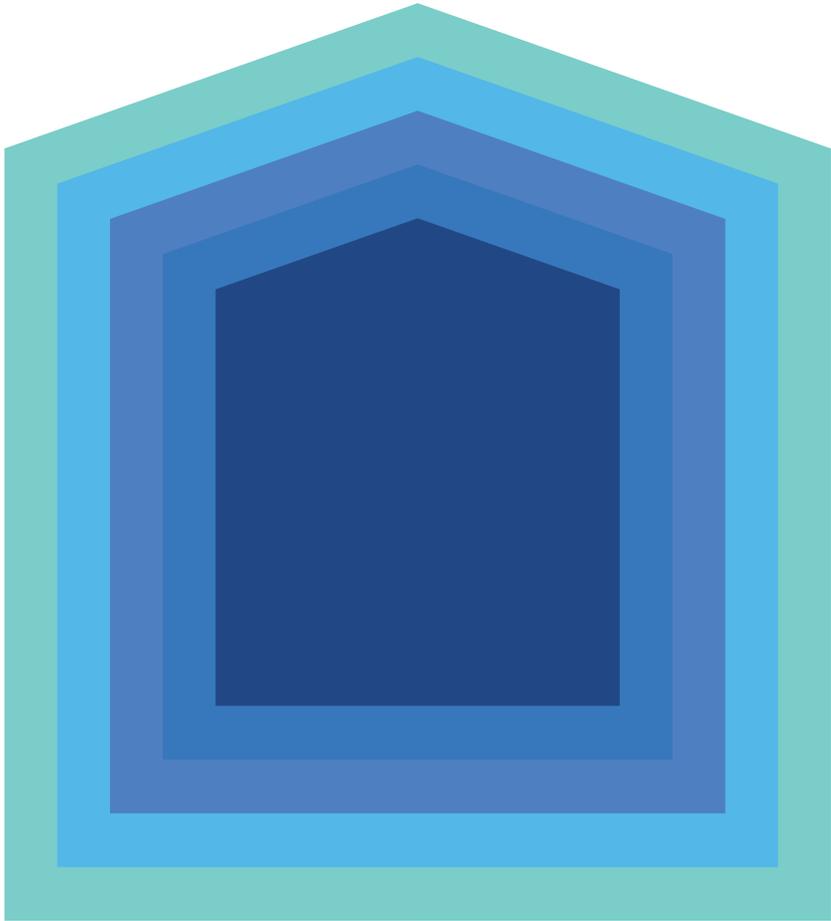
Douglis, C., & Kennaway, A. *Ting and the possible futures*. Nairobi: United Nations Environment Programme, 2008.

McKay, K., & Bonnin, J. *True green kids: 100 things you can do to save the planet*. Washington, D.C.: National Geographic, 2008.

Rodger, E. *Building a green community*. New York: Crabtree, 2008.

Walsh, M. *My green day: 10 green things I can do today*. London: Walker, 2010.

NOTES:



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changeforclimate.ca/guides