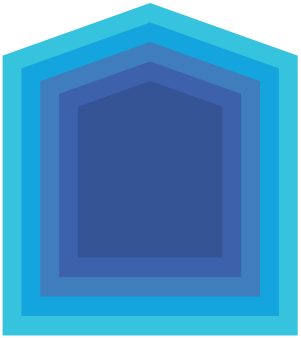
CHANGE HOMES FOR CLIMATE

YOUR GUIDE TO AN ENERGY EFFICIENT AND SUSTAINABLE HOME

Edmonton

December 2023



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CHANGE FOR CLIMATE

Edmonton

Edmonton is part of global, social, economic, and environmental systems that support our quality of life—systems that are being disrupted by climate change.

Seven out of 10 Edmontonians believe we need to take action on climate change. What actions will you take to protect our quality of life?

The Change Homes for Climate Guide outlines a variety of ways to improve the sustainability and energy efficiency of your home. Every action makes a difference, but to show you just how impactful your actions are, we developed a spectrum. It features over 30 actions that are rated from lowest to highest impact in reducing our total greenhouse gas (GHG) emissions. Find the impact ratings of the actions you're already taking and which ones you can start now to take your efforts to the next level.

Look for the blue arrows in the margins to quickly identify some of the measured actions you can take to reduce your greenhouse gas emissions.

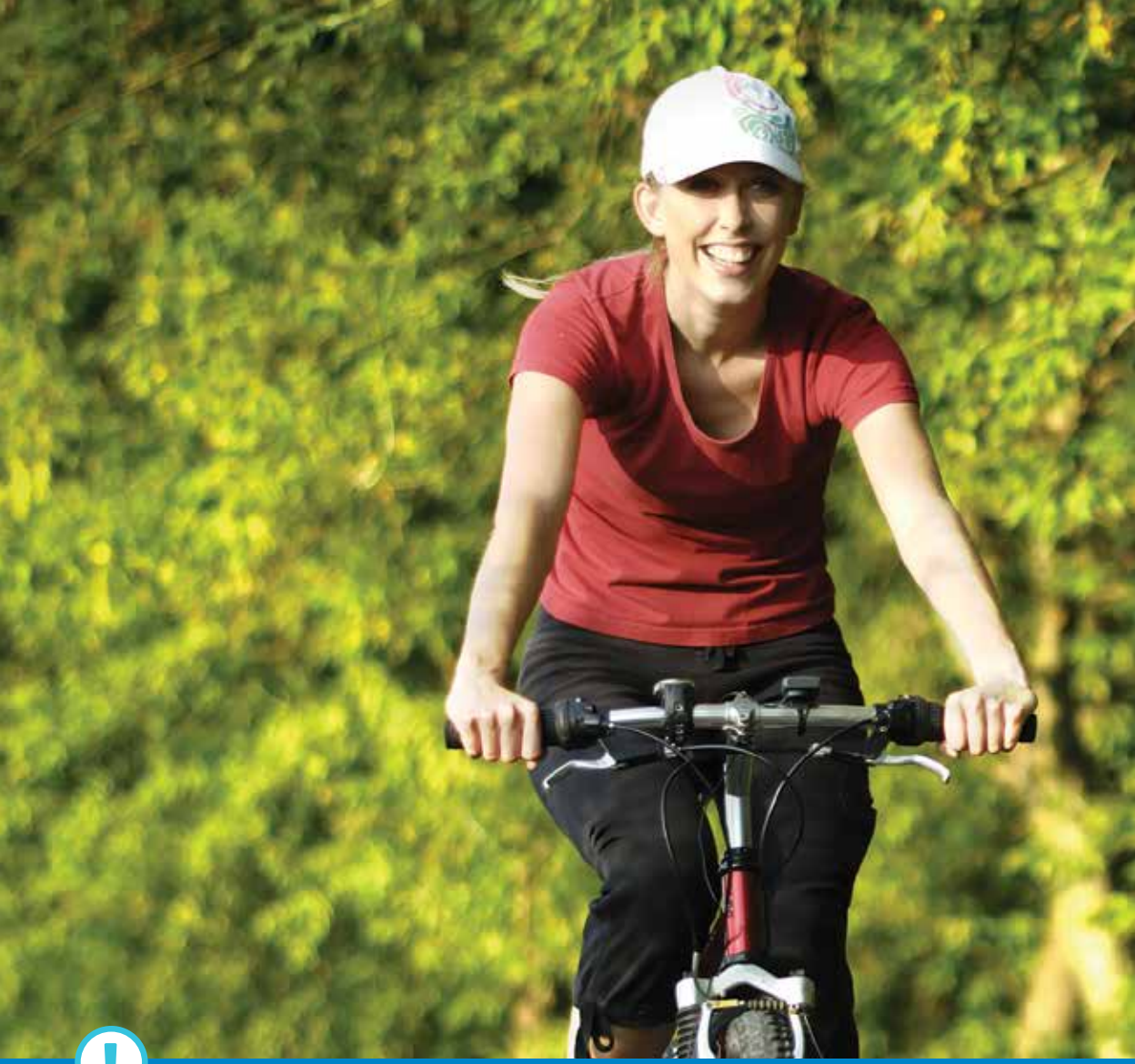
IMPACT RATING

LOW 1 2 3 4 5 HIGH

Each action is rated on a scale of 1 to 5 for how much it helps reduce greenhouse gas emissions.

Weather-proof your home (1)	Set your thermostat to 17–21°C (1)	Commute sustainably once per week (1)	Dry your clothes naturally (1)	Replace your showerhead and go low-flow (1)
Open and close your blinds seasonally (1)	Replace your faucet aerators (1)	Carshare instead of owning a vehicle (1)	Switch to a tankless water heater (1)	Use fans instead of air conditioning (1)
Cut your lawn using a solar or push mower (1)	Wash your clothes in cold water (1)	Leave your grass clippings on the lawn (1)	Use a toaster oven for small meals (1)	Drive better, drive smarter (1)
Retrofit your drain with a DWHR unit (1)	Replace your stove with an induction top stove (2)	Purchase the most efficient washer and dryer (2)	Switch to LED bulbs (2)	Insulate your basement (2)
Drive an electric vehicle (3)	Install energy efficient windows (3)	Insulate your walls (3)	Vacation locally instead of abroad (3)	Commute sustainably year-round (3)
Work and play close to where you live (4)	Install a high-efficiency furnace (4)	Invest in renewable energy with a solar PV system (5)	Upgrade your roof's insulation (5)	Retrofit your building's envelope for efficiency (5)

For more actions, join the movement at **changeforclimate.ca**



DISCLAIMER:

Construction based on the Change Homes for Climate Guide does not ensure compliance with the regulations of either the Edmonton Zoning Bylaw or the Alberta Building Code. Any approvals or inspections provided by the City of Edmonton will be based solely on those regulations and will neither confirm nor refute the standards of this guide. Homeowners considering undertaking construction related to this Guide should contact Development Services to ensure such compliance, and to obtain the necessary permits, inspections, and approvals. For more information, visit: **edmonton.ca/HomeImprovement**

A BIG STEP TOWARDS MINIMIZING OUR ENVIRONMENTAL FOOTPRINT

Our homes have a significant impact on the city's long-term sustainability. By taking some simple, affordable steps to greening your next home purchase or renovation, you're helping to minimize Edmonton's environmental footprint, one house at a time.

An overview of the:

CHANGE HOMES FOR CLIMATE GUIDE

INFORMATION SECTIONS

ALL THE ENERGY-SAVING DETAILS

So what are the features that a home should have? This Guide has the answers. Each information section is filled with the details you need, covering everything from location, home size, and Canada's energy rating system, to the building envelope, ventilation information, and home heating. You'll also learn about hot water heaters, rating systems, high-efficiency appliances, water consumption, landscaping, healthy homes and environment, solar energy, plus other innovations. There's even a handy glossary of terms.

An overview of the:

CHANGE HOMES FOR CLIMATE GUIDE

CHECKLISTS

ESSENTIAL FOR HOME BUYERS AND CONDO BUYERS

There's an easy-to-follow checklist for single-family home buyers that contains the important questions you need to ask your builder, your real estate agent, or the home seller. If you're buying a condo, then the checklist for condo buyers is tailor-made for you. Please refer to the checklist of your choice to help you plan your energy-saving activities.

This Change Homes for Climate Guide is intended to stay with the home; please use the checklists, write notes about your home in the margins, and give this book to the next owner.

TABLE OF CONTENTS

CHANGE HOMES FOR CLIMATE GUIDE INFORMATION SECTIONS

1 | LOCATION INFORMATION

Take a Good Look at Your Location

Changing how you travel in the city and making travel choices that are sustainable—taking the bus, cycling, walking, carpooling—reduces Edmonton's greenhouse gas emissions and helps to mitigate climate change. So take a good look at your location, because it plays a big part in determining how reliant you are on your personal vehicle.

A Walkable Location is a Healthy Choice

Whether you're buying a new or existing home, 800 metres (about 8 downtown blocks) is generally considered a walkable distance for most individuals. Housing that's located in a walkable neighbourhood near public transit, employment centres, schools, and other amenities is often considered to be location efficient. And a walkable location promotes an active lifestyle, which contributes to better health.

Every Home in Edmonton has a Walk Score. What's Yours?

Walk Score® is a large-scale, publicly accessible walkability index that assigns a numerical walkability score for any address in Edmonton. To learn more, visit: walkscore.com

And be sure to look for Walk Score on the Multiple Listing Service® (MLS), as many listings are starting to include it.

Taking Transit Reduces Transportation Costs

Being close to transit gives you the opportunity to cut down on the amount you drive, which helps reduce transportation costs.

WORK AND PLAY CLOSE TO WHERE YOU LIVE

Increase Your Location Efficiency

Here's something for home buyers to consider: Depending on where you work and your lifestyle, purchasing a home in a mature area may increase your location efficiency. Household energy costs include your transportation, so improving your location efficiency can reduce your overall household bills. Also, purchasing a home in a mature area keeps Edmonton's existing neighbourhoods vibrant and sustainable into the future.

FACTS AND TIPS: LEVERAGING YOUR LOCATION

Jobs

Living close to work is one of the greenest moves you can make. Your daily commute becomes low carbon, and the convenience, the health benefits, and the time-saving advantages of not driving to and from work can all have a positive impact on your quality of life.

Transit

Generally, a home is considered to have good access to transit if it's within a 5-minute walk of a regular city bus stop, and within a 10-minute walk of a rapid bus or rail. The primary goal with locating close to transit is that daily trips (such as commuting to work or school) are possible on transit.

COMMUTE SUSTAINABLY YEAR-ROUND

Amenities

Finding a home in a neighbourhood with convenient access to services, groceries, restaurants, and shopping means you'll spend less time in your car.

Parks and Green Space

Being able to quickly and easily get to a walking trail, a dog park, or sports field can have a positive impact on your family's lifestyle. In Edmonton, most homes are within a 5-minute walk from a green space.

Walking Maps

Check out Edmonton's walking maps at: edmonton.ca/walkmap

2 | HOME SIZE INFORMATION

Reduce Energy Costs with the Right-Sized Home

Choosing a home size that meets but doesn't exceed your family's needs can save you money on your monthly heating and electricity bills.

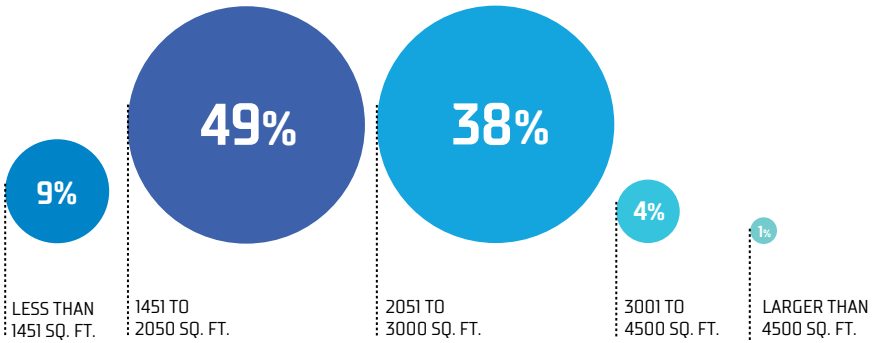
Smaller Home Sizes Make a Big Difference for Edmonton's Future

As a rule, a smaller home uses less energy than a larger one of a similar age. Attached homes like duplexes, row houses, and apartments use less energy on a square footage basis than single-detached homes due to shared walls, which reduce exposure to outside temperatures. Whenever less energy is used in Edmonton, it helps us contribute to our goals of using less fossil fuel and reducing greenhouse gases, which helps mitigate climate change while saving you money.

Home Size Quick Math: 500 Sq. Ft. per Person

Sometimes bigger isn't necessarily better. Look for a home that gives you the space you and your family need, but think twice about going too big. Depending on your family's needs, aim for 500 square feet per person. Look for homes that have an open plan or can be easily renovated to create an open plan in the main living areas. Open-plan homes feel more spacious even with a smaller total square footage.

Size of Homes Being Built in Edmonton (2019)



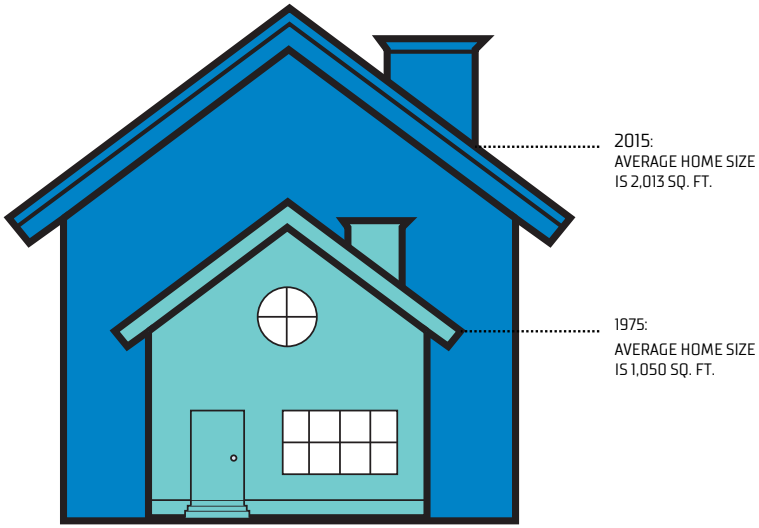
Smaller Homes are Easier to Clean, Cheaper to Remodel

Small is beautiful. In addition to being more cost-effective and energy efficient, a smaller home is also easier to clean, as there is less physical space to become dirty. Smaller homes are also cheaper to maintain and remodel as less house means less to fix and update.

Reduce Home Space: Put a Halt to Hallways

A quick way to determine if a home uses space well is to look at how much space is taken up by hallways. Open concepts that eliminate hallways can make a smaller house feel much bigger. Inpsiration for loving smaller homes can be found at: hgtv.com/design/topics/small-homes

Size of Homes: Then and Now



FACTS AND TIPS: AVERAGE HOME SIZES IN CANADA

The following are considered by ENERGY STAR® and LEED Canada for Homes® to be average home sizes.

A smaller-than-average home generally costs less to buy and less in monthly energy and maintenance costs.

DETACHED HOUSE SIZE	NUMBER OF BEDROOMS
93 sq. m (1,000 sq. ft.)	1
148 sq. m (1,600 sq. ft.)	2
204 sq. m (2,200 sq. ft.)	3
260 sq. m (2,800 sq. ft.)	4

Source: ENERGY STAR for Homes, V3 & CaGBC LEED Canada for Homes, V4

3| ENERGUIDE RATING SYSTEM

EnerGuide: Canada's Energy Rating and Labeling System

EnerGuide™ is Canada's energy rating and labeling system that certifies the energy efficiency of products and homes (new and existing). The EnerGuide rating allows you to easily compare the advantages of an energy-efficient major household appliance (dishwasher, furnace, etc.) to see how it measures up against the range of products sold in Canada.

How Does Your Home's Energy Performance Stack Up?

EnerGuide also provides a standard measure of your home's energy performance. The EnerGuide label shows you (and future buyers) approximately how energy efficient your home is while allowing you to compare the energy efficiency of your home with similar homes in your neighbourhood and across Canada. It's easy to understand and gives you comfort knowing that the home has been professionally assessed by a third party.

If you're planning to renovate or sell your home, the rating shows your home's present level of energy efficiency and projects the level it could achieve with recommended upgrades.

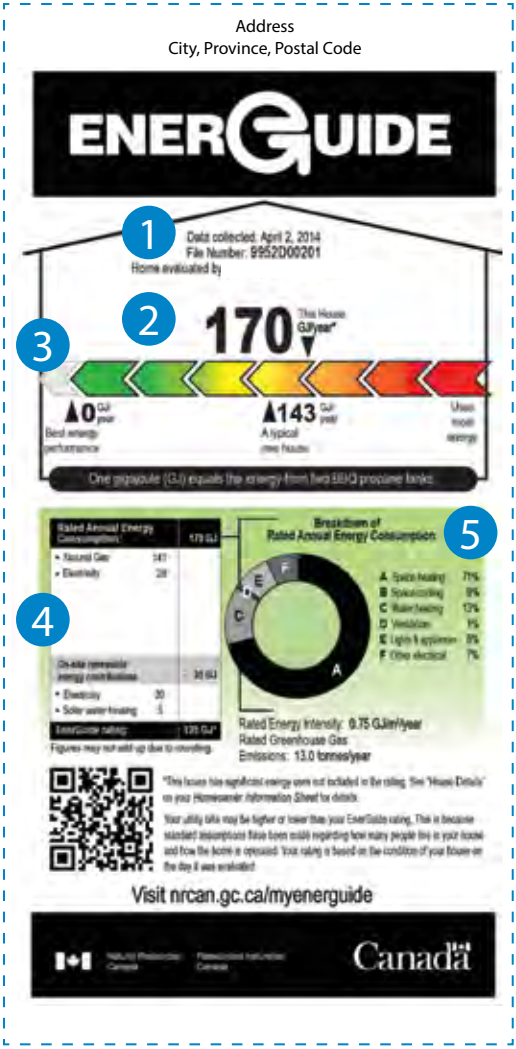
Energy Ratings Help Edmonton Measure Environmental Progress

The City of Edmonton actively encourages the use of EnerGuide as a way for everyone to engage in energy conservation. The EnerGuide rating also provides a basis for Natural Resources Canada (the federal agency that administers the EnerGuide for Homes program) to assess the estimated greenhouse gas emissions of buildings. This, in turn, helps the City of Edmonton measure progress towards its climate change mitigation goals.

For a New House, Look for a Label that Indicates that 'This House' Uses Less Energy on an Annual Basis than 'A Typical House'

As of 2016, the EnerGuide rating system has changed. The new EnerGuide labels show the gigajoules (GJ) per year that a house uses. Gigajoules per year is a unit of measurement for energy on an annual basis. The higher the GJ per year number the less efficient the home is, whereas the closer to zero the GJ per year measurement is the more efficient the house is. Homes that produce more energy than they use will have a rating of zero.

Explanation of New EnerGuide for Houses Label



After an EnerGuide evaluation is performed on your home, an EnerGuide Label will be given to you to affix to your electrical panel.

1. Information about the evaluation for the homeowner
2. EnerGuide home rating
3. EnerGuide rating scale
4. Calculation of the rating
5. Breakdown of the rated annual energy consumption

Not all houses are created equal and you can't tell the energy efficiency of a house just by looking at it. So be sure to ask for the EnerGuide annual energy consumption of the home, as this will vary, even in homes built in the same neighbourhood.

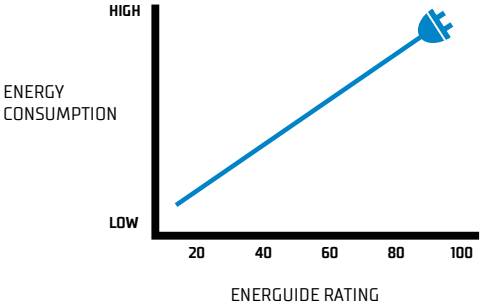
If you come across an older EnerGuide label when shopping for an existing home, take note of the differences. The old label used an arbitrary system with ratings ranging from 1 to 100, where higher numbers represented an increased efficiency. The new EnerGuide label rates homes using energy (in GJ) to show approximately what the home will use over a year. Therefore the lower the number the lower the consumption and the more money in your pocket!

Live Comfortably, Use Less Energy

» Enjoy paying lower energy bills in your EnerGuide home

» Feel good about how your purchase decisions are helping to reduce your carbon footprint

» Enjoy living in a comfortable and efficient home

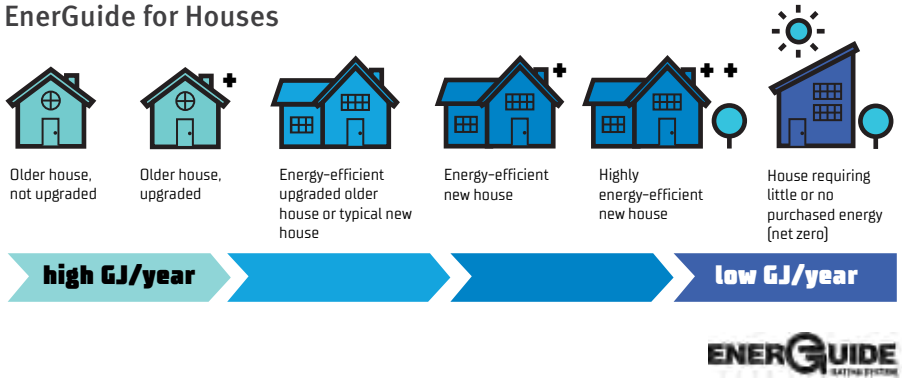


EnerGuide Label and Utility Costs

The EnerGuide label breaks the GJ per year into electricity and natural gas, making it easy for you to calculate the anticipated energy costs of the home. In order to calculate the annual energy costs, multiply the GJ per year by the current utility costs. Electricity consumption and rates on electricity bills are generally in kilowatt hours (kWh); but don't worry! You can convert the GJ estimate on the label to kWh by multiplying by 277.8.

Reduce Your Energy Consumption

It is important to note that the amount you pay for energy depends on many factors in addition to the design of your house. These include the choices made by occupants like turning off lights, taking shorter showers, and turning down the thermostat. To further reduce your utilities, encourage your family to be aware of their consumption! To learn more, visit: edmonton.ca/changeforclimateguides



A home that produces all the energy it needs would be 0 GJ per year on the EnerGuide scale.

FACTS AND TIPS: ENERGUIDE

Buying or Selling a home? Make sure you have an EnerGuide Rating first!

Builders can apply to have a newly built home tested and rated prior to occupancy. As a buyer, request to see the EnerGuide rating for all the new homes you are considering. And whether you are buying or selling an existing home, have a qualified energy advisor conduct an EnerGuide Evaluation. All homes are not created equal, and an EnerGuide home evaluation and rating can help inform your decisions.

EnerGuide and Energy Advisors in Your Area

You can find more information about EnerGuide and locate energy advisors in your area at: nrcan.gc.ca/energy/efficiency/housing/service-providers/15807

Incentives

Homeowners may be eligible for various rebates, grants or low interest loans for home energy efficiency upgrades. For a list of incentive programs, visit: edmonton.ca/environmentalrebates. Be sure to check with the incentive program to ensure funding is still available prior to applying.

4 | BUILDING ENVELOPE

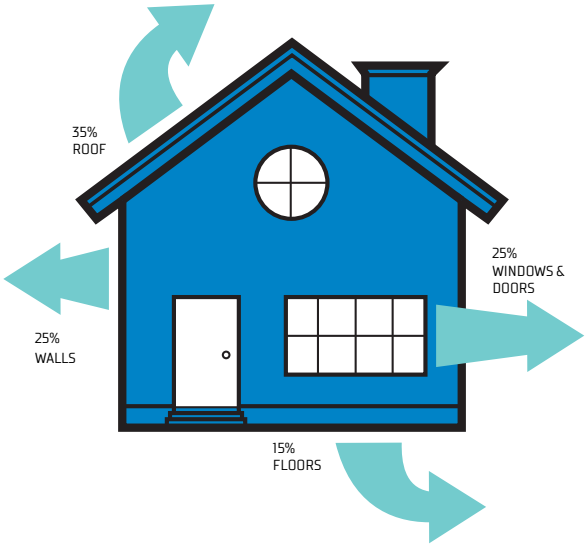
The Building Envelope: Your Home's Magic Membrane

The building envelope can include climate resilient design features to adapt your home for the future. You can choose climate resilient siding material, replace or repair the exterior air barrier, install exterior wall insulation, or completely sheath your walls. Avoid exterior basement stairwells and enclose crawl spaces with flame resistant and damp-proofed materials.

The design, configuration, and performance of the building envelope has a direct impact on your comfort, your home heating bills, and your home maintenance costs. The cost to heat your home is affected by your home's overall surface area-to-volume ratio, the number of projections such as balconies and dormers, and the quality and design of the envelope itself.

The envelope is also the longest lasting and most difficult piece of a home to change, so it should be a top priority when building a home.

Where Does the Heat Go?



Source: greenbuildingadvisor.com/article/how-to-perform-a-heat-loss-calculation-part-2

Efficient Envelopes Deliver Good News for Our Future

Ensuring that your home's envelope is airtight and well-insulated improves the energy efficiency of your home. Whenever less energy is used in Edmonton, it helps us contribute to our goals of reduced fossil fuel use and greenhouse gases, which helps to mitigate climate change.

Does Your Building Envelope Deliver Outstanding Energy Performance?

If you're looking to buy or renovate an existing home, an EnerGuide energy rating (ER) confirms the performance of the envelope and provides recommendations on where to make improvements. You can ask the seller if they've completed an EnerGuide evaluation, or make it a condition of sale. Please refer to the **EnerGuide Rating System** chapter for more details, or visit the EnerGuide website at: natural-resources.canada.ca/energy-efficiency/homes/what-energy-efficient-home/welcome-my-energuide/16654

Insulation R-Value (or RSI)

The Alberta Building Code specifies minimum insulation standards, but insulation levels that exceed the building code are recommended if you want to reduce your home's energy consumption and costs. Insulation effectiveness is measured by the thermal resistance.

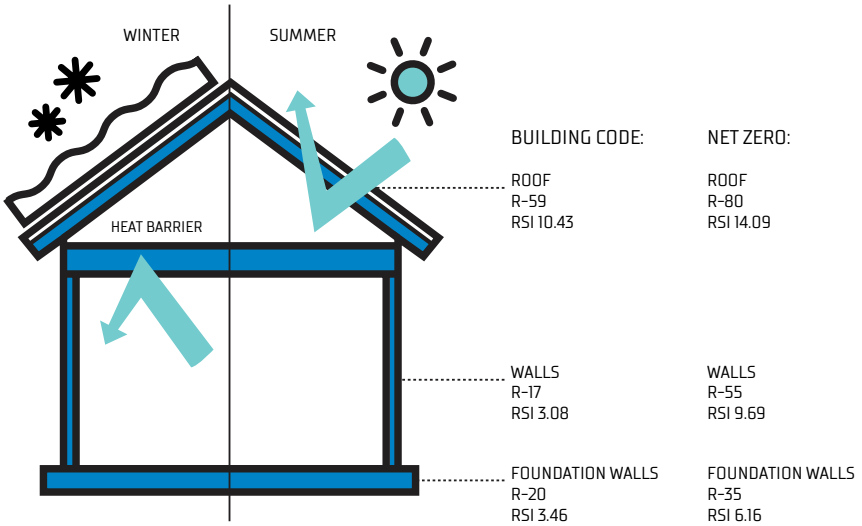
The thermal resistance of an object is measured using R-value or RSI. R-value is an imperial unit. RSI is a metric unit. Until recently in Canada, the building industry used the R-value of materials; however RSI is now becoming more common. An object's thermal resistance can either be nominal or effective. Nominal is the value of the material before installation, whereas the effective value is the actual thermal resistance to heat loss after installation and is, therefore, more meaningful when designing and modeling a home.

The effective R-values shown in the image below are examples to be used as a guide. Each home's R-values will be as unique as its design, location, orientation, building envelope, and mechanical equipment. In order to design or renovate a home to perform better than code, engage with a building science expert, such as a Certified Energy Advisor, to guide you through the process. To find a Certified Energy Advisor in your area visit: natural-resources.canada.ca/energy-efficiency/homes/find-service-provider/15807

INSULATE YOUR BASEMENT
INSULATE YOUR WALLS
UPGRADE YOUR ROOF'S INSULATION
RETROFIT YOUR BUILDING'S ENVELOPE FOR EFFICIENCY

Building to Code Achieves the Following Effective R-values (RSI):

Building better will achieve higher energy efficiency



Note that a Heat Recovery Ventilator (HRV)—see **Ventilation Information** chapter—was assumed to be in use for both the building code and net zero R-value examples above; without an HRV, the R-values will typically increase.

Window Location and Size

Windows and doors are generally the least thermally efficient areas of the building envelope, so the location and size of windows need to be carefully designed to maximize natural daylight and views while minimizing heat loss and ambient noise.

Window Performance: What to Look for

A number of factors affect window performance. Ask your builder for the following technical details about the windows (as provided by the manufacturer):

» **U-Value:** The amount of heat loss a window allows. The lower the value, the better the window performance. A double-paned, argon-filled, low-E window has a U-value of 0.33 with fiberglass frames and 0.39 with wood or vinyl frames.[1]

» **Solar Heat Gain Coefficient (SHGC):** The amount of heat from sunlight that passes through windows. In the Edmonton climate, generally a higher SHGC allows more

1 CHBA Builder's Manual 2008

solar heat to be captured, lowering energy consumption for heating. SHGC is expressed as a fraction of a number between 0 and 1. In the context of passive solar building design in Edmonton, the aim of the designer is normally to maximize solar gain within the building in the winter, so a number closer to 1 is better. This, of course, means you will also maximize solar gain in the summer months. So combining this approach with shading strategies in the summer months (for example, a deciduous tree in front of a south-facing window) works to minimize winter heating bills and summer overheating.

» **Energy Rating (ER):** The energy rating (ER) value is calculated using a formula that balances a product's U-value with its potential solar heat gain coefficient (SHGC) and its airtightness. The higher the number, the more energy efficient the product. ER values normally range from 0 to 50, with an ENERGY STAR-qualified window in Edmonton's climate being 29.

Learn more about these ratings in the **Glossary of Terms**.

Other Window Choices

» Triple-pane windows are more energy efficient than double-pane windows and can reduce outside noise, reduce temperature fluctuations, and increase comfort near windows in the summer and winter.

» Low-E glass coatings reflect both infrared and ultraviolet light. This helps to reduce heat transfer and prevent furnishings from fading.

» Argon gas-filled panes are better insulated than those filled with air.

» Impact resistant windows are generally heavier than regular windows and designed to withstand damage from fire, hail, and high winds.

Save Significantly with an Energy-Efficient Building Envelope

A well-insulated home with energy-efficient windows provides optimal comfort with no drafts or cold spots. An energy-efficient home is a "future-proofed" home, giving you peace of mind in a world of rising energy prices. Space heating is the single largest consumer of energy in your home, accounting for over 2/3 of the total annual energy consumption.[1] A high-performance, efficient building envelope can significantly reduce your home heating costs.

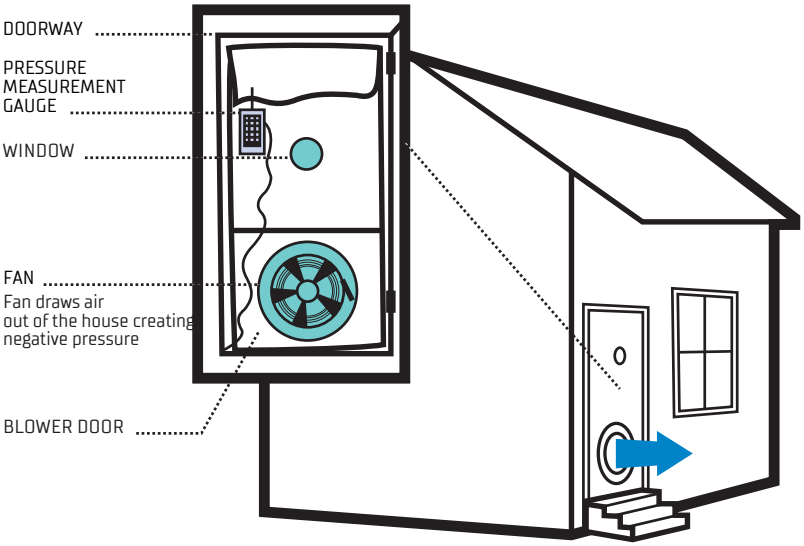
1 *International Energy Agency)—Technology road map - Energy Efficient Building Envelopes*, iea.org/reports/technology-roadmap-energy-efficient-building-envelopes

The Blower Door Test Shows if Your House is Leaking Heat

When your home's exterior walls are leaking due to penetrations in the building envelope, heat is lost to the outside, meaning your heating system has to work harder to heat your home. Not only do you end up paying more in heating bills, but also your house can feel drafty and uncomfortable. A Blower Door Test checks the leakage rate of your home. A reading of 2.5 ACH (Air Changes per Hour) is considered to be a typical air leakage rate, whereas a Passive House has a much tighter envelope with an air leakage rate of only 0.6 ACH, meaning much less heat is lost. Alternatively, in summer months, a tight envelope can help your home stay cool and reduce costs associated with cooling your house.

To view a demonstration of a blower door test, visit: youtu.be/icZG05XU9pM

Blower Door Test: How it Works



Energy Modelling and the Building Envelope

An energy model analyzes multiple attributes of the home, including the building envelope. The energy model can be used to run simulations on envelope design changes to see which combination of materials will be the best solution. Changing the envelope details in the design phase does not cost you anything; changing the envelope details during construction is very costly. If you are involved in the design of your new home, and you are interested in making it as energy efficient as your budget will allow, work with your builder and ask about using an energy model as part of the design process.

FACTS AND TIPS: BUILDING ENVELOPE

Insulation

Located inside the building envelope—the walls, roof, and under the slab—insulation helps slow the transfer of heat through the building envelope. In practical terms, the insulation is primarily responsible for helping keep heat inside the home when it's cold outside and keeping it cool inside on warm days.

If you're looking to upgrade the insulation in an existing home, hiring a qualified professional to conduct a home energy audit is recommended. A Certified Energy Advisor will inspect the type, quality, and degradation of your existing insulation and recommend solutions to improve the performance of your home.

There are multiple types of insulation, each with different properties to consider: blown-in cellulose, spray foam, as well as various types of batt and cellulose fibre. Seeking the advice of a qualified building envelope professional is strongly advised when you're planning to improve the insulation of different components of your home's envelope system.

Good Windows

Energy-efficient windows, doors, or skylights, when combined with improved envelope insulation, can significantly reduce your home energy costs while making your home quieter and more comfortable. Look for ENERGY STAR-qualified windows as an easy way to choose energy-efficient windows. For ENERGY STAR-rated windows, there are four climate zones in Canada (A, B, C, and D), based on an average annual temperature indicator called a heating degree-day (HDD). Zone A is the mildest and Zone D is the coldest. ENERGY STAR Zone D-rated windows are more efficient than ENERGY STAR Zone C-rated windows (C is the minimum rating allowed in Edmonton for the window to meet the ENERGY STAR standard). Look for windows with the highest R-value.

Ventilation

As homes become more efficient, they become increasingly airtight, which increases the important need to maintain sufficient fresh air. Highly efficient and airtight homes will typically have a Heat Recovery Ventilator (HRV) that provides abundant fresh air into the home while minimizing heat loss. The HRV allows for fresh air to enter into the home but in a controlled way so that the air can be filtered first. To learn more, please read the chapter **Ventilation Information**.

WEATHER PROOF YOUR HOME

Air Leaks

Airtightness (sealing) is critical to reducing leakage of air between indoors and outdoors. In existing homes, caulking and weatherstripping are effective air-sealing techniques that offer quick returns on investment, often a year or less. Caulking is generally used for cracks and openings between stationary house components such as around door and window frames. Weatherstripping is used to seal components that move such as doors and operable windows.

For further weatherproofing, you can install impact-resistant windows and doors to protect from hail damage. You can also install storm or roll shutters and install safety film on windows. Use pressure treated, reinforced, and laterally braced garage doors to protect from high winds.

Visit the NRCan online publication of “Keeping the Heat In”, which provides details on how to air seal your home: nrcan.gc.ca/energy/efficiency/housing/home-improvements/15768

5 | VENTILATION INFORMATION

The Art of Ventilation: A Breath of Fresh Air

On average, we spend about 90% of our time indoors, so we need an abundance of fresh air in our homes. That's why ventilation is so important. Ventilation helps control moisture, which minimizes mould growth and structural damage.

The Characteristics of a Well-Ventilated Home

In naturally ventilated homes, look for windows that are strategically placed to encourage cross-ventilation so that during the times of the year when they're open, they can cool as much of the home as possible. Minimum building code requires exhaust fans in all bathrooms (preferably on timers) and in the kitchen, which should be used to prevent moisture buildup.

In New Homes, a Heat Recovery Ventilator (HRV) is Important

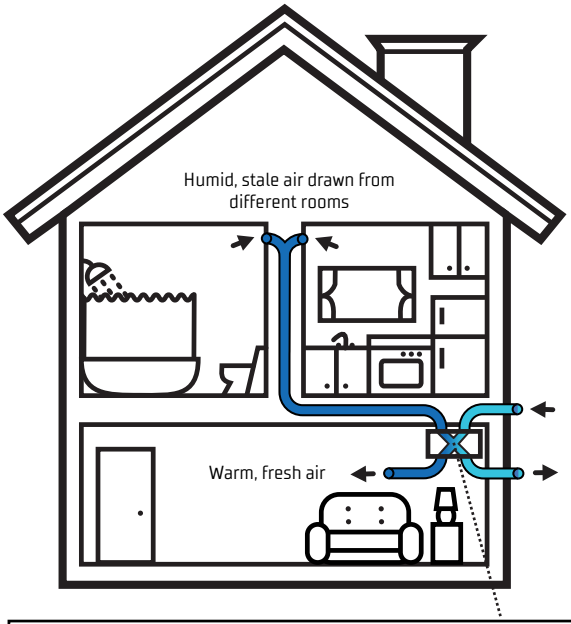
An HRV is an air exchanger that delivers filtered, fresh outside air to living rooms and bedrooms and extracts stale air from high-moisture areas such as bathrooms, kitchens, and laundries. It also saves energy by recovering 60 to 90% of the heat from the air that's being extracted.

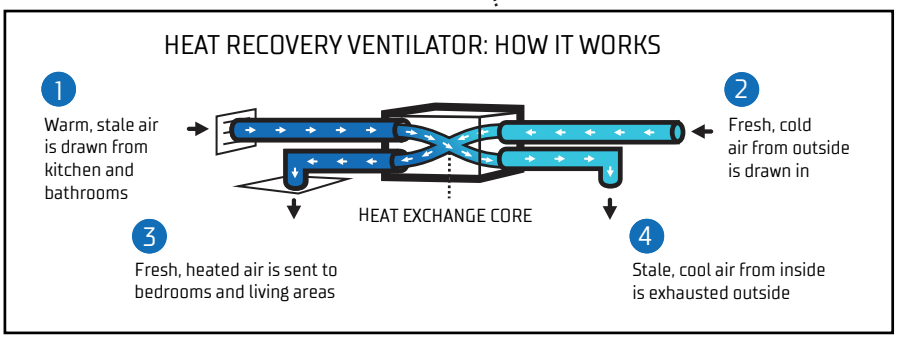
In any home, an HRV can provide healthy indoor air quality, with minimal energy consumption. However, you don't want to just ventilate the home—you also want to recover the exiting heat so it can be used to heat the incoming outdoor air. This is efficient and saves you money!

ALTERNATIVES TO HRVS

The low-technology version of a mechanical ventilator in homes is the bathroom exhaust fan or kitchen exhaust fan. Switches and timers can be installed to turn the bathroom fans on for periods of time to increase ventilation. However, in general, these systems don't have heat recovery, so the energy-saving potential of an HRV isn't utilized.

Heat Recovery Ventilator





Improve Your Indoor Air Quality, Reduce Your Heating Costs

An HRV improves your indoor air quality, helps overcome moisture-related health and structural problems, and reduces heating costs. An HRV can also reduce household odours, as fresh air is constantly being provided to the home.

HRV Home System Helps People with Respiratory Sensitivity

Did you know that according to the Canadian Lung Association, over 30% of Canadians suffer from some sort of respiratory sensitivity? Homes can be designed with these Canadians in mind. According to Canada Mortgage and Housing Corporation (CMHC), homes equipped with hard-surfaced flooring (no carpets) and HRVs are the best choice. Learn more by reading CMHC's "Research House for the Environmentally Hypersensitive", available at: national-toxic-encephalopathy-foundation.org/researchhouse.pdf

FACTS AND TIPS: HEAT RECOVERY VENTILATORS (HRVS)

What Types of Homes Are Best for HRVs?

Heat recovery ventilators (HRVs) can be used in all building types, small and large. In larger condominium complexes, ventilation systems with heat recovery can be centralized for the whole building. HRVs can be retrofitted into existing homes to improve air quality and save energy. It especially makes sense to install HRVs in homes that have undergone energy efficiency retrofits and are very air tight. Technically, a very air tight home is one with a blower door test result of approximately 2 air changes per hour or less.

HRV Maintenance

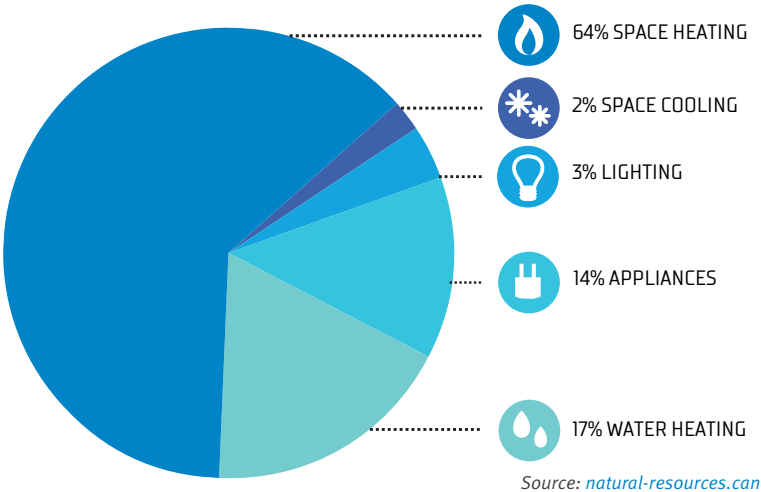
HRVs require routine maintenance and periodic adjustment. If the home you're interested in has an HRV, ask when it was last serviced or adjusted. Poorly maintained HRVs can cause imbalances where the house can become over-ventilated or under-ventilated. Some HRVs are completely separate of other systems in the house, while others are connected to a forced-air furnace system.

6 | HOME HEATING

The Heating System: Your Home's Biggest Energy User

Your home heating system is the biggest energy user in the home. On average, home heating accounts for about 2/3 of your home's energy use, so making the right choice is important.

Canada's Average Home Energy Usage (2019)



Source: natural-resources.canada.ca/energy-efficiency/products/lighting/13730

Natural Gas Usage per Year for Edmonton Single-Family Home

The average single-family home in Edmonton uses about 120 gigajoules (GJ)[1] of natural gas per year which produces about 6.7 tonnes of greenhouse gas (GHG).

While a variety of home heating systems are available, a gas-fired heating appliance is the most typical in Edmonton.

1 Calculated average for Edmonton for the 2015 year based on city-wide consumption in single family homes.

INSTALL A HIGH EFFICIENCY FURNACE

Gas-Fired Furnaces

Most homes in Edmonton are heated using a forced-air furnace in which natural gas combustion heats the air, which is then blown by a fan to living spaces through a network of ducts and vents.

For all gas-heating appliances, look for the EnerGuide or ENERGY STAR label (or both) to determine the energy efficiency of the appliance. Efficiency is measured by annual fuel utilization efficiency (AFUE). An AFUE of 90% means that 90% of the energy in the fuel becomes heat for the home and the other 10% escapes up the chimney and elsewhere. Look for an efficiency above 95% as best practice. AFUE doesn't include heat losses from the duct system or piping, which can be as much as 35% of the appliance output energy when ducts are located in the attic, so ensuring they are sealed is important.

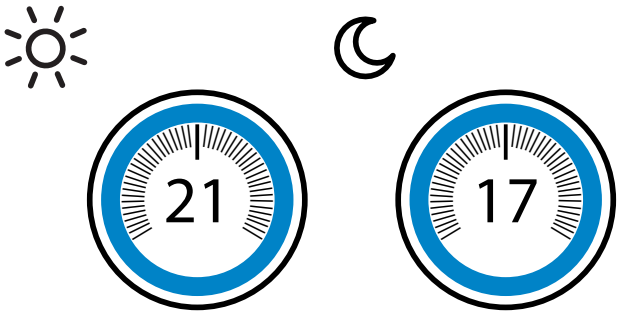
Condensing Furnaces and Boilers

A condensing furnace or boiler condenses the water vapour produced in the combustion process and uses the heat from this condensation to heat the home. All new furnaces have an AFUE of 90% or better, but a lot of old ones are still in operation. The cost of a new furnace for an average home can usually be recouped in energy savings in less than 10 years.

SET YOUR THERMOSTAT TO 17-21°C

High-Efficiency Furnace + Programmable Thermostat = Savings

Enjoy the warm feeling you get knowing that your heating system is keeping your home comfortable, saving you money, and reducing your carbon footprint. Through the use of a programmable thermostat, a planned temperature drop of 1°C over an eight-hour period can save about 2% on your heating energy consumption. If you are away from home for more than three or four hours, it is worthwhile to turn down the temperature. Additionally, replacing an older furnace with a new one will reduce your heating costs; if you replace a furnace operating at 85% efficiency with a new one operating at 92% efficiency, you have directly reduced your heating costs by 7%.



Don't Wait to Replace your Furnace

A high-efficiency furnace has an AFUE rating of 90 to 98%. This means that a furnace at the high end of this range will convert 98% of the combusted natural gas to usable energy, with the remaining 2% exhausted to the outside. By comparison, many older furnaces have an AFUE of only about 60%, meaning 40% of the fuel is wasted. So replacing your furnace starts to save you money right away!

Air Source Heat Pumps

Air source heat pumps move heat from the outdoor air into your home. They function the same way as refrigerators and air conditioners, which are more commonly known heat pump technologies. Air source heat pumps can be reversed and used for air conditioning as needed.

Air source heat pumps work well in cold climates. This is because the refrigerant liquid is still much cooler than the outdoor air, allowing it to capture heat. While -15°C seems cold to us, anything above absolute zero (-273°C) has heat energy which can be captured.

During the coldest times of year in Edmonton, air source heat pumps are used in conjunction with a supplementary heat source. With any heating technology, it is best to ensure you have a high performing building envelope to stop your warm air from escaping.

For more information on Air Source and Ground Source Heat Pumps, read Heating and Cooling With a Heat Pump: natural-resources.canada.ca/energy-efficiency/energy-star-canada/about/energy-star-announcements/publications/heating-and-cooling-heat-pump/6817

ENERGY STAR

ENERGY STAR is the international symbol of premium energy efficiency. Products that display the ENERGY STAR symbol have been tested according to prescribed procedures and have been found to meet or exceed higher energy efficiency levels without compromising performance.

The ENERGY STAR website, operated by Canada's Office of Energy Efficiency, lists all the different appliances and products that have the ENERGY STAR qualification. The site also highlights the most efficient products in a variety of different categories. You'll be surprised at the range of products there are for homes. To learn more, visit: nrcan.gc.ca/energy/products/energystar/12519

Look for this symbol when you're shopping for new appliances.

FACTS AND TIPS: HOME HEATING

Programmable Thermostats

Programmable thermostats allow you to program your furnace to different temperature settings at different times of the day and week to maximize energy savings without compromising your comfort. You can buy a simple ENERGY STAR-rated mercury-free programmable thermostat for about $30 to $80.

Are There Other Types of Heating Systems?

Yes. The most common alternative to a gas furnace is a gas boiler connected to a radiant heating system. Radiant heating systems are more comfortable and energy efficient than forced (moving) air systems because they heat the home without excess air movement. A form of radiant heating that is becoming more common is underfloor heating. Radiant heating systems are also healthier than forced air systems as there is minimal air re-circulation, which minimizes exposure to dust, pollen, and other pollutants found in a home. The drawback of radiant heating systems are that they are more costly than forced air systems.

Alternatives to gas heating systems can include electricity-based resistance heating, as well as air-source and ground-source (geothermal) heat pump systems. Heat pump systems move thermal energy (heat) from one area to another and have the advantage of providing both heating and cooling within one system. For additional details regarding heat pumps, please read the **Other Innovations** chapter.

7 | HOT WATER HEATERS

Water Heating: Your Second-Biggest Energy User

As the pie chart of Canada's Average Home Energy Usage (Chapter 6) shows, water heating uses almost 20% of the total energy consumed in a home and is the second-largest energy user after space heating. A hot water heater is one of the most straightforward pieces of equipment to upgrade and also provides a good opportunity for energy savings.

Factor in the Energy Factor (EF)

Several different types of water heaters are available, and prices and energy efficiency vary. The best measure of water heater efficiency is the energy factor (EF), which compares the energy supplied in heated water to the total daily energy consumption of the water heater. An EF of 0.67 or higher is considered the benchmark to be looking for.

Natural Gas Storage Water Heaters

These types of water heaters are the most common in Edmonton. Their cylindrical tanks offer a ready reservoir (storage tank) of hot water. Since water is constantly heated in the tank, energy can be wasted when the tank isn't in use. (This is called standby heat loss.) Therefore, it's important to select the right size of tank. According to Natural Resources Canada's Office of Energy Efficiency, a single family with four family members, two bathrooms, a dishwasher, and a clothes washer requires a 180-litre (40 gallon) tank.

Extra Water Tank Insulation = Extra Savings

Some storage water heater models have a heavily insulated tank, which significantly reduces standby heat losses and lowers annual operating costs. Look for models with tanks that have a thermal resistance (R-value) of R-12 to R-25. A high R-value increases the energy factor of the water heater. Look for ENERGY STAR-rated high-efficiency hot water tanks. Gas water heaters also have venting-related energy losses. Either a fan-assisted gas water heater or an atmospheric-sealed combustion water heater reduces these losses.

Heat Pump Water Heaters

Heat pump water heaters (HPWH) run on electricity and use 60 to 70% less energy than conventional ones, offsetting the higher upfront cost. Similar to the air source heat pump mentioned in the Home Heating chapter, these water heaters move heat from one place to another rather than producing heat directly, making them more energy efficient. Learn more at: energy.gov/energysaver/heat-pump-water-heaters

Tankless Water Heaters: Energy Efficiency's in the House

SWITCH TO A TANKLESS WATER HEATER

Tankless water heaters, also known as on-demand or instantaneous water heaters, provide hot water only as it's needed. Since they don't produce the standby energy losses associated with storage water heaters, they can save you money. They're also mounted on the wall so they save on floor space as well.

Tankless water heaters typically provide hot water at a rate of 8 to 15 litres (2 to 5 US gallons) per minute. Gas-fired tankless water heaters produce higher flow rates than electric ones and are generally cheaper to operate. However, while running, on-demand gas water heaters use more gas than a regular hot water storage tank and may require a larger gas supply line. Similarly, electric on-demand heaters require significantly larger electrical draw than storage tanks and may be restricted by the home's electrical service size.

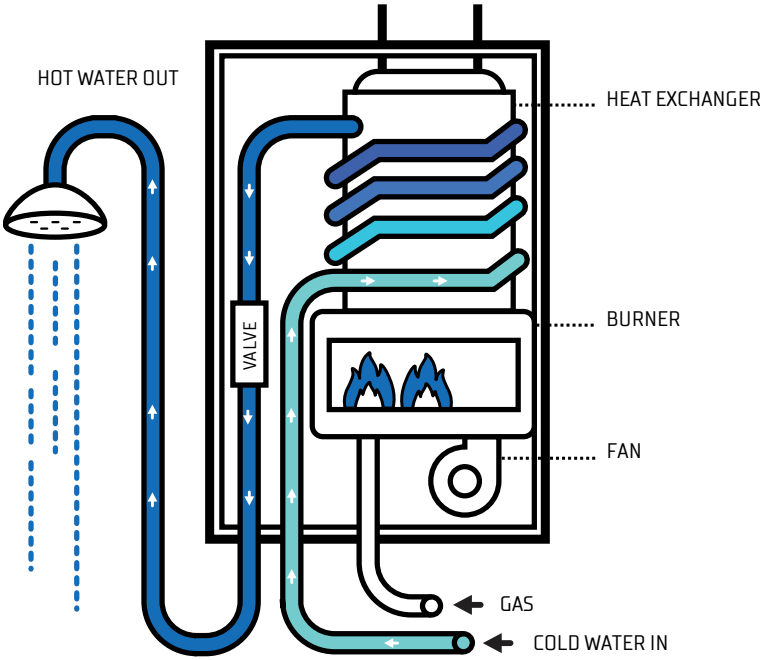
On-demand water heaters can be between 19 and 53% more energy efficient than conventional storage tank water heaters.[1] The greatest potential improvements are in homes that use the least hot water, such as small dwellings, households using hot water only a few times in the day, and places with very efficient fixtures. However, installing an on-demand water heater at each hot water outlet can be very cost prohibitive. To determine if this is appropriate for your home, work with an experienced mechanical professional to calculate the payback.

Lower Your Energy Costs with a Tankless Hot Water Heater

The initial cost of a tankless water heater is higher than that of a conventional storage water heater, but wall-mounted tankless water heaters take up much less space, typically last longer, and have lower energy costs which could offset the higher purchase price.

1 greenbuildingadvisor.com/blogs/dept/musings/are-tankless-water-heaters-waste-money

Tankless Water Heater: How it Works

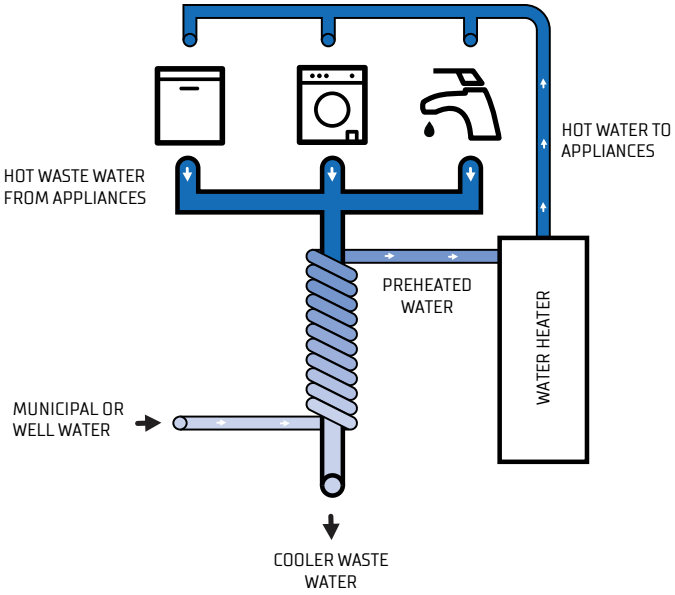


RETROFIT YOUR DRAIN WITH A DRAIN WATER HEAT RECOVERY SYSTEM

Drain Water Heat Recovery

Drain water heat recovery and drain-line heat exchangers: These systems are essentially a coil that goes around the drain line (coming from hot water sources like sinks, showers, bathtubs, dishwashers, and clothes washers) that capture up to 60% of the waste heat passing through the drains.

The heat that's recovered is returned to the system which lessens the amount of energy required to heat additional hot water. These systems have no moving parts, so nothing can wear out or get clogged. Only fresh water goes through the pipes; hair and other materials go through a separate pipe. Drain water heat recovery systems can reduce hot water energy needs for showers by up to 60%! These systems, including installation, can be one of the most cost-effective energy efficiency improvements in a home.



FACTS AND TIPS: HOT WATER HEATERS

Preventing Legionella Bacteria

It is important to remember to clean and disinfect all mist-producing items in your home such as showerheads, hot tubs, whirlpool baths, and humidifiers. Home hot water heaters should also be set at a minimum of 60°C; however, in order to reduce the risk of scalding , ensure that a qualified plumber installs mixing valves so that the temperature at the tap is not higher than 49°C. To learn more, visit the Public Health Agency of Canada: canada.ca/en/public-health/services/infectious-diseases/legionella.html

Excessive Water Temperature

Water that's too hot is not only more expensive but can also be dangerous for your family.

Tankless Water Heaters Last Longer

Most tankless water heaters have a life expectancy of more than 20 years. They also have easily replaceable parts that extend their life by many more years. In contrast, storage tank water heaters last 10 to 15 years.

Have Your On-Demand Water Heater Installed by a Pro

It's important to ensure that on-demand water heaters are installed by qualified contractors and are properly vented. The condensing models require access to a drain.

8 | GREEN RATING SYSTEMS

Green Building Certification

A green building certification provides a framework of green initiatives to follow during design and construction, as well as assurance that once constructed, the home's green claims have been third-party verified.

Get to Know the Green Rating Systems

Green rating systems play an important role in promoting green homes. There are some—like EnerGuide™ and Passive House™—that focus solely on energy performance. Others, such as R-2000, BUILT GREEN®, and LEED®, consider a wider set of green criteria important to Edmontonians, such as indoor air quality and local material use.

Green Certification Can Increase Resale Value of a Building

According to a study by the UCLA Institute for the Environment and Sustainability, green certification can add an average of 9% to the resale value of buildings. To learn more, visit: issuu.com/nilskok/docs/kk_green_homes_071912/1

A similar, but more involved data study from Canada, found that LEED certification increases the resale price of condominiums by between 5 and 14%. For more information, visit: td.com/document/PDF/economics/special/GreenCondos.pdf

FACTS AND TIPS: ENERGY RATING SYSTEMS

BUILT GREEN

BUILT GREEN is a popular green building rating system that applies to houses, row houses, condominiums, and multi-storey residential towers. It includes an energy requirement (EnerGuide label) and, therefore, requires a Certified Energy Advisor to be involved with the project. Additional categories include materials and methods, indoor air quality, ventilation, waste management, water conservation, and building practices. For more information, visit: builtgreencanada.ca

ENERGY STAR for New Homes

The ENERGY STAR for New Homes initiative promotes energy efficiency guidelines that enable new homes to be more energy efficient than those built to minimum provincial building codes. Home builders must be licensed for ENERGY STAR for New Homes. To learn more, visit: nrcan.gc.ca/energy/efficiency/housing/new-homes/5057

LEED

The LEED (Leadership in Energy and Environmental Design) for Homes program applies to houses, row houses, condominiums, and multi-story residential towers. LEED certification includes energy performance, as well as connectivity to the surrounding community, site activities, landscaping, water usage, materials, durability, home size, and air quality. Pursuing LEED for Homes certification requires the involvement of a recognized Provider Organization (cagbc.org/our-work/certification/leed/leed-homes-providers) and Green Rater. For more information, visit: cagbc.org/our-work/certification/leed

Passive House

Passive House is a rigorous program with strict energy performance requirements. Buildings are designed to reduce the need for energy use and then mechanical systems are sized correctly to reduce consumption when required. A Passive House designer and/or builder is typically required as part of the process and specialized software is used to model the home from design to end of construction. To learn more, visit: passivehouse.ca

R-2000

R-2000 includes requirements relating to energy efficiency, indoor air quality, and the use of environmentally responsible products and materials. The emphasis of R-2000 is energy efficiency and, therefore, the program requires a Certified Energy Advisor to be involved with the project. For more details, visit: natural-resources.canada.ca/energy-efficiency/homes/find-service-provider/15807

9| HIGH-EFFICIENCY APPLIANCES

Your Kitchen: The Source for up to 14% of Your Energy Bill

The average kitchen accounts for 14% of a home's total energy bill.[1] If your refrigerator and dishwasher are more than 10 years old, you can most likely reduce your utility bills by replacing these appliances with high-efficiency models. There's an initial investment to upgrade old appliances, but chances are you'll appreciate the superior performance and lower utility bills.

Be sure to dispose of your old appliances properly at your local Eco Station. Learn more at: edmonton.ca/ecostations

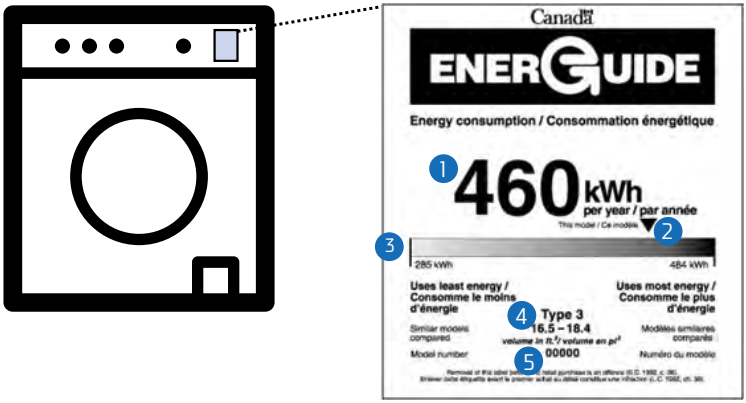
Energy-Efficient Appliances have the ENERGY STAR Label

- An ENERGY STAR label means that a product has been third-party certified to meet stringent energy requirements.
- Ovens and ranges are not eligible for the ENERGY STAR program, given the inherent inefficiency of these appliances. It's estimated that only 6% of the energy used to power an oven is absorbed by the food![2]
- To find the most energy-efficient electric appliances, look for the ENERGY STAR label at your retailer. More ENERGY STAR information is available from Natural Resources Canada at: nrcan.gc.ca/energy/products/energystar/why-buy/13631

1 nrcan.gc.ca/energy/products/categories/appliances/13630
2 Rocky Mountain Institute, rmi.org

Compare the EnerGuide Labels

Federal law requires that the EnerGuide label be placed on all new electrical appliances manufactured in or imported into Canada, and that the label indicate the amount of electricity used by that appliance. The EnerGuide label shows the energy efficiency of the appliance relative to similar models, so you can easily compare EnerGuide ratings between competing appliances. The rating is the total energy the appliance will consume yearly under average operation.



1. Average annual energy consumption of the appliance in kilowatt hours (kWh)
2. Energy efficiency of the appliance relative to similar models
3. Annual energy consumption range for models of this type and size
4. Type and size of the model
5. Model Number

Quick Math: Calculate Operation Cost of Energy-Efficient Appliances

Energy-efficient appliances aren't much more expensive, if at all, than regular appliances. When you add up your monthly energy savings, you may find that you can pay back the extra amount you paid for your energy-efficient appliance in less than one year. To determine how much your energy-efficient appliance costs to operate, multiply the annual kilowatt hours (kWh) on the EnerGuide label by the current electricity or natural gas rate found on your utility bill.

FACTS AND TIPS: APPLIANCE EFFICIENCY

To maximize your savings, select the smallest possible appliance size that meets your needs.

Dishwashers

80% of the energy used by a dishwasher goes towards water heating; the rest runs the motor and the fan.[1] Try using an energy-efficient or lower-heat cycle and you may see a big change.

Compact dishwashers use less water and energy per wash, but if you have to use it more than once a day, it's likely more efficient to use a standard size.

Dishwashers and refrigerators operate most efficiently when they're full. The dishwasher uses the same amount of water whether half full or completely full; and more items in a fridge help to keep the internal temperature cool.

Don't position your dishwasher next to the refrigerator. The heat produced by the dishwasher causes your refrigerator to work harder.

For more information, visit: energystar.gov/products/dishwashers

Refrigerators

The style of refrigerator can affect energy use. In general, models with the freezer on bottom use up to 12% less energy and models with the freezer on the top use up to 40% less energy than comparable side-by-side refrigerator/freezer models.[2] Remember, if you buy a new fridge and you keep using your old one as a second refrigerator in the basement or garage, you will not see these energy savings!

For more information, visit: energystar.gov/products/refrigerators

REPLACE YOUR STOVE WITH AN INDUCTION TOP STOVE

Oven Ranges and Hoods

The most energy-efficient cooking system is an induction range, which heats only the pot, in combination with a recirculating, or ductless, range hood and a heat recovery ventilator (HRV) exhaust intake in the kitchen that handles the smoke and odours.

For more information, visit: energystar.gov/products/electric_cooking_products

1 Alliance to Save Energy, treehugger.com/htgg/how-to-go-green-dishwashers.html
2 ENERGY STAR FAQs, bit.ly/49O14ir

Clothes Dryers

DRY YOUR CLOTHES NATURALLY

Clothes dryers use a lot of energy so the opportunity for energy savings is large. A typical system simply directs the air outside via the dryer exhaust. To find an ENERGY STAR rated dryer, visit: energystar.gov/products/clothes_dryers

New technology includes condensing dryers and heat pump dryers.

A condensing dryer recovers much of the waste energy from the hot, humid air, drains the excess moisture away, and funnels the remaining exhaust air into an adjacent space where it can offset heating energy for most of the year in our climate.

A heat pump dryer does not require a vent; instead, the pump reuses the heated air and through condensation, funnels the moisture into a drain or collection tank. This system offers more than double the energy efficiency compared to a conventional electric dryer.

For the best energy savings, consider hanging your clothes to dry. This will also increase the lifespan of your items, saving you the expense of having to replace them.

10 | WATER CONSUMPTION

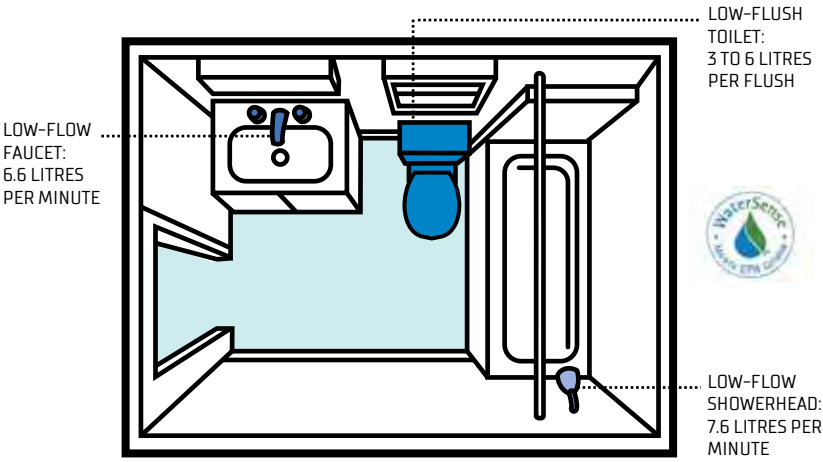
Water Conservation = Cost Conservation

Simple, low-cost water conserving fixtures can reduce your water consumption and water bills significantly. They also reduce your energy costs by lowering the amount of water that needs to be heated. By switching to energy-efficient and water-wise low-flow fixtures and appliances, homeowners can save hundreds of dollars a year. Learn more at: epcor.com/learn/efficiency-conservation/inside-your-home

REPLACE YOUR SHOWERHEAD AND GO LOW-FLOW

Efficient Fixtures Make for Effective Future

When renovating or designing a home, consider installing water efficient fixtures such as low-flush toilets (maximum 6 litres per flush), low-flow showerheads (maximum 9.5 litres per minute) and low-flow faucets (maximum 8.3 litres per minute). Reducing water consumption is a good practice that lessens the pressures on the North Saskatchewan River. Also, water treatment requires energy and produces greenhouse gases, so reducing water usage contributes to climate change mitigation.



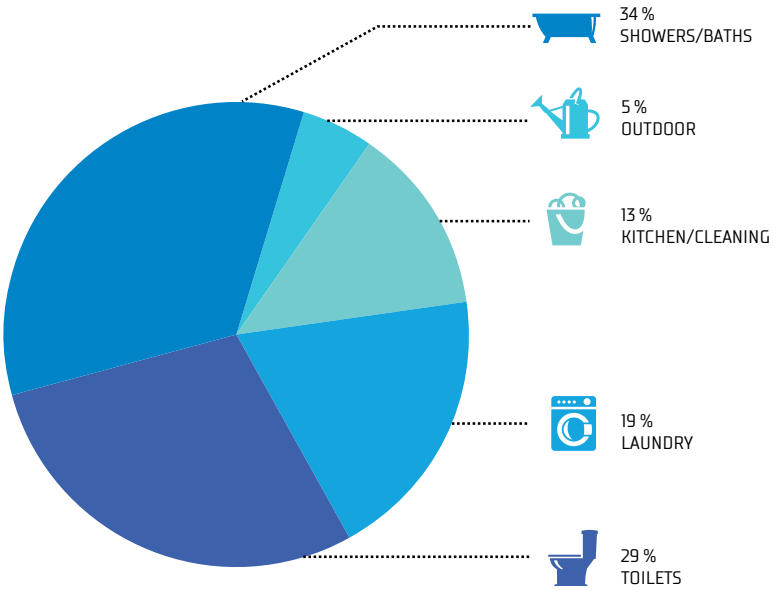
Be Water-Wise: What to Look for in Household Products

WaterSense® is a labeling program that aims to decrease indoor and outdoor water use through water-efficient products and simple water-saving practices. Look for the WaterSense label to find products which have been independently certified by a third-party licensed body to save water without sacrificing performance or quality.

Edmonton Water Usage: The Numbers

An average single-family Edmonton household has 2.4 people and consumes 18.5 cubic metres (18,500 litres) of water per month, which is the equivalent of 230 litres of water per person per day for indoor and outdoor use.[1] You no longer have to worry about being cold in a shower with a low-flow fixture; the pressure and performance of newer low-flow fixtures are specifically designed to feel like their high-flow counterparts.

Edmonton Water Consumption



1 EPCOR

MORE WATER CONSERVATION TIPS AT EPCOR

EPCOR provides great tips on how to reduce your water use and save money at:
epcor.com/learn/efficiency-conservation/Pages/default.aspx

Reduce The Risk of Basement Flooding

There are many steps you can take to reduce your risk of basement flooding, such as cleaning out your eavestroughs and installing a backwater valve. For more ideas on how to protect your basement from flooding, visit intactcentreclimateadaptation.ca/wp-content/uploads/2019/06/English_Three-Steps-to-Basement-Flood-Protection-Infographic_2019.06.12.pdf

You also want to ensure your driveway slopes away from your house and garage. For details on measures to improve your lot drainage and grading, including a Homeowners Guide, visit: edmonton.ca/residential_neighbourhoods/residential-lot-grading.aspx

Edmontonians can sign up for a free home inspection to find ways to prevent flooding through EPCOR. They also offer rebates for qualifying homeowners that want to install a backwater valve. A backwater valve can help prevent sewage from backing up into a basement during a storm. If your home was built before 1989, it typically wouldn't have one. For details and to book an inspection, check EPCOR's Homeowner programs at: epcor.com/products-services/drainage/flooding-flood-prevention

If you have a backflow preventer valve, remember not to run your dishwasher or do laundry or other wastewater generating activities during a rainstorm, since you may inadvertently flood your home.

If you live in the Rossdale, Riverdale, or Cloverdale neighbourhood, please sign up to receive email alerts warning of rising water levels in the North Saskatchewan River. This will help you to prepare for and mitigate any potential flooding. Sign up at: epcor.com/products-services/drainage/flooding-flood-prevention/Pages/high-river-level-community-list.aspx

FACTS AND TIPS: WATER CONSERVATION

Toilets

Older-model toilets use 20 litres per flush. Replacing your existing toilet with a new low-flush toilet reduces water use between 30% (down from 13 litres to 4.8 litres) and 75% (down from 20 litres to 4.8 litres) per flush, depending on your existing unit. Dual-flush toilets (3 and 6 litres per flush) are even more efficient.

Low-Flow Showerheads

Showering is one of the most significant water uses in our homes. Showers account for nearly 17% (50 litres per day) of the water used by an average family. Low-flow showerheads (under 7.6 litre per minute) are readily available for a cost comparable to traditional high-flow fixtures. Look for the WaterSense label when making a fixture purchase. For more information, visit: epa.gov/watersense/showerheads

Bathroom Faucets And Aerators

REPLACE YOUR FAUCET AERATORS

Using a low-flow or WaterSense labeled faucet or aerator (under 5.7 litres per minute) can reduce the water use for a sink by 30% or more when compared to a standard fixture. Using an aerator means you can upgrade existing fixtures and achieve savings by only spending a few dollars. Saving water has double the benefits since you reduce the demand on your hot water heater as well. For more information, visit: epa.gov/watersense/bathroom-faucets

Kitchen Fixtures and Appliances

As in the bathroom, low-flow faucets and accessories can be used in the kitchen to save water and energy. If your dishwasher was produced before 1994, it is most likely using an extra 38 litres of water per cycle, which translates to extra money on your utility bill for heating the water. Wouldn't you rather spend the money on something else? For more information, visit: energystar.gov/products/dishwashers

Kitchen Garburator

Try to avoid using a kitchen garburator, since it consumes energy and water every time you flip the switch. Putting food waste down the sink increases the load on city sewage systems and treatment plants. When you put it in the organics cart, it makes its way to Edmonton's waste management facility, where food scraps are properly managed at the compost facility. Better still, you could build or buy a backyard composter to deal with your food waste.

Washing Machines

PURCHASE THE MOST EFFICIENT WASHER AND DRYER

ENERGY STAR certified clothes washers use about 20% less energy and 30% less water than regular washers.[1] These washers extract more water from clothes during the spin cycle, reducing drying time, which saves energy and wear and tear on your clothes. Save even more energy and water by running your washing machine only when it is full. Additional tips for a more efficient laundry room include washing in cold water, conducting routine maintenance on your machines, and using clotheslines and drying racks. See the **High-Efficiency Appliances** chapter for more details.

Leaks

Leaks account for approximately 14% of water use in the average household. That is a lot of water (and money) literally going down the drain! Fixing leaky toilets and taps can save up to 12,000 litres of water each month. To learn more about finding and fixing leaks visit: epcor.com/learn/efficiency-conservation/inside-your-home/bathroom

1 energystar.gov/products/clothes_washers

11 | LANDSCAPING AND OUTDOOR ENVIRONMENT

Eco-landscaping Makes Sense

Eco-friendly landscaping offers a wide range of landscape design possibilities that can help your home look great while minimizing chemical fertilizers, reducing water consumption, and saving money.

Reducing Lawn and Garden Irrigation Reduces Costs

A cornerstone of eco-landscaping is reduced water use. This is because pumping water from its natural source, treating it so it's safe to drink, and moving it to your tap uses a lot of energy. By reducing the amount of water you use to irrigate your lawn and gardens, you help lower the energy use and reduce greenhouse gas (GHG) emissions responsible for climate change. Landscaping choices should be naturally tolerant to drought and the warmer temperatures that are projected for Edmonton as the climate changes.

Green Space Reduces Water Flow and Storm Sewer Demand

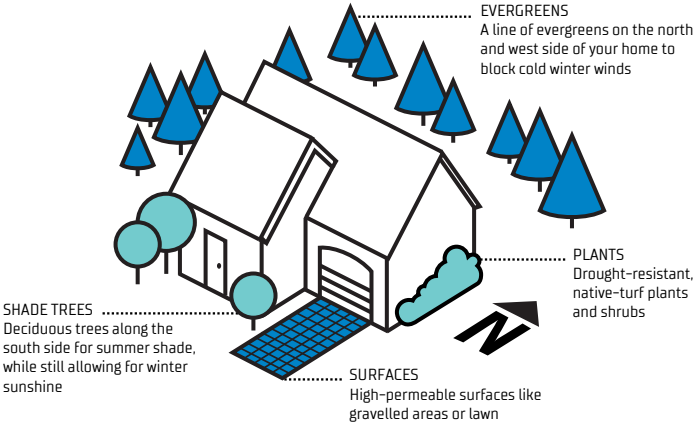
Eco-landscaping serves other sustainability objectives as well. Lawns and gardens provide green space, help increase infiltration, and decrease the flow of water off your lot. This, in turn, reduces the demands on the storm sewer system as less water reaches the catch basins. This also decreases contaminants entering the North Saskatchewan River and can help to reduce the overall volume of water needing to be treated by the sewage treatment centre (in areas of the city that have combined sewer systems). Ensure you always slope landscaping downhill, away from your house.

Enhance Your Property Value by Being Energy Wise

Eco-landscaping approaches to your home's lawn and garden reduce energy use while improving the aesthetic and property value of your home.

A recent, local study recommends a number of deciduous and coniferous (evergreen) trees suitable for Edmonton's changing climate. Species are listed in the Appendix of the full report, *Urban Forest Management in a Changing Climate*, found at: **allonesky.ca/regional-climate-adaptation-collaborative**

Eco-Friendly Landscaping: What to Look for



FACTS AND TIPS: EFFICIENCY AND CONSERVATION

Lawns

Lawns only need 2.5 centimetres (1 inch) of water per week to stay nice and green. Keep track of how much water your lawn is getting by setting out an empty tin such as a tuna can to collect rainwater and irrigation. There's no need to water your lawn more than this. Learn more at: epcor.com/learn/efficiency-conservation/outside/Pages/lawn.aspx

Native Plants

Plants native to the Edmonton region are a gardener's best friend because they thrive in our local climate. They're relatively unaffected by drought, wind, extremes in temperature, and the unpredictable early and late frosts of our short prairie growing season. You can choose flowers and flowering plants for pollinators. Also, consider planting a vegetable and fruit garden; while not all vegetables and fruit are native, having your own edible garden helps reduce your carbon footprint. For more information on types of native plants suitable for landscaping, visit: epcor.com/learn/efficiency-conservation/outside/Pages/garden.aspx

Trees

A well-placed line of evergreens on the north and west side of your home provides shelter against winter winds and reduces your home's demand for heat. Deciduous trees (trees that lose their leaves in the winter) on the south side of your house provide shade in the summer and sunshine during the winter. Plant tree varieties that will thrive in the future climate.

Soil, Mulch, and Compost

Adequate soil depth and quality play an important role in retaining water and nutrients for vigorous growth. Increase depth of topsoil by 30 cm (12 inches) in grassed areas and 60 cm (24 inches) in shrub beds, for better plant survival and health. Soil should be good quality, contain organic material such as compost, and drain well. Mulch bare soil with compost, shredded bark, or other organic material to help maintain moisture. Keep mulched beds moist if possible, to reduce fire risk during hot and dry conditions in the summer. Provide a minimum of 45 cm (18 inch) distance between beds and your house. Store flammable and explosive materials, such as firewood, away from your home.

For further guidance on healthy lawns, visit:

- edmonton.ca/residential_neighbourhoods/gardens-lawns-trees
- canada.ca/en/health-canada/services/consumer-product-safety/pesticides-pest-management/public/protecting-your-health-environment/healthy-lawns.html

Efficient Irrigation

More than half of the water applied to lawns can be lost to evaporation and runoff due to overwatering. If you're looking at a home that has an irrigation system, check to see if it uses drip or low-volume nozzles wherever possible, as these reduce water flow rates. Automatic shut-off devices or irrigation timers and controllers can further optimize irrigation and reduce wastage.

Rainwater Collection

A cistern or rain barrel to capture and store rainwater for irrigation reduces runoff and the greenhouse gas (GHG) emissions associated with tap water. The water can be used to irrigate the garden (instead of using tap water, saving you money by reducing your water bill) and is healthier for the plants.

Rain Gardens

Rain gardens are stormwater management landscaping features to look for. They're characterized by a vegetated, shallow depression with permeable topsoil. Rain gardens provide water quality treatment, reduce runoff, and allow for infiltration near where runoff originates, such as roofs, driveways, and sidewalks. Learn more at: epcor.com/learn/efficiency-conservation/outside/Pages/installing-a-rain-garden.aspx

More Information on Conservation and Landscaping

EPCOR provides great efficiency and conservation tips for outside your home: epcor.com/learn/efficiency-conservation/outside/Pages/default.aspx

Also, see the ideas on landscaping features such as rain gardens, bioretention, and box planters: epcor.com/products-services/drainage/flood-mitigation/Pages/low-impact-development.aspx

12 | HEALTHY HOMES AND ENVIRONMENT

Healthy Indoor Spaces are Important for Edmontonians

Edmontonians spend a great deal of time indoors, particularly in winter, so it's important to make our indoor spaces as healthy as possible.

Smart Product Choices Reduce Environmental Impacts

Using local, recycled, and non-toxic products and materials can reduce environmental impacts of transportation, material harvesting and processing, and toxic environmental emissions. That's better for the environment and better for you.

What Makes a Home Healthy? Here's What to Look for:

- When looking at a home on the resale market, be aware that depending on the age of the home, some potentially toxic compounds may have been used in its construction like lead paint, asbestos, and urea formaldehyde foam insulation. It can be difficult to identify the presence of these substances without hiring an expert. If it's known by the seller, it must be disclosed at the time of sale.
- A healthier home uses no- or low-VOC (volatile organic compound) paints, adhesives, and flooring (Green Seal®, Green Label®, or equivalent labels). It's important to note that VOCs are in many things, and the products brought into the home after you move in can also contribute to indoor air quality issues.
- Also look for rapidly renewable or recycled materials like bamboo flooring or recycled glass tile. Ask if the wood (including bamboo) is certified by the Forest Stewardship Council® (FSC), which means it comes from sustainably managed forests.
- A healthy home has a heat recovery ventilator which delivers filtered fresh air into bedrooms and living rooms while removing contaminated air from the bathrooms and kitchen. To learn more, please refer to the heat recovery ventilator (HRV) details listed in the **Ventilation Information** chapter.
- Look for healthy amounts of natural lighting in all areas that are regularly occupied.

Make Healthy Product and Material Choices for Your Home

A healthy home is free of toxins, provides plenty of fresh air, and lets lots of daylight in. Healthier product and material choices can reduce the toxins that potentially accumulate in your indoor environment, cut down on odours, and provide a more pleasant living space that can enhance the value of your home.

FACTS AND TIPS: CREATING A HEALTHIER HOME

Environmental Product Declarations

The manufacturing industry has been going through a revolution; it is much easier now to purchase environmentally friendly building materials that are of high quality at comparable prices. Many factors determine if a product is 'green', so make sure to read up on what the product you are purchasing is made of. Contact the manufacturer if needed, but also look out for Environmental Product Declarations (EPDs) that confirm if a product is 'green'. EPDs cover a range of green attributes from sustainable manufacturing processes, products made from materials that re-grow quickly, waste materials recycled into new products, products that can be recycled at the end of their useful life, and products that do not contain or release toxic chemicals. You will probably not find one product with all green attributes, but you can select a product with at least one green attribute that is important to you.

Also consider repurposing building materials from local material reuse suppliers such as the Habitat for Humanity Restore (hfh.org/restore/about-restore).

Non-Toxic Products

The easiest way to keep indoor air quality toxin-free is to avoid bringing toxins into the home in the first place. Be aware that many types of carpets, paints, solvents, glues, and other building materials used in the home contain toxins such as volatile organic compounds (VOCs). Make sure the indoor building materials are low-VOC or no-VOC. Look for paint or adhesive products certified by Green Seal, GREENGUARD®, or Master Painters Institute® (MPI). For carpets, look for the Carpet and Rug Institute's Green Label or equivalents.

Dust Control

Dust and vacuum often. Household dust is now recognized as one of the most significant sources of childhood exposure to toxic substances. Household dust often contains toxins from both indoor and outdoor sources. These toxins pose a substantial health risk to adults, children, and pets as they have been linked to cancer, adverse effects on children's brain development, and immune and reproductive problems. One source of indoor toxins include

flame retardants found in furniture, carpets, and electronics. When buying new furniture, mattresses, and pillows look for options that do not have flame retardants. When using or buying a vacuum, make sure it has a HEPA filter system so that you are not allowing the dust back into the air.

Ventilation Systems

Think of your furnace as the lungs of your house; having a clean heating system with a clean filter is a good way to enhance the air quality of your home while also ensuring your furnace lasts longer. If you are finding your home to be dusty, it might be time to change your filter or have your ductwork professionally cleaned. The main purpose of a furnace filter is not to actually clean your air; it is to protect the furnace by collecting the dust, hair, and allergens that enter through the return ducts usually located on the floors of your house. A clean filter helps to ensure your furnace lasts longer because it isn't trying to move air through a blocked filter, while also removing larger contaminants. However, it does not remove smaller toxins like formaldehyde, most VOCs, and radon. Many older homes do not have a ventilation system with a fresh air supply to refresh the indoor air; oftentimes it just recirculates the air in the home. A newer home may have a fresh air intake with a heat recovery ventilation (HRV) system, which often includes filtration to remove contaminants before they enter your home.

Daylight and Views

Homes with abundant daylight create pleasant indoor environments and can contribute to the well-being of occupants. However, making sure that the home doesn't lose too much heat in winter may require using triple-paned glass or other strategies.

Local Manufacturers

Using building materials and products made in or near Edmonton supports the local economy and reduces the amount of energy used and greenhouse gases emitted in shipping.

Durable Materials

Choosing durable building materials can add up to savings in the long run. Getting longer use out of building materials is good for the environment too.

Radon Testing

Radon is an odourless radioactive gas that occurs naturally in the environment. Naturally occurring radon arises from the breakdown of uranium, which is a common trace element in some natural geologic materials such as granite, shale, or phosphate minerals. Radon has been connected to serious health issues and is the second leading cause of lung cancer in Canada, with 1,900 Canadians dying each year due to exposure to high levels of radon.[1] Concentration levels vary from one house to another, even if they're similar and next door to each other. Testing for radon is simple and you can buy inexpensive radon test kits from a number of local retailers. The good news is Alberta has adopted requirements to require radon proofing in new homes and many good contractors are now able to install active radon mitigation systems in existing homes.[2] To learn more about radon, visit: canada.ca/en/health-canada/services/health-risks-safety/radiation/radon.html

Eco-Labels

A number of organizations offer product certification programs. When choosing products or materials, always look for eco-labels such as Forest Stewardship Council (FSC) certified lumber and Green Seal paints. To learn more about these labels, visit: ised-isde.canada.ca/site/office-consumer-affairs/en/be-green-consumer/environmental-labels-and-claims

1 hc-sc.gc.ca/ewh-semt/pubs/radiation/radon_canadians-canadiens/index-eng.php
2 nrc.canada.ca/en/certifications-evaluations-standards/codes-canada/codes-canada-publications/alberta-building-code-2014

13 | SOLAR ENERGY AND HEATING

Solar Energy Makes Environmental Sense

Solar energy works in any climate and the fuel—sunshine—is free! Solar energy is sustainable and it doesn't produce greenhouse gas emissions.

Passive Solar Design

Most houses incorporate small amounts of passive solar space heating to reduce their energy consumption from the grid. In this case, a house needs to have good solar access and orientation (for example, facing southeast to southwest) with minimal blockage of sunlight.

Passive solar design generally involves optimal sizing and orientation of high-quality windows, careful selection of building methods and materials that retain heat, and proper building orientation and solar access.

By integrating passive solar design into the design of a new building, grid energy use can be greatly reduced. This design strategy requires careful integration and optimization of passive solar elements within the home's design. It's therefore best suited to new homes and is more challenging to achieve by retrofitting.

INVEST IN RENEWABLE ENERGY WITH A SOLAR PV SYSTEM

Clean Energy with a Low Carbon Footprint: Solar Photovoltaic (PV) Systems

Installing solar PV systems helps reduce Edmonton's reliance on electricity generated from polluting sources. Solar energy systems generate clean energy with a very low carbon footprint, which contributes to Edmonton's climate change mitigation goals. Micro-generation (the generation of small amounts of power at the household or building level) makes Edmonton's energy system more resilient as it increases redundancy and diversity of energy sources. Promoting and encouraging solar can also help create green jobs in Edmonton and diversify the economy.

Go Solar: Here's What to Look for

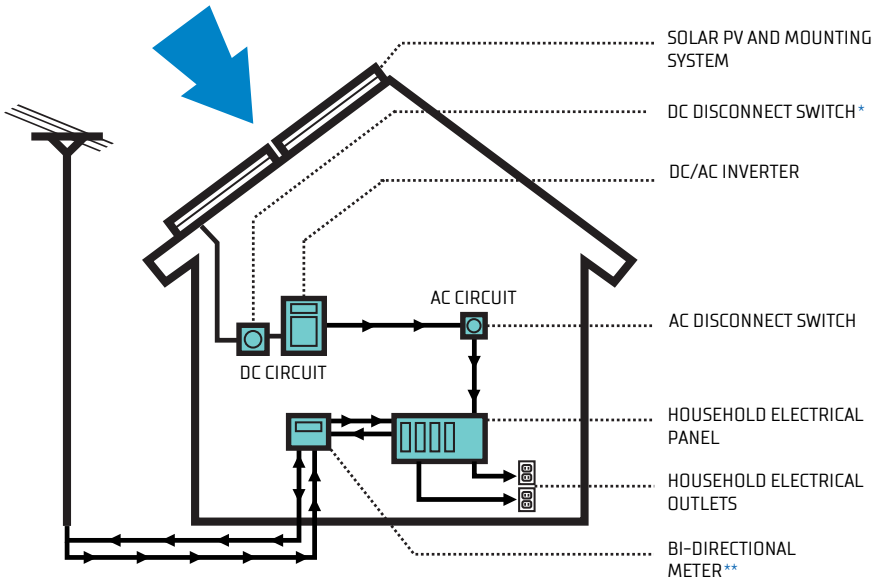
Solar systems can be installed on new or existing homes. Consider what type of system you want: water heating or photovoltaic (electricity-producing). Work with a qualified system designer to select the appropriate technology and system size for your home. Solar Alberta (solaralberta.ca) provides guidance on selecting qualified solar energy service providers.

When buying a new home, many builders can offer designs which include solar PV systems. Edmonton builders are also national leaders in net-zero homes. These homes produce as much energy as they use on an annual basis.

If you're buying a new home without a solar PV system, request that the builder make it 'solar ready'. Making a new home solar ready is a fairly simple process which will save you money when you install a PV system later.

For more information on building a 'solar ready' home, read the Solar Ready Guidelines from Natural Resources Canada: natural-resources.canada.ca/energy-efficiency/data-research-insights-energy-ef/housing-innovation/solar-ready-guidelines/5141

Solar Home System



* The DC Disconnect Switch allows for the inverter to be shut down for maintenance or in the event of a house fire

** The bidirectional meter measures energy coming from the grid and energy that the house is exporting to the grid

Shed New Light on Price Fluctuations

Using solar energy means you'll be less affected by fluctuations and long-term increases in the price of grid energy such as natural gas and conventional electricity.

Find Out More from Solar Alberta

Solar Alberta provides technical information, examples of installed systems, and details on solar energy providers at: solaralberta.ca

FACTS AND TIPS: SOLAR ENERGY

Sunny Edmonton Makes Perfect Solar Sense

Edmonton's winter climate is well-suited to solar energy. Edmonton is one of the sunniest cities in Canada, with a solar resource better than Germany, a world leader in residential solar PV.[1] Thanks to research[2] completed at the Northern Alberta Institute of Technology (NAIT), PV designers are able to accurately design systems which account for Edmonton's snowy weather.

Solar energy systems can supply all the energy consumption of a home, although they're often sized to supply a portion of the energy consumption based on affordability or the practicality for a given home. These systems can also contribute to a net-zero energy home (a home that uses zero net external energy on an annual basis).

Solar Water Heaters

Solar water heaters use the sun to heat the water you use in your home for washing. Most solar water heaters require a well-insulated storage tank; almost all need a back-up or booster system, such as a tankless water heater; and all require a detailed piping manifold.

As solar photovoltaic electricity has become more affordable, rather than installing specialized solar hot water equipment, many people are now simply pairing solar PV with electric water heating.

1 greenenergyfutures.ca/episode/sunny-solar-alberta
2 techlifetoday.nait.ca/articles/2018/solar-shines-in-dead-of-winter-even-in-edmonton

Grid-Connected Solar Energy Systems

Presently the vast majority of solar installations in Alberta are connected to the electricity grid. This means that when it is sunny, your solar energy system is over-producing and providing electricity to the grid, and when the sun is not out, your home uses electricity from the grid.

Until battery technology improves, the grid is the best and least costly solution for homeowners to ensure electricity reliability.

Off-Grid PV Systems

Off-grid PV systems operate independently of the electrical utility grid. Designing and installing an off-grid system can be very challenging. Sizing the system to meet the needs of a typical Edmonton family may not be economical without pursuing energy consumption strategies.

Incentives

Various organizations offer rebates, grants or low interest loans to improve the energy efficiency of your home and to add solar PV. For more information: edmonton.ca/environmentalrebates

14 | OTHER INNOVATIONS

There are many other emerging technologies that have potential green benefits but are not yet commonplace:

Rainwater Collection & Reuse

Collecting rainwater from the roof of your home is a simple concept but it can be complicated because you need to treat the water before it can be reused for certain purposes. This water can be reused in the home to flush toilets, water your lawn, and wash your car.

The amount of water that you can collect is dependent on the square footage of your roof, the typical amount of rainfall in your area, and how much water you can store and treat. Typically 80% of rainfall is the maximum proportion of water that you can capture from your roof, as some will be lost due to absorption, leaks, overruns, etc.

To learn more about how to design and install your own system, read CMHC's "Collecting and Using Rainwater at Home – A Guide for Homeowners" (crd.bc.ca/docs/default-source/water-pdf/cmhcrainwaterhandbook.pdf), and be sure to follow Government of Alberta legislation (alberta.ca/reclaimed-water.aspx).

What about grey water? Grey water is a term referring to wastewater from baths, sinks, washing machines, and other kitchen appliances. Grey water reuse is different than rainwater reuse, and grey water reuse in Alberta is currently not legal. To learn more about this water reuse system and why it is not legal, visit: alberta.ca/reclaimed-water#jumplinks-1

Deep Green Rating Systems

Some rating systems are considered 'light' green and other rating systems are considered 'deep' green and are relatively more challenging to accomplish but offer significantly greater sustainability benefits. Green rating systems that fall into the deep green category are: Living Building Challenge™, Passivhaus™, and Net Zero Energy™. These three certification systems are the most difficult to achieve, but have the largest returns—think of having no utility bills at all! To learn more about these, visit the chapter **Green Rating Systems**.

Red List Materials

Chemicals found in various building materials have been connected to human health issues and toxicity concerns. Building professionals and scientists are constantly working to find healthier alternatives and design professionals are encouraged to use products that do not contain harmful chemicals and compounds. A term for these chemicals is "Red List". For those who are chemically sensitive, or just interested in making your home toxin free, you can learn more about these Red List chemicals at: living-future.org/red-list

The Red List is considered a deep green initiative because sourcing alternatives can be difficult, time consuming, and potentially costly. A less time consuming alternative is to write letters to manufacturers that use Red List chemicals, advocating for them to find alternatives. The Living Building Challenge has examples of such letters.

Geoexchange, Geothermal, or Ground Source Heat Pumps

Geothermal heating and cooling systems use buried pipes to take advantage of the stable earth temperature below the frost line. These systems extract or reject heat as needed using a heat pump (similar to an air conditioner or refrigerator). Geothermal systems don't create heat (like a furnace does) but rather, they *move* heat, and as a result, the efficiencies are much higher and can reduce heating and cooling consumption by 70 to 80% compared with traditional systems.

Even with a relatively carbon intensive electricity grid, these systems provide carbon dioxide (CO_2) emissions reduction, and when paired with green power, can eliminate carbon emissions entirely. While the initial cost can be high for a single family home, the energy reduction is greater than with almost any other technology.

Combined Heat and Power (CHP) or Cogeneration

A combined heat and power plant uses a fuel-fired engine to generate power while simultaneously capturing the excess heat produced for heating purposes. Using the waste heat and creating electricity on-site makes the system more efficient than a traditional one fuelled by carbon intensive electricity. These systems can require a lot of maintenance and are best suited for buildings which have a constant need for heat so that the excess heat is not wasted. Furthermore, depending on the carbon emissions factor of your electricity grid, these systems can actually increase the carbon footprint, especially over time, as the electricity grid gets cleaner. Learn more at: cogeneurope.eu/what-is-cogeneration_19.html

Wind Energy

While large-scale wind energy generation sites are growing, small systems for homes tend to have relatively high costs compared to other options. It's also worth noting

that the winds that Edmonton experiences are often intermittent and too variable in speed to generate significant quantities of electricity. As a result, it can be challenging to design a system to generate dependable power at the household level.

District Energy

A district energy system is one that centralizes heating and cooling energy generation and distributes this energy to a larger area that includes many buildings, such as a neighbourhood. District energy systems have traditionally used high temperature boiler plants that distribute high temperature water through insulated steel piping; this heat is then used directly at each building.

More recently, lower temperature systems are being used, which allow much easier tie-in of renewable energy generation and eliminate the need for boiler plants. An example is ambient-temperature district energy systems, which extract low grade heat from sewers or geoexchange systems and deliver ambient temperature water to each building, which can be used for heating or cooling. These systems are much more efficient and can share energy on a district scale.

When purchasing a new home, investigate whether it is connected to a district energy source!

DRIVE AN ELECTRIC VEHICLE

Electric Vehicle Charging Stations

As electric vehicles become more common, home builders and owners may choose to install vehicle charging stations in garages or other appropriate locations. These stations need to be included in the design of the home's electrical system. As with ground source heat pumps, unless the electricity used to power the electric vehicles comes from a green source, electric vehicles will still result in carbon emissions. Electric bicycles, however, are a great option because they use so little energy compared to a car. Electric bicycles also provide moderate physical exercise if they're the pedal-assist type. And during some urban commutes, the rider can reach their destination quicker than by car.

For more information on electric vehicles and chargers, electric bikes and potential rebates, visit edmonton.ca/electricvehicles.

Be Prepared for Emergencies

Designate a spot in your home for a first aid kit, emergency phone numbers, and supplies to keep handy in the event of an emergency, for staying in place, or if you must leave your home. Review the Change Habits for Climate guide for more information, or visit edmonton.ca/programs_services/emergency-preparedness

Climate Resilience

Based on historical climate records, Edmonton is warming at a faster rate than the global average. Scientists predict that Edmonton will be exposed to hotter and drier summers, more storm events, more variable extreme weather events (such as high winds and wildfires), and an overall warmer and drier climate. See Climate Resilient Edmonton: Adaptation Strategy and Action Plan at: edmonton.ca/climateresilience

As Edmonton's climate continues to change, there are various actions you can take to adapt your home for the future. Check out the interactive road map at: climateresilienthome.ca

Actions for a Climate Resilient Home

Get a home energy audit	Learn how to protect your home from extreme weather events	Have an emergency plan
Grow your own vegetables	Purchase a weather radio	Locate your local emergency services or shelters
Know where to access emergency alert systems	Erect awnings and window shades	Plant shade trees
Install and maintain your sump pump	Install and maintain your backwater valve	Grade your lot to drain water away from your basement
Keep a supply of traction sand	Have an emergency kit at home and in vehicle	Prune weaker trees
Secure outdoor furniture from high winds	Use rain barrels or a cistern to harvest rain water	Plant drought-tolerant and wind-hardy species
Have a supply of back-up power or batteries	Have a way to recharge your phone, like a solar charger	Have extra blankets or sleeping bags on hand
Set up smart irrigation or drip irrigation systems	Make sure siding and roofing is rated for severe winds	Check whether your doors and garage door are pressure rated
Store firewood and propane tanks at least 100 metres away from structures	Purchase a home with a steeper sloped roof; flatter roofs are more vulnerable to hail damage	Purchase shutters to protect windows from airborne debris
If your home is next to a natural treed area, ensure that you use only fire-retardant roofing rated Class A, B, C and fire resistant exterior siding	Leave your grass clippings on the lawn	Remove leaves, pine needles, and other combustible debris from your roof and gutters

Check out more information from these sources

- iclr.org/wildfire
- firesmartcanada.ca
- iclr.org/wind
- intactcentreclimateadaptation.ca/wp-content/uploads/2019/06/English_Three-Steps-to-Basement-Flood-Protection-Infographic_2019.06.12.pdf
- intactcentreclimateadaptation.ca/programs/home_flood_protect

15 | GLOSSARY OF TERMS

Annual Fuel Utilization Efficiency (AFUE):

AFUE is the measurement of the thermal efficiency of combustion equipment, such as hot water heaters, furnaces, and boilers. A higher AFUE means a higher efficiency.

Biomass:

Vegetation, sewage, or agricultural waste used as a fuel or energy source.

Blower Door Test:

A test that measures airtightness in homes and small buildings. It can also be used to find the location of major air leaks. The equipment for the test includes: 1) a temporary door covering installed in an outside doorway; 2) a fan that forces air into or out of the building; and 3) a pressure measurement instrument called a manometer to measure the pressure difference across the fan and the building envelope.

BUILT GREEN:

Built Green Canada® is a national, industry-driven organization committed to working with builders interested in responsible sustainability practices in the residential building sector. A BUILT GREEN® certified house includes a two-in-one label with both an EnerGuide label and the BUILT GREEN seal. The homes must be built by BUILT GREEN qualified builders.

Carbon Footprint:

The amount of carbon dioxide and other greenhouse gases emitted into the atmosphere from human activities, such as the consumption of fossil fuels. In buildings, carbon is typically emitted from heating, cooling, electricity use (if the electricity is generated by fossil fuels), and hot water use.

Certified Energy Advisor (CEA):

A Certified Energy Advisor is an individual who has been trained and is recognized by Natural Resources Canada to conduct EnerGuide energy models for homes as well as air leakage (blower door) tests.

Climate Change Adaptation:

Actions that reduce the negative impacts, or take advantage of positive impacts of a changing climate. With expectations of sudden rainfalls that result in overland flooding, hotter summer temperatures, and increases in high winds and convective storms, it is important that one's home and yard is prepared for gradual changes and projected weather extremes.

Climate Change Mitigation:

Actions taken to reduce greenhouse gas emissions. Reducing greenhouse gas emissions is expected to slow global temperature increases.

Cogeneration:

A combined heat and power plant uses an engine to generate power while simultaneously using the waste heat for heating purposes. Using the waste heat and creating electricity on-site makes the system more efficient than a traditional boiler paired with grid electricity. These systems are best suited for buildings that have a constant need for heat, otherwise the heat is wasted. Typically, this application works better in larger commercial, institutional, or mixed use buildings than single family homes.

Condominium:

A multi-family building in which the suites in the building are individually owned and the owners pay a monthly fee to cover the operating costs of the building.

District Energy:

A district energy system centralizes heating and cooling energy generation and distributes this energy to an entire neighbourhood. District energy systems have traditionally used high temperature boiler plants that distribute high temperature water through insulated steel piping; this heat is then used directly at each building. More recently, lower temperature systems are being used which allow much easier tie-in of renewables and eliminate the need for boiler plants. A district energy system is installed on a community scale, not by single family home.

Drain Water Heat Recovery:

The use of a heat exchanger to recover energy and reuse drain water heat from various activities such as dishwashing, clothes washing, and especially showers. The technology reduces energy consumption for water heating and is also known as water heat recycling, drain-line heat exchange, or grey-water heat recovery.

Ecological Footprint:
A measure of the amount of biologically productive land necessary to supply the resources a human population consumes and to absorb the associated waste.

EnerGuide:
The official Government of Canada mark associated with the labeling and rating of the energy consumption or energy efficiency of specific products. EnerGuide™ labeling exists for appliances, heating and cooling equipment, houses, and vehicles.

Energy Rating (ER) for Windows:
The energy rating (ER) value is calculated using a formula that balances a product's U-value with its potential solar heat gain coefficient (SHGC) and its airtightness. The higher the number, the more energy efficient the product. ER values normally range from 0 to 50.

ENERGY STAR:
The international symbol of premium energy efficiency. Products that display the ENERGY STAR® symbol have been tested according to prescribed procedures and have been found to meet or exceed higher energy efficiency levels without compromising performance.

Environmental Product Declaration (EPD):
In life cycle assessment, an EPD is a standardized way of quantifying the environmental impact of a product or system. EPDs are independently verified and communicate transparent information about the life cycle environmental impact of products. Having an EPD for a product does not imply that the declared product is environmentally superior to alternatives; rather, it is simply a transparent declaration of the life cycle environmental impact.

Geoexchange:
Low-temperature earth energy commonly used for heating and cooling a building with a heat pump. The stable temperature of the earth just below the surface can be used as a heat source or sink to generate free earth-energy for a building.

Geothermal Energy:
Energy derived from the heat in the interior of the earth.

Greenhouse Effect:

The earth's atmosphere acts somewhat like the glass of a greenhouse. Some incoming radiation from the sun is reflected directly back to space by the earth's atmosphere and surface and some is absorbed by the atmosphere. The rest of the incoming radiation is absorbed by the earth's oceans and land, where it's converted into heat, warming the surface of the earth and the air above it. Particular gases in the atmosphere act like the glass of a greenhouse, preventing the heat from escaping. Without this natural greenhouse effect, the earth would be much colder—about 33°C colder—making the average temperature on the planet a freezing -18°C rather than the 15°C it is now.

Greenhouse Gases (GHGs):

Any of the gases whose absorption of solar radiation is responsible for the greenhouse effect, including carbon dioxide, methane, ozone, and the fluorocarbons.

Ground Source Heat Pump (GSHP):

A central heating and/or cooling system that pumps heat to or from the ground. It uses the earth as a heat source in the winter, or a heat sink in the summer. This design takes advantage of the moderate temperatures in the ground to boost efficiency and reduce the operational costs of heating and cooling systems. Also known as a geoexchange system.

Heat Pump:

A heat pump is a mechanical system that extracts heat out of a cold space into a warmer one, such as out of the air or the ground and into a home. Heat pumps can also be used for cooling and typical examples of this are air conditioning units and refrigerators. The relative energy and cost savings for installing a heat pump depend on your heating system and the current cost of energy. By running a heat pump you will use less natural gas, but you will use more electricity to run the pump.

Heat Recovery Ventilator (HRV):

A fully ducted system that delivers fresh-filtered outside air into the house, while moving stale air out. As the fresh air passes the stale air (in separate chambers), the heat from the hot stale air is passed to the cool fresh air, pre-warming it before it is heated. This action reduces the amount of energy it takes to heat the home.

Hydronic Heating:

A heating system that transfers heat by circulating a fluid through a closed system of pipes.

Leadership in Energy and Environmental Design (LEED):

A third-party certification program and an internationally accepted benchmark for the design, construction, and operation of high-performance green buildings, homes, and neighbourhoods. The program is administered in Canada by the Canada Green Building Council (CaGBC).

LEED Canada for Homes:

Leadership in Energy and Environmental Design® (LEED) has several programs for certifying buildings based on building type. LEED Canada for Homes certifies single-family homes, townhomes, and even low-rise multi-family houses up to 3 levels high. Certification requires on-site inspection and third-party verification, meaning certifications are based on what is actually constructed.

Living Building Challenge (LBC):

LBC™ is one of the most difficult programs to gain certification under as it has the most stringent requirements, including requirements to achieve net zero energy and water. LBC has seven performance categories, or "Petals", which are further divided into twenty "Imperatives" that can be applied to almost any building type, scale, or location. The overarching Petals include: Place, Water, Energy, Health and Happiness, Materials, Equity, and Beauty.

Location Efficiency:

A term that describes how easily you can access work, shopping, entertainment, parks, and other amenities from your home, either by walking or through the use of transit. If the location of your home results in easier walks, shorter car trips, and faster access to transit, it's generally considered a more efficient location.

Low-Emissivity (Low-E) Coating:

The coating put on glass to reduce its thermal (heat) emissivity (loss). Low-E-coated windows can provide greater thermal efficiency (insulation properties) than regular windows.

Multi-Family Building:

Under the EnerGuide program, a multi-family building is defined as any building that has four or more levels or storeys, and where 50% or more of the floor area is residential.

Native Plants:
Native plants are species indigenous to a certain geographical area, meaning they thrive in that climate. Native plants are relatively unaffected by drought, wind, and extremes in temperature, and are particularly helpful for Edmonton's short prairie growing season.

Net-Zero Home:
A home that produces at least as much energy on-site from a renewable source as it uses on an annual basis.

On-Demand Hot Water Heater:
On-demand or tankless hot water heaters can be between 19 and 53% more energy efficient than conventional storage tank water heaters; however, they typically cost more to install. The greatest potential improvements are in homes that use the least hot water—typical hot water heaters continually use energy to heat water all day long, even when not being used.

Passive Design:
Passive design is key to green building design. It's an approach that maximizes the use of free, renewable sources of energy, such as sun and wind, to provide household heating, cooling, ventilation, and lighting. This reduces or removes the need for mechanical heating or cooling. Using passive design can reduce temperature changes, improve indoor air quality, and make a home drier and more enjoyable to live in. (Passive design is also called passive solar design.)

Photovoltaic (PV) Panels:
Specially designed panels that convert solar energy into electricity as an alternative to getting power from the electrical utility grid. Also called solar panels.

R-2000:
Operated by the Natural Resources Canada (NRCan) Office of Energy Efficiency, R-2000 is a voluntary standard for new homes which demands a high level of energy efficiency, typically beyond what building codes require.

Radon:

Radon is an odourless radioactive gas that occurs naturally in the environment and can accumulate within homes. It arises from the breakdown of uranium, which is a common trace element in some natural geologic materials such as granite, shale, or phosphate minerals. Radon has been connected to serious health issues and is the second leading cause of lung cancer in Canada, with 1,900 Canadians dying each year due to exposure to high levels of radon. Radon is present across Canada.

Red List:

Red list chemicals are the chemicals and compounds that are known to have the worst health effects. These chemicals can be found in all products including various building materials. Look for products that do not contain these worst-in-class chemicals and compounds.

RSI:

RSI stands for “R-value Système International,” meaning it measures the R-value of an insulating material, but uses the international metric system of units. Converting one to the other requires some simple math: **R-value** (US) = RSI multiplied by 5.678263337 or **RSI** (SI) = R-value multiplied by 0.1761101838.

R-Value (Insulation):

R-value, which stands for "resistance value", provides a means for quantifying the thermal resistance of an insulating material. It is a measure of thermal resistance used in the building and construction industry. Thermal resistance is a measure of a temperature difference by which an object or material resists a heat flow—the higher the R-value, the more effectively the insulation resists the transfer of heat (that is, less heat escapes your home in the winter and less heat enters your home in the summer). If the R-value is low, the material is a poor insulator.

Single-Family Home:

Under the EnerGuide program, a single-family home includes the following building types: fully detached house, duplex, triplex, fourplex, row house, or low-rise multi-family building no more than three storeys high and in which over 50% of the floor area is residential.

Solar Gain:

The increase in temperature in a space, object, or structure that results from solar radiation. The amount of solar gain increases with the strength of the sun and with the ability of any intervening material to transmit or resist the solar rays. This concept is also referred to as solar heat gain or passive solar gain.

Solar Heat Gain Coefficient (SHGC):

The number to know when selecting windows, doors, and skylights. It's a measure of how much of the sun's heat is transmitted through those fixtures, expressed in a number from 0 to 1. A window that has a SHGC of 0.3 allows 30% of the sun's heat to pass through. Whether you want a higher or lower number depends on your goal: a product with a low SHGC helps block heat and reduce cooling loads in hot weather; a product with a high SHGC is more effective at harnessing solar heat in cold weather.

U-Value:

The heat transfer coefficient that describes how well a building element conducts heat. It measures the rate of heat transfer through a building element over a given area under standardized conditions. The usual standard is at a temperature gradient of 24°C, at 50% humidity, with no wind. A smaller U-value is better at reducing heat transfer. A value of 0.33 is a good benchmark for a double-paned, argon-filled window.

Walk Score:

A large-scale, public access walkability index that assigns a numerical walkability score to any address in Canada. The final score gives you a general idea of how walkable your area is by analyzing how close common, everyday amenities like grocery stores, transit stops, shopping malls, etc. are to your home.

WaterSense:

WaterSense®, a partnership program developed by the US Environmental Protection Agency, seeks to reduce water usage by offering people a simple way to use less water with water-efficient products and services. Products and services that have earned the WaterSense label have been certified to be at least 20% more efficient without sacrificing performance.

Window-To-Wall Ratio:

The proportion of the building facade area that has glass compared to solid wall provides a benchmark of the thermal performance of the building envelope as a whole. Generally, the larger the window area, the more energy is required to heat the building.

CHANGE HOMES FOR CLIMATE GUIDE CHECKLISTS

SINGLE-FAMILY HOME CHECKLIST

ADDED VALUE AND HIGH PERFORMANCE

This checklist can be filled out for your home and passed on to the new homeowner if you sell.

	QUESTIONS TO ASK	WHAT TO LOOK FOR RESALE NEW	BENEFITS	☑
LOCATION	Is transit readily accessible or can I walk to work, school, and recreation activities?	Whether you're buying a new or existing home, look for a house that's within a 5 to 10 minute walk (400 to 800 metres) of a transit stop, a grocery store, a park, and other daily destinations. Visit: walkscore.com	This is a feature you cannot change. Your location is important in reducing your household energy costs and maximizing the convenience of your lifestyle.	☐
HOME SIZE	What is the square footage of the home?	A home that provides less than 46 sq. m (500 sq. ft.) per person is more resource efficient than a larger home. Reference: Energy Star for Homes (version 3) and Canada Green Building Council LEED Canada for Homes (version 4)	Choosing the right size of home can save you money on your heating and electricity bills every month.	☐
ENERGUIDE RATING SYSTEM	What is the EnerGuide rating of the home?	Look for a label that indicates that 'this house' uses less energy on an annual basis than 'a typical house'.	EnerGuide for Houses is a measure of the home's energy performance. Not all homes have a label but it's easy to get and is extremely important for determining the energy efficiency of the home. Your energy bills can be among your greatest monthly expenses. Choosing an energy-efficient home reduces your energy costs.	☐

	QUESTIONS TO ASK	WHAT TO LOOK FOR RESALE	NEW	BENEFITS	☑
BUILDING ENVELOPE	**Is the home airtight?**	Ask if a blower door test has been done. A reading of 2.5 ACH at 50 Pa is considered current good practice, whereas an R-2000 home will have a reading of 1.5 ACH at 50 Pa. A lower exchange rate signifies better airtightness.		Reducing the amount of air that leaks in and out of your home is an easy and cost-effective way to cut heating and cooling costs, improve durability, and increase comfort.	☐
	Is the home well-insulated?	A qualified professional can test the level of a home's insulation. Ask if the home has had an energy audit done. This report will indicate the levels of insulation in the home.	The Alberta Building Code specifies minimum insulation standards. But insulation levels that exceed the Building Code are recommended if you want to reduce your home's energy consumption and costs. For example, insulation for a house built to code: » Roofs/Attic: R-59, RSI 10.43 » Walls: R-17, RSI 3.08 » Foundation walls: R-20, RSI 3.46	Your home's insulation keeps the heat inside when it's cold outside and keeps your home cool when it's hot outside. Ensuring your home is well-insulated is a key to saving on your heating bills and staying comfortable. It also keeps the home quieter.	☐
	Are the windows ENERGY STAR-labeled and triple-paned?	Check to see that the windows are triple-paned.	If the window isn't ENERGY STAR-rated, look for a window with a high energy rating (ER). As a guide, an ENERGY STAR-qualified window in Edmonton's climatic region will have an energy rating (ER) of 29. The higher the ER, the more energy efficient the window is.	Energy-efficient windows, doors, or skylights reduce household energy bills by an average of 12%. It also improves comfort near windows and keeps the home quieter. Reference: energystar.gov/products/res_windows_doors_skylights	☐
	Are the building envelope materials resilient to extreme weather?	Look for: » a steeper pitch on the roof » roofing materials that can withstand weather events like hail or wind » durable siding types, like cement board or panels		Steeper pitched roofs will more easily shed heavy, excess snow and are less prone to hail damage. The appropriate roofing material can help ensure your roof is longer lasting and can decrease the cost of insurance for your home. Siding can be vulnerable to wind and hail damage. Cement board siding or panels are most resilient for fire, hail, wind, and UV damage.	☐

	QUESTIONS TO ASK	WHAT TO LOOK FOR		BENEFITS	☑
		RESALE	NEW		
VENTILATION	**Does the home have a heat recovery ventilator (HRV)?**	An HRV system would likely only be installed in an existing home if it was already airtight. If the home's envelope has been upgraded, look for an HRV also being installed.	Although other methods of ventilation are available, if your home has a good EnerGuide rating (that is, it's quite airtight), an HRV is considered the best solution to provide fresh air indoors while maintaining energy efficiency through heat recovery.	An HRV provides numerous benefits, such as: » a healthier home » energy savings » greater ventilation control » prevention of the buildup of contaminants that can enter and become trapped in the house » control of moisture, which can minimize mould growth	☐
HOME HEATING	**Is the home's furnace ENERGY STAR-rated?**	If your home's furnace doesn't come with an ENERGY STAR label, look for an EnerGuide annual fuel utilization efficiency (AFUE) rating of greater than or equal to 95% (high-efficiency furnace). In a resale home, even if the furnace has an ENERGY STAR label, ask when the furnace was replaced. Older ENERGY STAR furnaces would not meet the same standard of the ENERGY STAR furnaces of today.		The heating system is your home's largest energy user, so making it more energy efficient can make it one of the biggest cost savers.	☐
	Are there programmable thermostats?	Programmable thermostats are an easy and inexpensive way to reduce energy use. Look for an ENERGY STAR-rated, mercury-free thermostat that is easy to program.		Setting back the temperature each night from 21 to 17°C can reduce yearly annual heating costs.	☐
	Is there a drain water heat recovery system?	These systems capture the waste heat passing through the drains from hot water sources like sinks, showers, bathtubs, dishwashers, and clothes washers. These systems can reduce hot water requirements of showering by 40 to 60%.		Drain heat recovery systems can cut hot water costs in half and have no moving parts so they never break and should last as long as the house.	☐
HOT WATER HEATERS	**Is the home's hot water tank ENERGY STAR-rated, and does it include tankless water heaters?**	First, look to see if the home has one or more tankless water heaters. If the home has a central hot water tank, check to see if it's an ENERGY STAR model. If not, see if the hot water heater has a high energy factor (EF). The EF measures the efficiency of the water heater by comparing the energy supplied in heated water to the total daily energy consumption of the water heater. Look for an EF of 0.67 or higher. Check for a drain water heat recovery system. Reference: energystar.gov/products/water_heaters/residential_water_heaters_key_product_criteria		The water heating system is the second-largest user of energy in the average home, so it's another area for excellent savings.	☐

	QUESTIONS TO ASK	WHAT TO LOOK FOR RESALE	NEW	BENEFITS	☑
GREEN RATING SYSTEMS	**Is the home certified by a recognized green building rating system?**	Look for homes certified by any of these rating systems: » BuiltGreen » LEED Canada » Passive House » R-2000 » ENERGY STAR for Homes		A green building certification typically goes beyond energy efficiency, so it can be a useful way to ensure that the home has a wide range of green features.	☐
HIGH-EFFICIENCY APPLIANCES	**Are the major appliances ENERGY STAR-rated?**	Look for an ENERGY STAR-rated refrigerator, dishwasher, stovetop, microwave, washer, and dryer. Ovens aren't ENERGY STAR-rated. You can also compare EnerGuide labels, which, under federal law, all new electrical appliances in Canada must have. Look for condensing or heat pump dryers.		ENERGY STAR-rated appliances typically use 10 to 50% less energy. ENERGY STAR dishwashers and clothes washers also save water. A front-loading clothes washer uses 45% less water and 25% less energy. References: » energystar.gov/newhomes/features_benefits » energystar.gov/products	☐
WATER CONSUMPTION	**Does the home have low-flush toilets and low-flow showerheads and faucets?**	Try to meet or exceed the City's requirements for new homes and major renovations, shown in the column to right.	The City mandates water-efficient fixtures for new homes and major renovations: » Toilets: 6 litres per flush » Faucets: 8.3 litres per minute » Showerheads: 9.5 litres per minute	Simple, low-cost water conserving fixtures can reduce your water consumption and water bills significantly. They also lower your energy costs by reducing the amount of water that needs to be heated. By switching to energy-efficient and water-wise low-flow fixtures and appliances, the average Edmonton household could save over $300 a year.	☐

	QUESTIONS TO ASK	WHAT TO LOOK FOR RESALE NEW	BENEFITS	☑
LANDSCAPING AND OUTDOOR ENVIRONMENT	**Does the home's garden and lawn area have low irrigation needs?**	Look for native plants and not too much turfed lawn area.	Eco-landscaping not only reduces water use, but typically reduces fertilizer and pest-and-disease-control requirements. Also, how your lot is landscaped has an impact on water conservation and water quality in the North Saskatchewan River.	☐
	Are trees strategically placed on the lot?	Look for a well-placed line of evergreen trees on the north and west side of your home. Deciduous trees along the south side provide summer shade while still allowing winter sunshine.	Well-placed trees provide shelter against winter winds and summer sun, reducing your home's demand for heating and cooling.	☐
	Does the home have an irrigation system?	Look for an existing rain barrel or an area that can easily accommodate a rain barrel. If an underground irrigation system is in place, look for drip or low-volume nozzles as these reduce water flow rates. Automatic shut-off devices or irrigation timers and controllers can further optimize irrigation and reduce wastage.	More than half of the water applied to lawns can be lost to evaporation and runoff due to overwatering.	☐
	Is the lot appropriately graded?	Look for landscaping that slopes away from the foundation and a driveway that slopes away from the garage.	Landscaping that is properly graded will help avoid flooding in your home or garage.	☐
	Does the home have an adequate foundation and flood controls?	Look for homes certified by any of these rating systems: » a foundation that is a minimum of 15.25 cm (6 in) above ground and landscaping that allows water to drain away from the home » a basement sump pump and backwater valve in good working order	A good foundation and flood control measures can help minimize the damage to property, should a flood occur.	☐
HEALTHY HOMES AND ENVIRONMENT	**Were sustainable materials used in the construction or renovation of the home?**	A healthier new or existing home uses low-volatile organic compounds (VOC) paints, glues, and flooring materials, with eco-labels such as Green Seal or Green Label for flooring.	Edmontonians spend a great deal of time indoors (particularly in winter), so it's important to make indoor spaces as healthy as possible.	☐
	Is there ample natural light?	Check to see that there's plenty of natural light in all the regularly occupied rooms.	Homes with abundant daylight create pleasant indoor environments and can contribute to the well-being of home occupants over the long term. However, making sure that the home doesn't lose too much heat in winter may require using triple-paned glass or other strategies.	☐

	QUESTIONS TO ASK	WHAT TO LOOK FOR RESALE	NEW	BENEFITS	☑
cont.	**Have recycled and locally sourced materials been used in the construction?**	Depending on when the house was built, the seller may not know the amount of locally sourced or recycled materials used in the home construction, but it doesn't hurt to ask.	Look for recycled and local content in building materials (especially those that make up a large percentage of the overall home materials), such as wood, concrete, and steel.	Local and recycled materials are less greenhouse gas-intensive than new materials shipped from far away.	
SOLAR ENERGY AND HEATING	**Does the home include passive design to reduce energy consumption?**	It's more challenging to retrofit existing homes for passive design.	Effective passive design can be achieved with careful integration of different design elements on sites with good solar access and potential to orient the home for better performance.	Passive solar design, when done properly, can reduce energy consumption significantly while adding minimal cost.	☐
	Does the unit face north or south?	Optimally, the longer axis of the building should have east-west orientation, within 15 degrees. Most of the window area should be on the south side, with a smaller amount of windows located on the north side.		Not all homes can have this orientation, so try to take the principles of solar orientation and passive solar and apply them (where possible) during your house hunt.	☐
	Does the home have solar panels? If not, is the home solar-ready?	The home may have pre-installed solar panels, or the home may be solar-ready so that you can easily install solar panels later. If panels are installed, find out how much of the home's energy needs are met by the solar energy system.		Solar photovoltaic (PV) electricity generation reduces your exposure to future energy price increases and is a feasible, renewable energy option for Edmonton's climate.	☐
		Solar energy systems can be sized to provide up to 100% of the energy needs, but older homes aren't usually energy efficient enough to make this economical. That doesn't mean solar energy systems aren't possible for older homes, just that it might make sense to invest in energy efficiency improvements in combination with solar.	A new home should be built to adapt to new technology. If solar panels don't fit into your current budget plans, ask if the home is solar-ready. This means conduit and other such provisions have already been added, which makes future installation much easier.		
OTHER INNOVATIONS	**Does the house have other technology such as geoexchange, combined heat and power, or an electric vehicle charging station?**	These systems are emerging in the marketplace and it's worth asking the builder or seller if the systems have been installed in the home.		These technologies can provide increased efficiency and/or provide alternative energy/fuel sources.	☐

DESIGNING & BUILDING A NEW HOME CHECKLIST

If you're looking to design and build a home, you'll want to consider many of the questions covered in the **Single-Family Home Checklist** section, especially those related to location, green rating systems, energy efficiency, and water efficiency. When building a new home, you have the opportunity to build it to be as energy efficient as possible. Here are some additional questions to consider when building a new home.

BUILDING TO NET ZERO

WHAT TO ASK FOR		☑
If you are interested in a net zero home, look for a net zero builder. If constructing a new net-zero home isn't feasible for you right now, consider a pathway to net zero over the lifetime of your home by prioritizing the most effective efficiency measures::		
1. **Make it tight.**	Efficient homes don't let as much air escape and conserve energy required to heat or cool your home. A blower door test during construction allows leaks to be repaired. After construction, a blower door test can be used to confirm the air leakage rate of the home. A value below 2.5 ACH (air changes per hour) means your home is well sealed, but achieving an ACH between 1.0 and 1.5 will set you up for future net zero success.	☐
2. **Insulate right.**	Insulation reduces heat lost through exterior surfaces (attics, walls, windows & doors). » This is easiest and most cost effective to do when the home is first being built. » Insulating and air tightness ensure a home can be efficiently electrified later.	☐
3. **Size for the space.**	Homes with better insulation and improved air tightness require less space heating and smaller equipment is possible. Electric heat pumps are an alternative to furnaces in energy efficient homes and can also provide cooling (replacing the need for separate AC!). » An air source heat pump combined with a natural gas furnace backup may be the most cost effective option to both heat and cool your home if you want to keep gas service at your home for other purposes (eg a gas stove, barbecue, or water heater). If you don't need a gas line for these other purposes, going all electric might be more cost effective. » A ground source heat pump is easiest to install when a home is first being constructed. The upfront cost is higher, but ongoing operating expenses may be lower compared to an air source heat pump	☐

	WHAT TO ASK FOR		☑
cont.	4. **Make up the difference.**	An effective path to net zero requires significant energy efficiency improvements, heat recovery (water and air), and appropriately sized mechanical systems and appliances - powered by electricity. With that combination, a rooftop solar panel installation can generate enough green electricity to meet your needs. If you aren't able to install solar panels right away, you can still make it easier to add them later by constructing a solar-ready home. Solar-ready homes have their roofs and electrical systems designed for solar panels. See the Solar Energy and Heating chapter to learn more.	☐
	For more details, read the blog post and watch the video, Climate-ready home: Reduce emissions, save money", from the Changing For Climate video series: edmonton.ca/ChangingForClimateSeries		
ENERGY MODELLING	Ask for an energy modelling report.	» The report will help you understand the energy use and emissions from your house's design. Your energy advisor can help with any questions you have about your energy modeling report. » Energy modeling can help to evaluate how energy efficiency upgrades translate into ongoing utility savings, and help you select what is most cost effective over time.	☐
ENERGUIDE LABEL	Get an EnerGuide label for your home.	The label: » Shows how your home compares to a typical new home. » Provides an estimate of annual utility use and emissions. » Can be shown to future purchasers to demonstrate the value of any energy efficiency upgrades you chose. » Can be shared on the City's home energy map. If you are planning to have an energy model and blower door test, you are already meeting most of the requirements.	☐
OTHER	Plan for electrification.	Look for lots in neighbourhoods that offer 200 Amp electrical service. This provides flexibility for electrification on net zero homes and opportunities for additional rental suites.	☐
	Plan for electric vehicle charging.	If you are planning to switch to an electric vehicle in the future, ask about home charging options. This might include upgrading the electrical service to your home, which is easiest and cheapest to do when the home is first built, especially if the electrical service is underground.	☐

CONDO CHECKLIST

If you're looking for a condo, you'll want to ask many of the questions covered in the **Single-Family Home Checklist** section, especially those related to location, green rating systems, energy efficiency, and water efficiency. However, condominiums also include additional common areas and unique amenities and you need to know how green they are. Even if the condo you buy doesn't have all of these things, you could work with the condo board to see if some of them can be implemented. Here are some additional questions that pertain to multi-family condominiums.

QUESTIONS TO ASK	WHAT TO LOOK FOR	BENEFITS	☑
IN EACH UNIT			
How is heat supplied to the unit?	Look for hydronic heat (hot water radiators or in-floor radiant heating) instead of electric baseboard heaters. Ask how efficient the boiler is and about its service record. An energy-efficient boiler has an annual fuel utilization efficiency (AFUE) of 90% or more. It's also important to see a history of utility bills for the building. If heating costs have changed over time, it's important to know why.	Space heating is the single largest consumer of energy in a building. Hydronic heating is considered one of the most efficient ways of heating multi-unit residential buildings. However, if the condominium unit comes with a forced-air furnace, look for tips in the Single-Family Home Checklist section.	☐
How will you be charged for electricity, gas, and water?	Find out if each of the units has its own electricity and water meter. Very few buildings have individual meters for gas heating at this time, but it can save you money if the building has them.	Individual unit meters help save money, water, and energy as you'll pay less if you use less.	☐
If there's a gas fireplace in the unit or in the common area, does it have electronic ignition and is it on a timer?	Make sure that any gas fireplaces can turn off automatically. New gas fireplaces with electronic ignition save gas associated with keeping a pilot light on.	Gas fireplaces consume a significant amount of natural gas and are easy to leave on by accident. Also, the pilot lights on older fireplace models consume gas. They're often tricky to light and tend to be left on throughout the summer months.	☐

QUESTIONS TO ASK	WHAT TO LOOK FOR	BENEFITS	☑
IN THE BUILDING			
Is the window-to-wall ratio optimized?	Look for units that provide a good amount of daylight but minimize windows (for example, glazing). As a rule of thumb, if the proportion of window-to-wall area is more than 50%, then the building has too much window and not enough insulated wall area.	Although a lot of windows can be a great addition to your condo unit, they provide less insulation than walls. An over-glazed building becomes more expensive to heat in winter and can be uncomfortably warm in summer.	☐
Are there low-energy lights and automatic timer controls in the common areas?	Look for light emitting diode (LED) and compact fluorescent light (CFL) bulbs in the hallways, front entrance, exterior lighting locations, and parking area. Also look for lighting controls that are motion-activated or on timers/photocells.	CFL bulbs use 1/4 of the energy and last up to 10-times longer than incandescent lights. LED lights use even less energy. Both types of lights save additional energy when controlled by photocells, timers, or motion sensors.	☐
Are the hot water recirculation tanks in the building on a timer?	Ask if timers are used to reduce the hot water temperature during early morning hours, when there's almost no demand for hot water.	Hot water tank timers can save a significant amount of money over the course of a year, and they're very inexpensive to install.	☐
Is there drain water heat recovery?	In larger (and mostly newer) condominium buildings, it's cost-effective to capture and recirculate the heat in wastewater from showers, kitchens, etc. Find out if the building has been fitted with heat recovery coils around drain pipes.	Hot water heating typically consumes the second-largest amount of energy in condominiums. The heat recovered from the outflowing bathroom and kitchen drains can be used to pre-heat hot water for future use, saving you money and energy.	☐
Does the building have any renewable energy equipment?	Ask if any solar hot water or photovoltaic (PV) systems have been installed in the building.	After the capital costs of these renewable technologies have been recouped, they can reduce energy costs significantly.	☐
Are there accessible and secure bike facilities?	Look for bike racks that are easily accessible, secure, and large enough to accommodate all those who would use them.	Bike racks encourage you and your visitors to use more sustainable forms of transportation more often.	☐

QUESTIONS TO ASK	WHAT TO LOOK FOR	BENEFITS	☑
IN THE BUILDING cont.			
Are electric bikes welcome in the building?	Look for designated areas in the building for secure storage of electric bicycles and scooters, preferably with access to a few electrical outlets for recharging.	For city driving distances of 25 minutes or less, electric bikes can often get their riders to their destination faster and at a far lower fuel cost than a car. It is a minimal cost to charge an electric bike (distance coverage: about 40 kilometres).	☐
What energy-saving and health-oriented initiatives are being pursued by the condominium board?	When reviewing condo documents, look for evidence that the condo board is making energy-saving improvements such as maintaining or adding controls on the air exchanger, changing boiler filters regularly, sealing air leaks, insulating pipes, using non-toxic paints and adhesives, buying eco-friendly cleaners, etc. Also ask if the condo board is purchasing any green power.	An energy-aware condo board and property management company ensures you're keeping your energy costs low while maintaining good levels of building comfort and health.	☐
Are green landscaping techniques being used?	Ask if the plants outside the building are watered on a water-saving drip irrigation system with timers, and whether the plants are fed with organic nutrients instead of chemical fertilizers and pesticides.	A drip irrigation system conserves water and saves money. The use of organic soil amendments (like fish bones) reduces health risks for kids and pets playing among the plants.	☐
Does the building have a good system for waste recycling and composting?	Look for an ample, well-ventilated, well-lit, and clean area with clearly marked bins: a blue one for recyclables and one for general waste. If the building doesn't have a blue bin, check for the nearest recycling depot at: edmonton.ca/waste Also look for outdoor bins for on-site composting or grasscycling. Organic bins are being provided to multi-residential buildings, including condos. Find out more at: edmonton.ca/programs_services/garbage_waste/apartment-condo-collection	Recycling costs less and keeps valuable materials out of landfills. On-site composting is the single most cost-effective way to reduce waste at the source and can add nutrients to the plants around the condo. (Organic food and yard waste make up about 30% of total waste.)	☐

QUESTIONS TO ASK	WHAT TO LOOK FOR	BENEFITS	☑
IN THE BUILDING cont.			
If there's a pool, is it being operated in an energy-efficient manner?	Ask about the pool operation and see if the temperature is turned down in the summer months or if thermal blankets are placed over the pool at night. Visit: energy.gov/energysaver/swimming-pool-covers	Pools and hot tubs can be a great addition to any lifestyle but they require a lot of energy. Adding a thermal blanket at night can reduce energy consumption by 50% in an indoor pool and 70% in an outdoor pool.	☐
If there's a fitness room, is the fitness equipment energy efficient?	Ask if any of the equipment is energy efficient. While no fitness equipment has been certified ENERGY STAR, non-electric versions are available for some of the most popular exercise machines. Some fitness equipment is energy-generating and is used to power the lights and music in the fitness room!	Not only does using fitness equipment that produces energy make you feel good, it can even make you healthier. Studies have shown that people exercise longer on fitness equipment that generates energy, especially if they can see a read-out of the energy they're generating.	☐

REALTOR®

Here when life happens.

August 8, 2013

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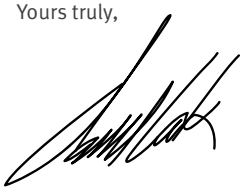
RE: Homes for Climate Guide

On behalf of the 3,200 members of the REALTORS® Association of Edmonton, I extend many thanks for your efforts to produce the City of Edmonton's Homes for Climate Guide. This will be a very useful document for consumers which provides background information on various energy efficiency improvements and green features that are possible in today's residential market (both new and resale). The booklet will help convey the value and benefits of the green features that are available in the market with a desired outcome of better informed consumer choice.

The REALTORS® Association of Edmonton is pleased to endorse the publication and to provide access to copies to our members and their clients. Our marketing department will provide a copy of the appropriate logo to print on the publication.

Yours truly,



Darrell Cook
President

Edmonton Region

Canadian Home Builders' Association

August 28, 2013

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RE: Homes for Climate Guide

The Canadian Home Builders' Association – Edmonton Region is pleased to lend its support to the City of Edmonton's Homes for Climate Guide.

This publication has a wealth of information and timely advice for new home buyers and home owners planning their renovation. By bringing together information on green features and innovations, energy-saving ideas and facts and tips on green practices within one concise document, everyone involved in home building and renovating will have a valuable resource to assist in making informed choices.

The creative partnership of municipal initiatives, corporate commitments and individual actions enables all of us to positively affect our environment, one small footprint at a time.

Yours truly,

Rod Taverner
President

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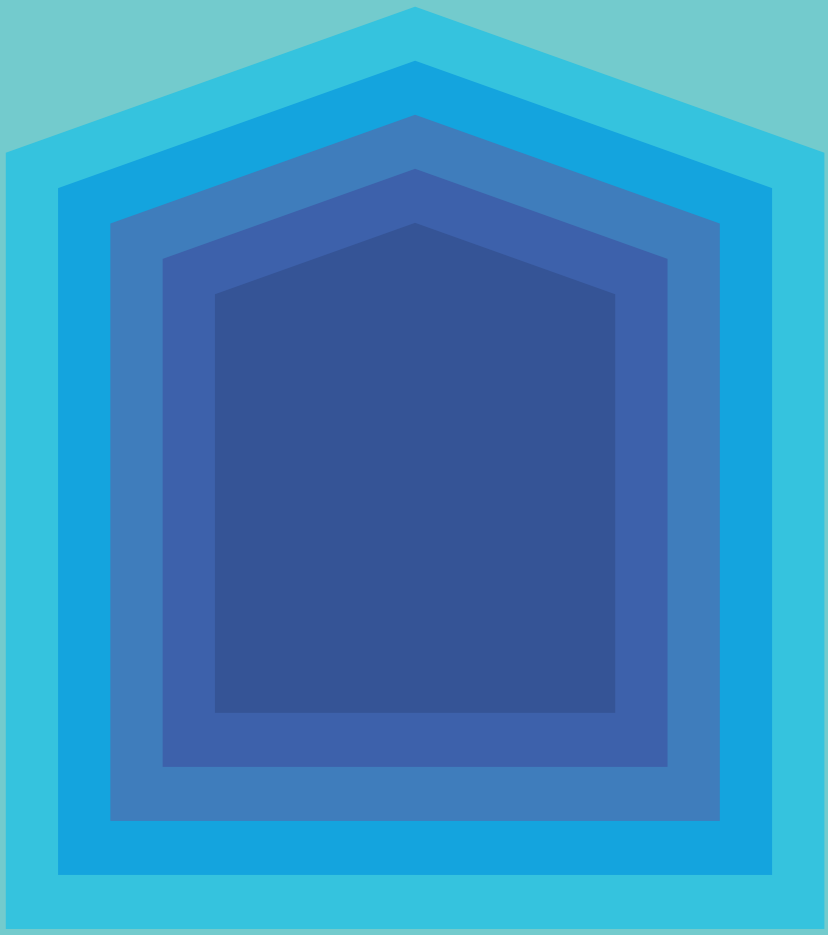

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