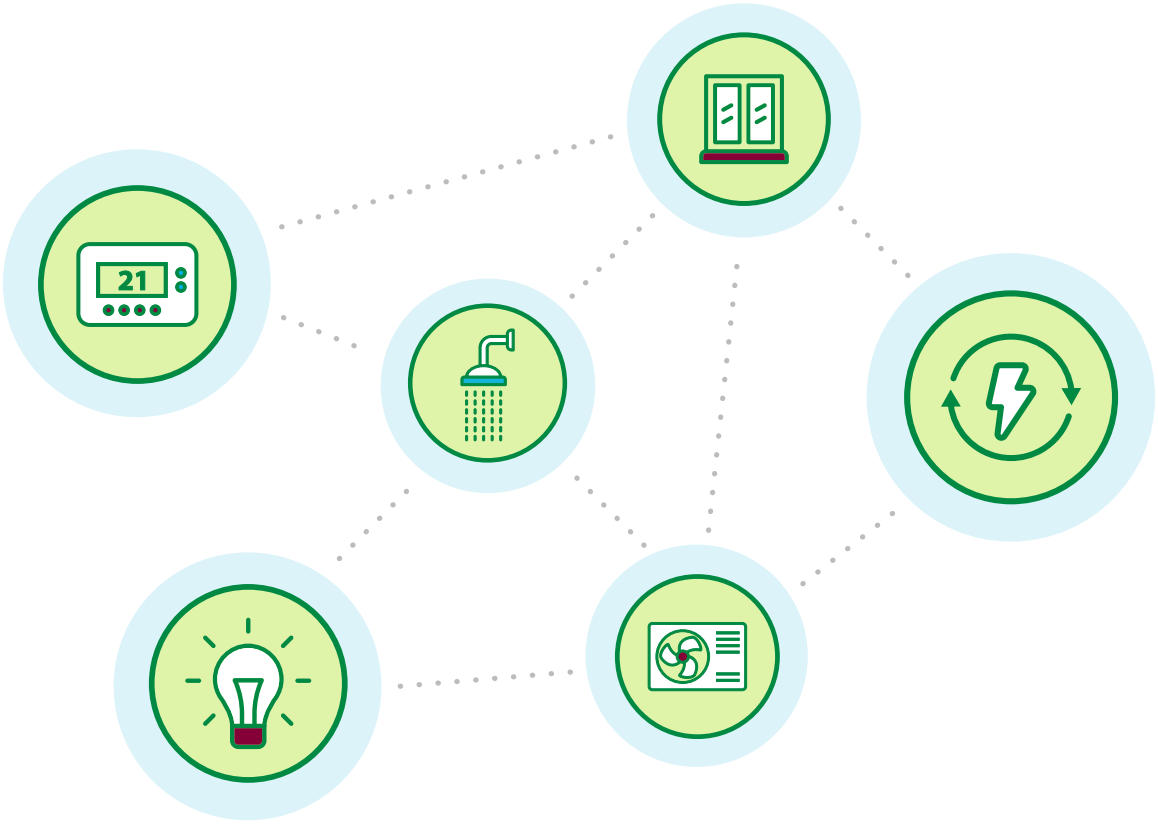
GREEN MUNICIPAL FUND
FONDS MUNICIPAL VERT

UNDERSTANDING ENERGY EFFICIENCY

→ A guide for affordable housing providers



A program of/ Un programme de la
FCM FEDERATION OF CANADIAN MUNICIPALITIES FÉDÉRATION CANADIENNE DES MUNICIPALITÉS

Funded by/ Financé par
Canada

Acknowledgement

The Federation of Canadian Municipalities gratefully acknowledges The Canadian Institute for Energy Training who conducted research and created the content for this guide, specifically Olivier Cappon and Alexandra Hopley.

Delivered by the Federation of Canadian Municipalities, the Green Municipal Fund (GMF) is a $1.65 billion endowment from the Government of Canada. GMF helps municipalities implement sustainability projects and emission-reducing policies—creating lasting environmental change, improving your quality of life, and driving sustainable economic growth in your community and across Canada.

CIET FORMATION EN ÉNERGIE DURABLE

A program of/ Un programme de la
FCM FEDERATION OF CANADIAN MUNICIPALITIES FÉDÉRATION CANADIENNE DES MUNICIPALITÉS

Funded by/ Financé par
Canada

Table of contents

About this guide 4

Why energy efficiency is important for the affordable housing sector 5

Energy basics 6

Why should you care about energy efficiency? 7

Start with an energy audit 7

Energy conservation measures (ECMs) 10

- ECMs for controls, optimization and maintenance 11
- Lighting ECMs 12
- Domestic hot and cold water ECMs 13
- Heating, ventilation and air conditioning (HVAC) ECMs 14
- HVAC ECMs: Heat and energy recovery 15
- HVAC ECMs: Heat pumps and air conditioning units 16
- HVAC ECMs: Boilers and furnaces 17
- HVAC ECMs: Motors, pumps, fans and VFDs 18
- Building envelope ECMs 19
- Building envelope ECMs: Air sealing 20
- Building envelope ECMs: Insulation 21
- Building envelope ECMs: Windows and doors 22
- Renewable energy ECMs 23

Get started! 24

FCM's Sustainable Affordable Housing (SAH) funding 25

Glossary 26

About this guide

This guide is for affordable housing providers who are interested in energy efficiency.

The affordable housing sector faces some unique challenges in undertaking energy efficiency projects. Affordable housing stock is aging and traditionally the sector has undertaken like-for-like improvement projects and as-needed capital repairs. This may make comprehensive retrofit projects more of a complex undertaking. Also, as most affordable housing providers are small- or medium-sized organizations, limited staff and resource capacity can make it challenging to take on and manage new projects.

The good news is that housing providers can overcome these challenges by building their knowledge in energy efficiency, undertaking good planning and securing the right support.

This guide is a good first step. It introduces energy efficiency and key energy concepts to equip housing providers with the information they need to get started on a project.

How to use this guide

The guide begins with an overview of energy basics and why an energy efficiency project can be beneficial.

Next, the guide presents a range of energy conservation measures (ECMs) that increase energy efficiency. Simple, low-cost upgrades are shared first. If you are new to energy efficiency, start with these. More complex ECMs are also included for providers who are interested in deeper energy savings.

After reading the guide, you should better understand what is possible and how to get started on an energy project. Read the guide in its entirety as an introductory resource or use it as a reference tool by navigating to specific ECMs that are of interest to you.

Housing providers are not alone on their energy journey. Eventually, design and energy specialists will join your project design team to help move the project forward. Page 23 has more information on how to take action.

Why energy efficiency is important for the affordable housing sector

Canada's buildings contribute 18 percent of the country's total greenhouse gas emissions. Affordable housing buildings are often older and as a result more than 20 percent of affordable housing is in only fair or poor condition[1]. This means that the affordable housing sector has an important role to play in decreasing its emissions and reducing its climate footprint. Many housing providers will be undertaking capital repairs to their aging stock in the coming years. This presents an opportunity to integrate energy efficient strategies into necessary capital repairs.

Residents who live in affordable housing and pay for utilities are often in challenging circumstances and may find themselves experiencing energy poverty. Even if the housing provider pays utilities, these costs are often passed on to residents in other ways. According to the *Canadian Urban Sustainability Practitioners* (CUSP), 45% of Canadian households living in nonmarket (subsidized) housing are responsible for paying one or more energy bills and 17% are experiencing energy poverty.

Energy efficiency projects can help address energy poverty by renewing equipment, improving living conditions and reducing energy costs for both housing providers and residents.

Greenhouse gas (GHG) emissions— Burning fuel to produce energy release gasses. These gasses trap heat in the atmosphere and are called 'greenhouse gas'. These types of GHG emissions are expressed in terms of equivalent tonnes of carbon dioxide (CO_2). Using less energy can cut down on GHG emissions.

CUSP defines energy poverty as households or communities that struggle to heat and cool their homes and power their lights and appliances. Energy poverty can have many impacts:

- Residents may experience discomfort because their homes are too hot or too cold.
- Utilities may be shut off by providers, leading to significant disruptions at home.
- Households may not have enough money for other essentials, like food and medication.
- Residents may experience health problems such as respiratory illness, high stress loads, mental health difficulties and decreased community engagement.

TABLE 1: Results of the CMHC Social and Affordable Housing Survey — Rental Structures[2]

Condition and repair status of the units	Percentage of housing
Excellent or good	55%
Average	23%
Fair or poor	22%

Age of affordable housing building	Percentage of housing
Pre-1970	19%
1970–1989	57%
1990 or later	25%

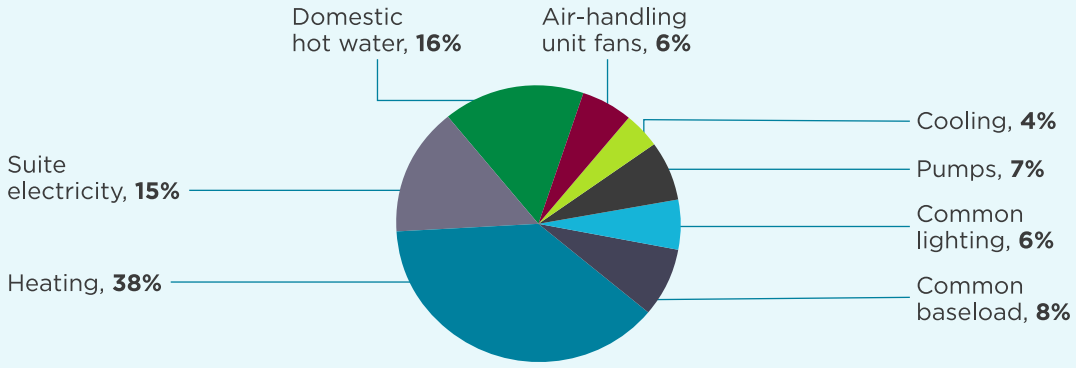
1 https://www.cmhc-schl.gc.ca/en/blog/2021/results-social-affordable-housing-survey-rental-structures
2 https://www.cmhc-schl.gc.ca/en/blog/2021/results-social-affordable-housing-survey-rental-structures

Energy basics

Energy is used in different proportions depending on the type of building.

For multi-unit residential buildings (MURB), the most common type of affordable housing, heating represents 38 percent of energy use. The next-highest energy consumers are domestic hot water (16 percent) and suite electricity (15 percent). All the other categories such as lighting for common areas and cooling take up under 10 percent each.

FIGURE 1: Average energy use in multi-unit residential buildings[3]



Energy is often expressed in kilowatt hours (kWh). This is the amount of energy used in one hour.

One kWh of energy is equivalent to the following:

- A 1000-watt toaster oven operating for one hour
- A 100-watt incandescent light bulb operating for 10 hours
- A 10-watt energy-efficient LED lightbulb operating for 100 hours

Electricity represents the highest proportion of energy costs.

Natural gas, oil, propane and wood are most often used for heating in Canada. Although electricity is sometimes used for heating, it is most often used for lighting, pumps, fans and air conditioning.

The main items on energy bills are the energy consumed and the delivery of that energy.

Energy efficiency projects will reduce costs by reducing the amount of energy consumed and the power required.

Total energy use intensity (TEUI pronounced "2E"): A measure of the total energy required by a building (heating, lighting, air conditioning, heating hot water, etc.). Improving the TEUI value happens when you decrease the energy used in a building.

Energy management is planning and managing the energy use in a building or organization by identifying opportunities, taking action to save energy and reporting on progress.

3 https://be-exchange.org/wp-content/uploads/2019/07/SWL-MURB-Presentation-Final.pdf

Why should you care about energy efficiency?

Energy efficiency can make a big difference in the affordable housing sector. Energy efficiency reduces energy consumption, but also provides non-energy benefits.

1. It can be a way to build better relationships with residents

Energy conservation measures (ECMs) that increase resident comfort and health, like temperature and humidity control, tend to make residents happier. Engaging residents in energy efficiency projects and providing opportunities for them to learn about energy-saving measures are great ways to build better relationships.

2. It reduces emissions

Almost 20% of Canadian greenhouse gas emissions are from building energy use. Implementing ECMs like those covered in this guide or switching to more environmentally friendly fuel options can reduce GHG emissions.

3. It saves you money

Implementing ECMs that reduce electricity and fuel usage will save you money on your energy bills. ECMs like tuning up old equipment, purchasing higher-quality equipment and lowering equipment usage will help to lower maintenance costs.

4. It can help you better understand how your building works

The energy advisors, contractors and others on your project design team can teach you a lot about the energy-consuming systems in your building.

Start with an energy audit

An energy efficiency project starts with an audit. This can take several different forms. A good first step is a free walkthrough energy assessment with one of FCM's Regional Energy Coaches (RECs). A REC can provide a virtual inspection of a building and help to determine next steps. See page 24 to learn more about our RECs.

Walkthrough audit [ASHRAE level 1]—A type of audit that allows for a high-level assessment of a building; the auditor will get an understanding of current operations and identify areas of focus to reduce energy consumption.

Energy audits [ASHRAE level 2]—An audit that provides more detailed energy analysis, calculations and financial analysis.

Baseline performance—The amount of energy a piece of equipment, system or building uses before making any upgrades.

Energy model—A computer-generated calculation estimates energy savings for one or more ECMs; completed by an energy efficiency expert, typically after an audit.

Measuring and monitoring—Done before and after a project using data loggers, existing metres or other measurement tools to help determine savings or to monitor use so problems can be identified early.

Building Condition Assessment (BCA)—An assessment that determines the state of a building's structure and systems; useful for determining what maintenance is required and where priorities should lie; includes a detailed inspection of every aspect of the building from the roof to the plumbing to the fixtures.

Case study: Community housing corporation improves resident comfort through energy efficiency

Cost: $5.6 million

Scope: Seven budlings ranging from four to 19 storeys—total of 1,237 households

Age of buildings: 1950–1970

Project timeline: 2015–2017

ECMs:

- High-efficiency boilers
- High-efficiency motors
- High-efficiency lighting
- Heat-recovery ventilation
- Low-flow faucets and toilets
- In-suite air-quality monitors and thermostats
- Gas-absorption heat pumps (for one building's hot-water system)

Savings:

- $500,000 in utility costs per year
- 963 equivalent tonnes of CO_2 per year

The EnerGuide rating system

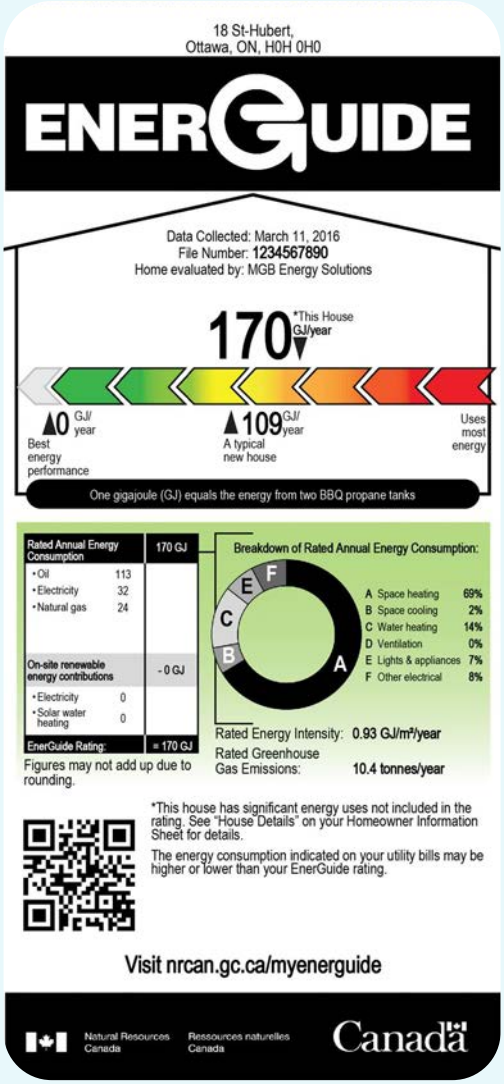
The EnerGuide rating system is a standardized energy labelling and reporting system created by the Government of Canada and administered by Natural Resources Canada (NRCan). The system uses a standard evaluation checklist to rate the energy efficiency of homes and some types of multi-unit residential buildings.

An EnerGuide evaluation can be an excellent place to begin to understand facility energy use and learn about potential retrofit opportunities.

During the evaluation, a registered energy advisor working with an NRCan-licensed service organization will inspect the building and undertake tests to determine its characteristics and its energy performance.

Following an EnerGuide evaluation, an *EnerGuide Renovation Upgrade Report* is provided. This report describes potential ECMs to consider along with their associated potential energy savings.

The process also produces a label showing a breakdown of the building's energy use, and how this use compares to other buildings.



vEnerGuide label example[4]

4 https://betterhomesbc.ca/faqs/what-is-an-energuide-home-label/

Energy conservation measures (ECMs)

We'll look at ECMs in the following areas:

An **Energy conservation measure (ECM)** is an upgrade to a building component or installation of energy-saving equipment, with the primary goal of saving energy.

A **retrofit** is an upgrade to an existing energy-consuming system.

Energy savings opportunities are typically categorized by the building systems that they affect. There are dozens of ECMs to consider—everything from simple, low-cost upgrades to more complex and/or expensive measures. This guide presents the most common ECMs: the ones that are typically viable in an affordable housing context.

Categories of ECMs vary in cost and complexity. The ECMs presented in this guide are complemented with:

- Case studies providing insights on payback and life expectancy
- "Important to know" call-out boxes that list key considerations for specific ECMs
- Definitions of common terms

Controls, optimization and maintenance
Recommissioning, thermostats and occupancy sensors

Lighting
Lighting both inside and outside of the building

Domestic hot and cold water
Systems that produce and distribute hot and cold water

Heating, ventilation and air conditioning (HVAC)
One of the more complex systems; includes heat and energy recovery ventilation; heat pumps and air conditioning units, boilers and furnaces; and fans, motors and pumps

Building envelope
Air sealing, insulation and windows

Renewable energy
Solar photovoltaic (PV), geothermal and solar air and hot water heating

ECMs for controls, optimization and maintenance

Recommissioning
This is a process of re-optimizing equipment to reduce energy use and maximize utility. Recommissioning can save up to 15 percent of a system's energy use, especially with older or oversized equipment.

Hallway thermostats
Thermostats can be used to better control the temperature in common areas, especially during spring and fall when outdoor temperatures vary.

In-suite programable thermostats
Replacing non-programable thermostats with programable versions and providing training to residents will encourage them to reduce temperatures at night and when they are out during the day (or other times they are regularly out), thereby reducing energy use.

Programmable thermostat

Occupancy sensors
Occupancy sensors in bike rooms, maintenance rooms, garbage rooms or storage closets will ensure that lights are not unnecessarily in use when no one is using the space. Occupancy sensors can also be used to dim lights, reducing their energy use.

How this ECM can be applied

Building: One building with 30 electrically heated units; operator pays hydro

Study: Showed that in-suite thermostats were old and were left at high settings by residents even in unoccupied periods

ECMs:

- Replacing thermostats in units with programmable thermostats in building
- Information session for residents

Savings:

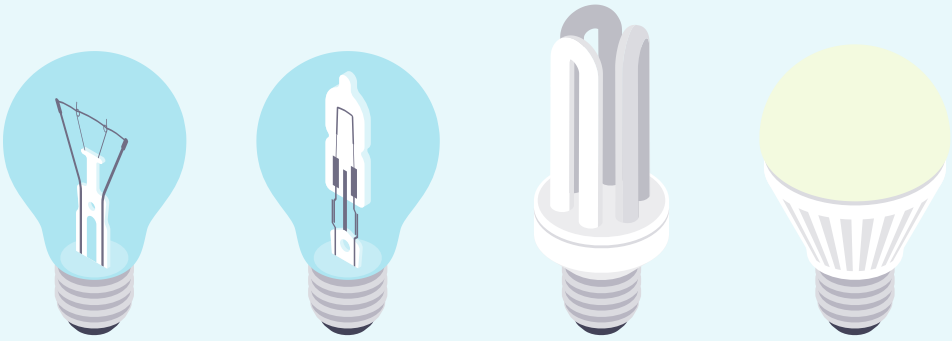
- Significant annual electricity savings
- Payback period of six years

Lighting ECMs

Lights are made up of a bulb and a fixture. Replacing just the bulb is an excellent option for plug-and-play type fixtures, which are common throughout residential buildings.

LED bulbs are the most energy-efficient choice. They are up to 90 percent more efficient than incandescent bulbs and have up to a 25 percent longer lifespan than fluorescents.

FIGURE 2: Types of lightbulbs



How this ECM can be applied

Building: Townhouse complex with 80 units

Study: Took inventory of all exterior lighting counts and estimated savings to upgrade all to LEDs

ECMs:

- Replacing outdoor halogen lighting with LED lighting
- Installing motion sensors that dim fixtures when on standby

Savings:

- Significant savings of lighting electricity and maintenance costs
- Payback in one to two years

Important to know

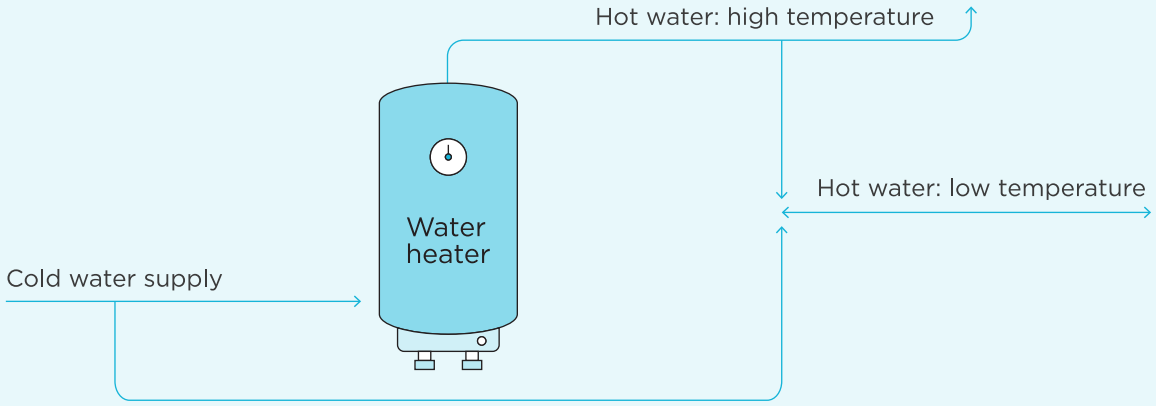
- Installing occupancy sensors can save power even without replacing bulbs or fixtures.
- In-suite lighting is an opportunity to talk to residents about saving energy.
- Parking garages often require specialized outdoor light fixtures.
- Improved lighting levels in walkways, parking lots and entryways also enhances safety for residents.

Domestic hot and cold water ECMs

Domestic hot water in MURBs is typically handled by a central boiler and storage tank system, usually either gas-fired, oil-fired or electric depending on the region. Sometimes in-suite heaters are used.

Both domestic hot-water and cold-water systems may require booster pumps in taller buildings.

FIGURE 3: Simplified heater flow chart for domestic hot water



How this ECM can be applied

Building: Five-storey building with 32 units

Study:

- Showed hot water boiler operating at low combustion efficiency
- Found hot water pumps were past their service life

ECMs:

- Temperature and pressure adjustment on the seven-year-old boiler
- Adding a variable frequency drive to hot water pumps

Savings:

- Natural gas savings from tuning up the domestic hot water system
- Electricity savings from reduced pumping

Important to know

- A tune-up by a qualified tradesperson can lead to increased domestic hot water capacity, better temperature range, lower fuel costs and increased reliability.
- Adding insulation to equipment and pipes will reduce temperature loss in the building.
- Older tanks and pumps can be replaced with high-efficiency models.

Heating, ventilation and air conditioning (HVAC) ECMs

HVAC systems are the main energy user in most residential buildings. HVAC equipment includes heat and energy recovery ventilation; heat pumps and air conditioning units, boilers and furnaces; and fans, motors and pumps.

These systems collectively represent several important energy efficiency opportunities presented in the following pages.

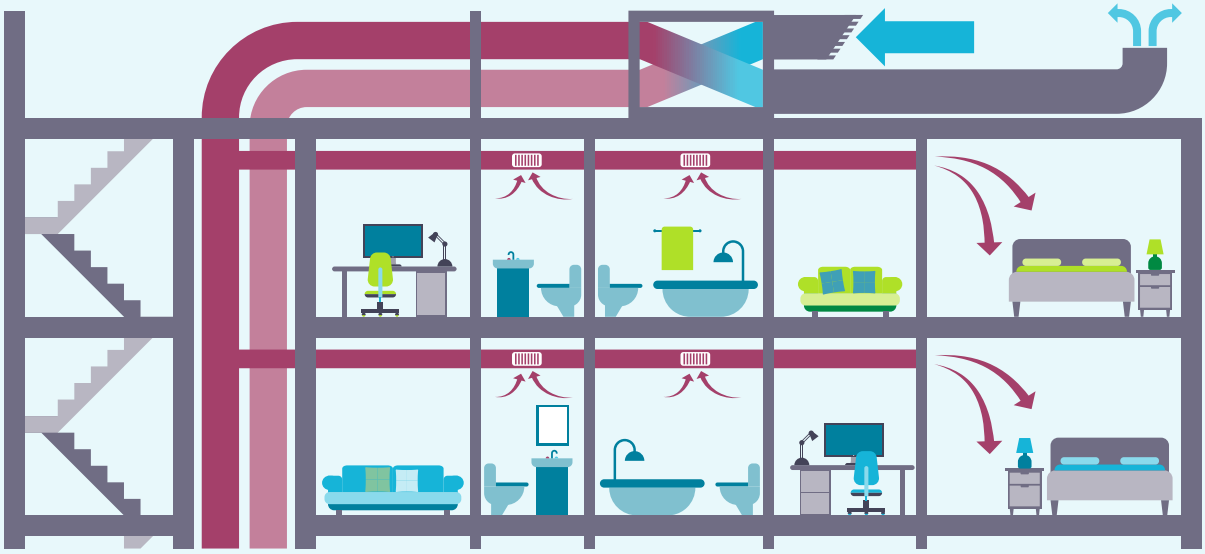
HVAC—Acronym for heating, ventilation and air condition systems, including all their auxiliary equipment.

Fuel-switching measures—Measures that save on money or energy by switching from one fuel to another (e.g., replacing a gas-fired furnace with a ground-source heat pump).

AC units connected to the residential house

HVAC ECMs: Heat and energy recovery

FIGURE 4: Heat recovery in a multi-unit residential building



How this ECM can be applied

Building: Six-storey building with 40 units

Study: Identified that the existing make-up air handling unit on the roof was beyond its service life and needed to be replaced (the unit also did not incorporate any heat-recovery)

ECM: Replace the make-up air unit with a new unit with upgraded configuration featuring an 85 percent efficiency HRV

Savings: Significant reduction in winter natural gas heating consumption due to heat recovery

Important to know

- HRVs become less effective if not cleaned and maintained regularly.
- ERV and HRV systems must be professionally designed to maximize resident comfort.

Heat recovery ventilation (HRV)—Captures heat from the stale air leaving a building in the heating season and uses it to preheat the fresh air coming in; does the reverse in the cooling season, cooling hot air coming in from outside.

Energy recovery ventilator (ERV)—A type of HRV that can exchange both heat and moisture.

Make-up air unit (MUA)—Delivers fresh, heated air to "make up" for the stale air being exhausted.

HVAC ECMs: Heat pumps and air conditioning units

Heat pumps can be used for electrical heating and cooling. They are up to three times more efficient than electric baseboards for heating, and newer units have much improved cooling efficiency compared to older units.

How this ECM can be applied

Building: Six-storey building with 40 units

Study:

- Found some existing air conditioning (AC) units were approaching their service life and were beginning to require more frequent service
- An analysis showed that heat pumps could replace units while adding cooling in some spaces and converting baseboard heaters in other spaces

ECM: Replace AC units and baseboard heaters with heat pumps

Savings:

- Significant savings on winter electricity bill
- Major improvement in resident comfort by adding cooling in some spaces, with small increase in summer electricity use

Air source heat pump

Important to know

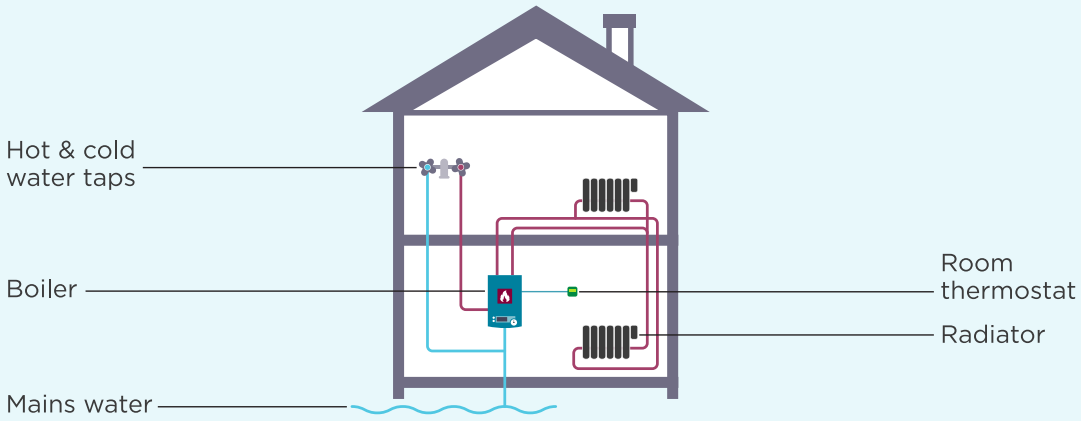
- Heat pumps are a good ECM for electrically heated buildings without central heating systems.
- Look for the Energy Star label on heat pumps and window AC units.

HVAC ECMs: Boilers and furnaces

Space-heating boilers and furnaces should be regularly maintained to function efficiently. Older models can be replaced for a 25–40 percent increase in efficiency.

Boilers heat buildings by circulating hot water or steam through radiators or radiant floor systems, while furnaces heat buildings by circulating air through ducts. Sealing and insulating ducts or pipes can also lead to energy savings.

FIGURE 5: Boiler and hot water system for domestic hot water and space heating



How this ECM can be applied

Building: Three-storey building with 10 units

Study:

- Showed that furnace was past its lifetime and was running well below standard efficiency rates
- Some leaks were found in the duct system

ECMs:

- Replacing the 65 percent efficiency central furnace with a 95 percent efficiency model
- Sealing leaky ducts

Savings:

- 30 percent savings on the heating bill

Important to know

- Look for the Energy Star label when replacing boilers and furnaces.
- Boiler and furnace replacements should be done outside the cold season.

HVAC ECMs: Motors, pumps, fans and VFDs

Case study: Perth Co-operative Housing retrofitted HVAC and lighting systems

Cost: $3.1 million

Scope: Eight-storey building with 102 units

Age of buildings: 1987

Timeline: 2014–2016

ECMs:

- Domestic hot water boiler replaced with condensing model
- Domestic cold water booster pumps with added VFDs
- Programmable thermostats
- LEDs to replace fluorescents
- Occupancy sensors in garbage and laundry rooms
- Low-flow aerators and toilets
- Weatherstripping of doors
- New air conditioning unit for the lobby
- Resident training

Savings:

- $84,000 annual savings
- 37-year simple payback period
- 103 equivalent tonnes of CO_2 /year

Perth Avenue Housing Co-operative
Photo courtesy of The Atmospheric Fund (TAF)

Important to know

- VFDs can be retrofitted to old equipment.
- Energy-efficient equipment often comes with built-in VFDs.
- Replacing pumps and fans doesn't automatically mean energy savings—they must be properly sized and have proper control systems.

Building envelope ECMs

The building envelope refers to the exterior of the building. It includes exterior walls, foundation, attic, windows and doors.

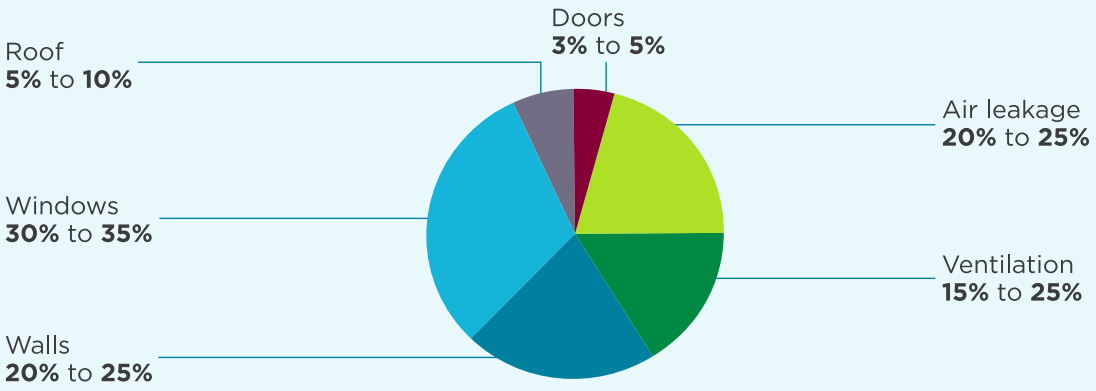
Having a better building envelope means that heating and cooling systems can be smaller or run less, making them less expensive to operate.

R value—This is a measurement of the insulation of a material; the higher the R-value, the more insulating it is. Layering materials increases the R-value. For example, triple-glazed windows have a higher R-value than double-glazed windows and adding foam insulation to an attic will increase the overall R-value of the attic.

Heat loss in a typical building

Windows account for the most heat loss because they tend to have low R-values and they make up a large area of most building envelopes.

FIGURE 6: Percentage of heat loss through building envelope elements[5]



5 https://www.agency.coop/media/747/download

Building envelope ECMs: Air sealing

Leaks happen mostly at joints and intersections of materials. Identifying leaks requires inspections and testing.

Building envelope retrofit at apartment tower

Case study: Raising the bar on community housing retrofits

Cost: $33 million (projected)

Scope: Apartment tower with 146 units

Age of buildings: 1967

Timeline: 2020

ECMs:

- Apply air barrier to exterior brick
- Remove balconies to eliminate thermal bridging
- Seal fire-separation breaks

Savings:

- Reduced energy intensity by 70 percent
- Reduced greenhouse gas emissions by 90 percent

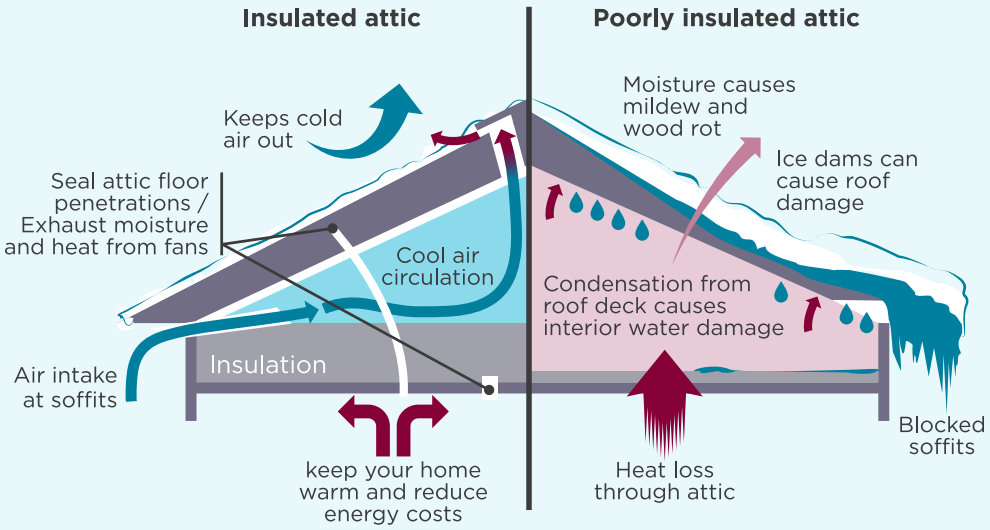
Important to know

- Air sealing reduces the amount of outside air that needs to be heated, cooled and dehumidified.
- Air leaks can be sealed by various means around windows, doors, light fixtures, wall plugs and penetrations, and at structural joints and architectural overhangs.
- Sealing methods include the use of caulking, films, gaskets, specialized tape and spray-foam insulation.

Building envelope ECMs: Insulation

Building insulation can degrade and become damaged over time. Replacing old insulation or adding more insulation to a building's envelope can make it operate more efficiently while increasing resident comfort. Insulation added to walls, attics and floors can make a significant difference.

FIGURE 7: Effects of attic insulation



How this ECM can be applied

Building: 30-townhouse complex

Study: Showed that attics were poorly insulated

ECMs: Added attic insulation to pitched roofs

Savings: Year-round electricity savings from reduced heating and cooling requirement with a six-year payback

Important to know

- Above-grade wall insulation is very costly because exterior cladding must be removed before it can be applied.
- Attic/roof insulation is beneficial in any shape of roof.
- Installation may be weather-dependent and this should be considered in the project timeline.

Building envelope ECMs: Windows and doors

There are a couple of different options for retrofitting older windows and doors:

- Weatherproofing using weather stripping and film
- Replacement with high-efficiency models

Construction workers installing windows

How this ECM can be applied

Building: 13-storey building with double glazed windows

Study: Showed that existing double-paned window frames were no longer sealed and were cracking

ECM: New double-paned windows with high-efficiency frames

Savings/benefits:

- Natural gas savings from reduced heat use
- Improved resident comfort from reduced drafts

Important to know

- The cost of windows depends on the number of panes, frame material, size and opening mechanism.
- Window replacements have a very long payback period but can be combined with other ECMs to reduce the payback period while reaping the comfort benefits.
- Unclad wood frames require regular maintenance while vinyl-clad ones are very low-maintenance.

Renewable energy ECMs

There may be interesting on-site renewable energy generation opportunities to consider. Generally, these should be considered after viable energy efficiency opportunities have been implemented to keep costs down.

Options to consider could include the following:

- **Solar photovoltaics (PV):** Energy from the sun is converted directly into electricity. The cost of these systems is declining, and financial cases for solar PV are usually more compelling than traditional energy efficiency options such as windows, walls and heating system upgrades.
- **Solar heating:** Heat captured from the sun can be stored in water or air and then pumped through the building for heat or used for domestic hot water.
- **Ground-source heat pump:** A pipe system used to heat or cool the building or heat its domestic hot water. Pipes typically buried 10–100 metres deep (depending on local ground temperatures) connect to a heat pump. Electricity runs the system, with very high efficiencies of 300–500%, higher than an air-source heat pump (a common, less-expensive alternative).

There are other common on-site renewable energy generation options, but these may be less appropriate for the affordable housing context. For example, wind, which requires a lot of space, and biomass, which uses agricultural or other biowaste, are better suited to rural and industrial sites.

Case study: Brownfield affordable housing incorporates geothermal heat pumps

Cost: $22 million

Scope: Industrial complex refurbish including 26 units for affordable housing and renewables with the goal to reduce water usage by 60 percent and greenhouse gas emissions by 40 percent

Age of buildings: 1980s

Timeline: 2007–2008

ECMs:

- Geothermal system provides heating and cooling
- Reflective roof panels limit heat absorption in summer
- Rainwater flows into on-site cistern for use in toilets and irrigation

Lessons learned:

- A consultative design process improves results
- New technologies don't always perform as anticipated

Get started!

Now that you have read about the different types of ECMs you might feel better resourced to start your own energy efficiency project. Consider these next steps to move forward your project.

Step 1

Identify a staff member to be the project lead. This individual will be the point person to keep the project moving. You should also identify a board member to be a project champion and to keep the board informed.

Step 2

Contact a Regional Energy Coach (REC) to conduct a free virtual walk-through energy assessment.

Step 3

Determine what areas are most important for the organization and building and where there is the greatest opportunity for energy efficiency. Speak with the management team, residents and the building operator to focus on relevant areas.

Step 4

Secure funding to support the initiation of your project. The Sustainable Affordable Housing (SAH) Planning and Study grants provide funding to support several of the steps outlined below. See page 24 for more information on SAH funding and capacity development supports.

Step 5

Establish a baseline on current energy performance. Look at the building's current condition, the costs associated with energy and maintenance, and the effects on residents.

Step 6

Set energy and environmental performance goals by speaking to an energy expert. Energy experts are NRCan-licensed service organizations and energy advisors, and engineers or architects with professional designations such as Certified Energy Manager (CEM), Certified Measurement and Verification Professional (CMVP), or Certified Energy Auditor (CEA).

FCM's Sustainable Affordable Housing (SAH) initiative

Regional Energy Coaches (RECs)

Reach out to a REC and request a **free walk-through virtual energy assessment** of a building to identify opportunities for ECMs.

RECs offer one-on-one coaching and support to affordable housing providers of any size with projects at any stage. RECs can find opportunities for energy efficiency, assess project feasibility, share information about the types of technologies that can be leveraged, and support funding applications.

Check out this one pager with a detailed explanation on how you can get help from a REC and how to contact one.

FCM's Sustainable Affordable Housing (SAH) funding

SAH offers support to affordable housing providers for retrofitting units and for energy-efficient new builds.

A planning grant or study grant may be a great place to start. These grants help providers in the early stages of sustainable affordable housing development. The planning grant supports activities such as project initiation meetings, project scoping, needs assessment, basic financial assessment, stakeholder engagement, evaluation of energy-efficient approaches, and support for identifying design consultants and contractors. The study grant supports more detailed project assessment activities such as technical evaluations and energy models, financial options analysis, site assessments, stakeholder engagement, and detailed project planning.

Capacity development resources

Access FCMs list of resources for retrofits or new build projects organized by project stage: discovery; planning; study; pilot and capital projects; and operations and maintenance. There are also inspiring case studies of energy efficiency projects.

Check out SAH's five factsheets that provide a "how to" for successful projects. They clearly outline how energy efficiency can increase affordability, lower greenhouse gas emissions and improve quality of life for residents.

Sign up for FCM Connect to get the latest news about funding and capacity development opportunities. Our newsletters share helpful information about relevant funding, courses, conferences, webinars, workshops and awards. Case studies, articles, guidebooks and reports on affordable housing and energy efficiency are also shared.

Read the SAH application guide and reach out to an FCM advisor through gmfinfo@fcm.ca or 1-877-417-0550 with any questions.

Glossary

Baseline performance—The amount of energy a piece of equipment, system or building uses before making any upgrades.

Booster pump—Boosts water pressure in taller buildings.

Building condition assessment (BCA)—An assessment that determines the state of a building's structure and systems; useful for determining what maintenance is required and where priorities should lie; includes a detailed inspection of every aspect of the building from the roof to the plumbing to the fixtures.

Building envelope—Exterior of a building, including exterior walls, foundation, attic, windows and doors; having a better envelope means that heating and cooling systems can be smaller or run less, which makes them less expensive to operate.

Energy audit [ASHRAE level 2]—An audit that provides more detailed energy analysis, calculations and financial analysis.

Energy conservation measure (ECM)—An upgrade to a building component or installation of energy-saving equipment, with the primary goal of saving energy.

Energy management—Planning and managing the energy use in a building or organization by identifying opportunities, taking action to save energy and reporting on progress.

Energy recovery ventilator (ERV)—A type of heat recovery ventilator (HRV, see definition below) that can exchange both heat and moisture.

Energy model—A computer-generated calculation estimates energy savings for one or more ECMs; completed by an energy efficiency expert, typically after an audit.

EnerGuide rating system—Standardized system created by NRCan to rate the energy efficiency of homes and gives a breakdown of energy use; homeowner is provided with a label showing the home's score as well as how it compares to other buildings.

Fuel-switching measures—Measures that save on money or energy by switching from one fuel to another, (e.g., replacing a gas-fired furnace with a ground-source heat pump).

Greenhouse gas (GHG) emissions—Burning fuel to produce energy release gasses. These gasses trap heat in the atmosphere and are called 'greenhouse gas'. These types of GHG emissions are expressed in terms of equivalent tonnes of carbon dioxide (CO_2). Using less energy can cut down on GHG emissions.

Heat recovery ventilator (HRV)—Captures heat from the stale air leaving a building in the heating season and uses it to preheat the fresh air coming in; does the reverse in the cooling season, cooling hot air coming in from outside.

HVAC—Acronym for heating, ventilation and air conditioning systems, including all their auxiliary equipment.

Make-up air (MUA) unit—Delivers fresh, heated air to "make up" for stale air being exhausted.

Measuring and monitoring—Done before and after a project using data loggers, existing metres or other measurement tools to help determine savings or to monitor use so problems can be identified early.

Non-energy benefits—Positive effects of a project that are not directly related to the energy savings of the project, such as increased comfort.

Retrofit—An upgrade to an existing energy-consuming system.

R-value—This is a measurement of the insulation of a material; the higher the R-value, the more insulating it is. Layering materials increases the R-value. For example, triple-glazed windows have a higher R-value than double-glazed windows and adding foam insulation to an attic will increase the overall R-value of the attic.

Total energy use intensity (TEUI pronounced "2E"): A measure of the total energy required by a building (heating, lighting, air conditioning, heating hot water, etc.). Improving the TEUI value happens when you decrease the energy used in a building .

Variable frequency drive (VFD)—A variable frequency drive or variable speed drive (VSD) reduces the speed of motors to match the demand on the equipment, which greatly reduces energy used.

Walkthrough audit [ASHRAE level 1]—A type of audit that allows for a high-level assessment of a building; the auditor will get an understanding of current operations and identify areas of focus to reduce energy consumption.