Decarbonizing Canada's housing market

Unpacking barriers and solutions to align Canada's housing sector with net-zero targets

BMO Climate Institute

Foreword

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As the world moves toward achieving net-zero emissions globally by 2050, banks will play a critical role in supporting the transition to a low carbon economy, not just in managing their own operations but through financing for retail, commercial and corporate clients to support their decarbonization investments as well.

To help advance the industry's efforts to address financed emissions, Canada's six largest banks, along with Vancity and Coast Capital, joined the UN convened Net-Zero Banking Alliance (NZBA) with a goal to achieve net-zero financed emissions in lending by 2050, and establish intermediate (2030) emission reduction targets.

Residential real estate contributes significantly to Canada's national greenhouse gas (GHG) emissions. The good news is that, as one of the world's cleanest electricity producers, Canada has a distinct opportunity to reduce emissions through electrification in the real estate sector, where currently most energy consumption and associated emissions are from natural gas. Policy initiatives appear to be aligned: provinces with higher emitting electricity grids have decarbonization plans in place, sector-wide GHG reduction targets are being rolled out, and building energy codes are being implemented. Adoption of technologies such as heat pumps, including those that can function in cold climates, is also advancing, as are some of the policy changes required to increase the potential for renewable natural gas.

But barriers to decarbonizing the real estate sector still exist, which could hinder the path to a net-zero future. These barriers include access to private capital, lack of data to measure progress in GHG reduction initiatives and inform strategies, and the carbon intensity of a significant proportion of the energy supply. Addressing these barriers involves a suite of solutions starting with initiatives to drive behavioural change for homeowners and their contractors, alongside investments in energy efficiency and electrification.

In this paper, the BMO Climate Institute delves into the challenges of decarbonizing residential real estate and what needs to be done by government and industry, in collaboration with banks and other mortgage lenders, to enable Canadian homeowners to be a part of the solution.

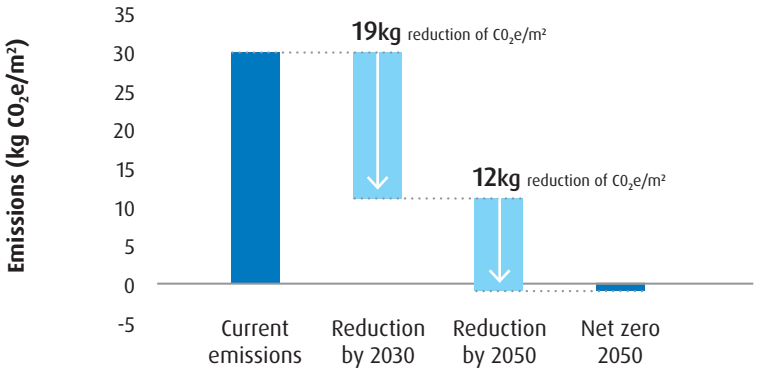
Canada's decarbonization goals

Canada has established targets to reduce greenhouse gas (GHG) emissions by 40-45% below 2005 levels by 2030, reach net-zero electricity generation by 2035, and achieve net-zero emissions across the economy by 2050.

Buildings account for 16% of Canada's annual GHG emissions, of which 57% (66 Mt CO_2e annually) is from residential buildings[1]. The emission intensity of energy consumption in Canada's residential real estate sector must decrease by 64% by 2030, and by more than 100% by 2050[2] to align with net-zero targets. Figure 1 presents emission reductions aligned with the International Energy Agency Net-Zero Emissions decarbonization scenario, which we have used here as a proxy for the Paris Agreement target of limiting warming to 1.5°C below preindustrial levels.

Figure 1: Net-zero aligned pathway for Canada's housing sector.

Current emission intensity of residential real estate is shown alongside emission intensity reductions required by 2030 and 2050 to align with the International Energy Agency's Net Zero Emissions by 2050 Scenario.



Data source: Residential Sector Canada Table 1: Secondary Energy Use and GHG Emissions by Energy Source | Natural Resources Canada

Scale of the challenge

Improvements to the building envelope[3], along with more efficient appliances, have yielded a 24% decline in residential energy intensity and an absolute decline in emissions for the sector since 2000[4]. Declines in absolute emissions, however, have not yet achieved the rate required to reach net-zero targets, highlighting the importance of scaling energy efficiency retrofits for existing homes. Achieving the scale required will be difficult, as deep energy efficiency retrofits[5] are disruptive.

The most economical time to decarbonize a residential unit is at the time of construction, but approximately 75% of the homes that need to be decarbonized by 2030 have already been built[6].

The most opportune times for retrofits in existing homes are when a buyer first takes ownership of the property, is undertaking a major renovation of the existing home, and when buying new appliances.

By 2050, approximately nine million buildings[7] housing a total of 16 million single unit dwellings[8] must undergo at least one deep retrofit to reduce their property-level energy consumption to the levels required to achieve net-zero goals. Canada's rate of deep retrofit renovations therefore will have to increase from less than 1% of homes currently to 5–12% annually by 2030, comprising up to 1 million dwellings each year at an estimated cost of $321–517 billion present value by 2050[9,10].

Governments will have a key role to play in establishing policies and regulatory environments to scale solutions. Strategies may include promoting extensive improvements in energy efficiency throughout Canada's sizeable building stock by, for example, requiring energy audits whenever a house is sold. Deeper GHG reductions can be realized by increasing the share of non-emitting fuel sources in power generation across the country to help realize the potential of electrification, and by creating an enabling environment to crowd in private capital.

Success in decarbonization will require not only significant initial capital investment, but also mechanisms to facilitate access to that capital for homeowners. Government funding programs alone cannot fund the full scale of deep retrofits required, nor can most homeowners easily access those funds. Leveraging these funding programs to scale capital from mortgage providers can help realize the levels of financing required and offer a far wider reach to individual property owners than governments could achieve in isolation.

Decarbonizing residential real estate

Decarbonizing Canada's housing market is a tremendous opportunity to make serious strides toward net-zero goals.

Significant challenges, however, remain:

1. Policy barriers impeding access to dedicated decarbonization financing for homeowners from private capital providers;
2. Lack of data to measure progress in GHG reduction initiatives and inform reduction strategies; and,
3. The carbon intensity of the energy supply.

Underpinning all three barriers is a lack of awareness on the part of homeowners, and often their contractors, on how or even why they should reduce their home's carbon footprint. A special section on what homeowners can do to decarbonize their dwellings is provided on page 9.

Policy barriers to scaling private capital

Leveraging private capital to accelerate the low-carbon transition is a foundational objective of the Glasgow Pact[11] to achieve national commitments to net zero by 2050. The housing market is a key example of a sector in need of public-private financing partnerships to support decarbonization.

Financial institutions, in conjunction with government agencies, can play a larger role in achieving the scale and market penetration of energy efficiency technologies needed for a net-zero pathway in Canada's residential sector.

Banks partner with millions of Canadians to provide home financing and have the reach and deep relationships that can help drive capital flows toward supporting clients in their household decarbonization journey. Approximately 60% of some 10 million owner-occupied dwellings in Canada are financed through a mortgage, and 28% of these have an additional Home Equity Line of Credit (HELOC)[12]. This financing establishes an opportunity to leverage the relationship between over six million Canadian homeowners and their financial institution to open a communication channel and expand the reach of government funds to support investments in reducing the homeowner's GHG footprint.

Government funding programs to date, however, are largely developed in isolation of financial services organizations, which impedes the ability of private capital providers to design the hybrid forms of funding structures needed to unlock the scale of investment required.

To advance the decarbonization of Canada's residential real estate sector, the federal government recently announced several programs to help homeowners complete major home retrofits. The 2021 Federal Budget proposed $4.4 billion over five years for a **Canada Greener Homes interest-free loan program** to help up to 200,000 homeowners, 1% of Canadian dwellings, complete major home retrofits through interest-free loans of up to $40,000. This program is supplemented by Natural Resources Canada (NRCan)'s **Canada Greener Homes Grant**[13], a $2.6 billion investment over seven years. The **Canada Greener Homes Grant** will give up to 700,000 homeowners $5,000 each to make energy-efficient retrofits to their homes and up to $600 each to help with the cost of an EnerGuide home energy evaluation. We estimate the GHG reduction potential of these two grants, which will support 5–7% of Canadian homeowners, to be 1.5 to 3 Mt CO_2e[14], far below the 66 Mt CO_2e of reductions required to get the sector to net zero. Substantially higher levels of investment are therefore required.

The reach of these programs could be significantly extended through public-private financing by leveraging the tools already in place, such as mortgage loan insurance for first-time home buyers[15]. The federal government can reduce the cost of private capital investments in retrofits by covering the risk of default to the mortgage lender or providing a loss ceiling on a retrofit top-up. For example, a $50,000 retrofit top-up could be offered by lenders on a $950,000 mortgage at a lower interest rate than the mortgage if the government guarantees the $50,000 top-up. The largest potential to accelerate this program is to offer it at the time of mortgage refinancing so that it can reach all estimated 6.08 million[12] dwellings in Canada with an existing mortgage. Such a structure would mobilize far greater levels of lower cost capital for homeowners to support investments in reducing their carbon footprint.

The government could extend capital even further by expanding the underwriting function of the Canada Mortgage and Housing Corporation (CMHC) at the time of mortgage origination. This mandate would allow lower-risk first-time homebuyers (i.e., those with more than a 20% down payment on the home) the opportunity for a lower rate top-up loan for energy efficiency retrofits as described in the example above.

Leveraging the reach of a retail bank could facilitate access to these hybrid financing products to all single dwelling homeowners with mortgages, compared to less than one million homes covered by the current government grants.

This private capital mobilization strategy has the potential to achieve 10 to 23 Mt CO_2e[16] of emission reductions, which exceeds the estimated 1.5 to 3 Mt CO_2e of the current strategy (Figure 2).

The Federation of Canadian Municipalities (FCM) also has financing programs[17] to support homeowner investments in energy efficiency. The programs have been designed to facilitate partnerships with mortgage lenders for scaling financing and sharing risk by combining the municipality's funds with a bank's products, such as HELOCs. The idea is for this public-private blended financing structure to offer more favourable financing terms to homeowners for meeting established climate-aligned criteria. The primary barrier to scale is that incentives are limited to the volume of borrowers within each municipality. As each municipality creates its own fund disbursement, mortgage lenders must design different financing solutions for each location. Another barrier to scale is the limit to the level of debt financing that municipalities can assume. The greater opportunity to leverage the FCM GHG reduction grants to municipalities would be for the municipalities to establish a reserve fund to underwrite some of the risk, thereby allowing lenders to extend cheaper credit at a more significant volume than the original grant amount.

For any of these policy solutions to be effective, however, there must be adequate demand from homeowners to achieve the scale needed by mortgage lenders to warrant the associated administrative build. The primary incentives for the homeowner are reduced utility payments and a higher home resale value. Establishing a demand level threshold is a precondition to deploying private capital. Analysis on strategies to increase individual consumer demand was recently the focus of Efficiency Canada, which last year released a paper entitled *Canada's Climate Retrofit Mission*. The paper described several actions governments could take to generate the required increase in incremental demand. These actions include reducing the high up-front costs of retrofitting through tax benefits, removing administrative barriers to accessing incentives, incentivizing growth in the supply of trades required, and educating homeowners on the benefits of home decarbonization, including the potential for increased property value[9].

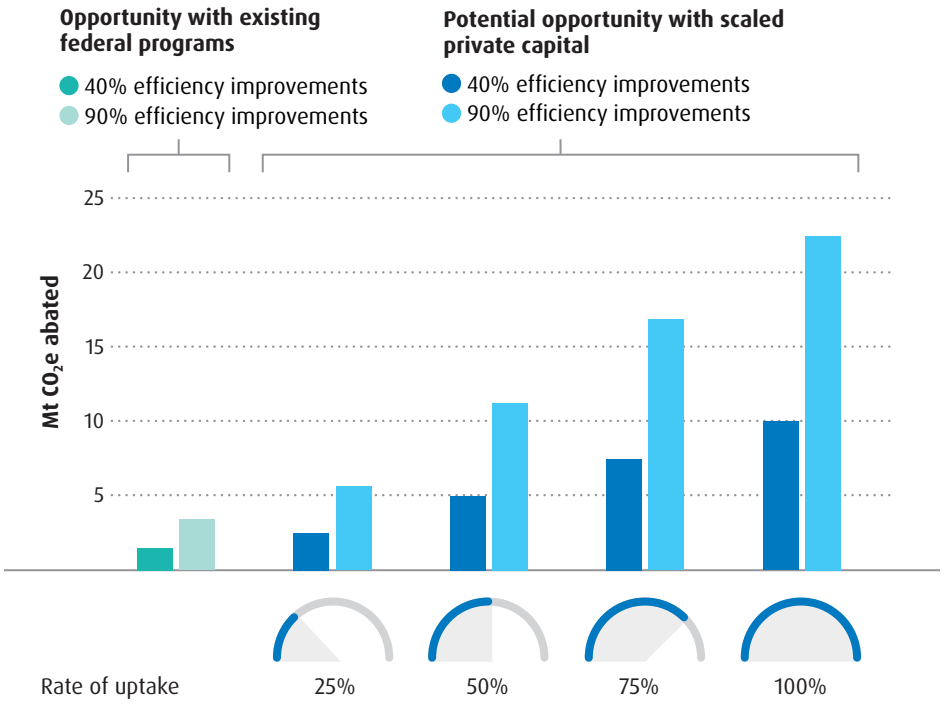
Lack of data to measure progress in GHG reduction initiatives

Even if Canada was able to implement strategies for widespread decarbonization of the housing stock, a lack of consolidated, standardized, and timely data would prevent government and mortgage lenders from accurately monitoring and evaluating GHG reduction outcomes.

Accurately quantifying current emissions from Canada's housing stock requires granular data on floor area and energy consumption at the property level. While regularly updated (e.g., annual average) property-level data on energy consumption exists through the utilities, there is no central government agency or entity that is collecting, compiling, and making this data available to inform public and private sector decision-makers.

Figure 2: Estimated GHG abatement potential for existing federal decarbonization programs and potential opportunity with scaled private capital.

Emission reduction potential of restructuring government incentives to scale private capital is demonstrated for different rates of market uptake assuming a range (40–90%) of emission reductions realized from deep retrofits. This potential is shown relative to the estimated abatement opportunity to be realized from existing federal programs.



Data sources: Natural Resources Canada Energy Use Database and Environment and Climate Change Canada National Inventory Report

Energy use data is currently compiled in Canada's National Energy Use Database, which provides data on floor space and energy consumption aggregated to the building type per province with average provincial emission factors presented annually in National Greenhouse Gas Inventory reports[18], but the reported data lags by several years. As a result, efforts to measure progress toward the decarbonization of Canada's building sector are limited to outdated provincial averages, creating data gaps that make it impossible to accurately measure how individual homeowner activities move the needle toward net zero.

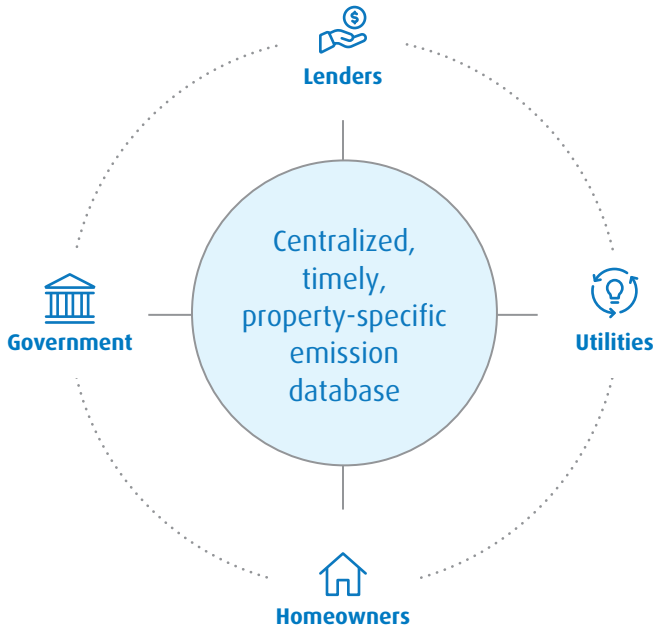
Opportunities to improve data availability include internal consolidation of floor area data for clients and implementing systems to collect data on home heating technology at the time of lending. This, however, does not provide the level of completeness required for a robust analysis of decarbonization financing program outcomes. A more complete data set would be augmented through regulatory requirements for timely, accurate, and validated square foot and energy use data at the single dwelling level.

Data should be made available in a centralized repository, as is done in the European Union's Energy Performance Certificate (EPC) registry[19]. In the EU's framework, national mandates requiring energy performance assessments are disclosed in a database of property-specific energy consumption data[20]. Although challenges to this model persist – including inconsistent standards between nations, incomplete databases, and gaps in the enhanced monitoring required to validate submissions[21] – it is a data source that has been leveraged by lenders as a foundation to support homeowners with sustainable financing[22].

The EPC framework also provides property owners with a clear description of the types of improvements – and associated costs – that can be implemented in their dwellings to abate emissions. These emission reduction improvements are further linked to positive impacts on property values[23]. Implementing a parallel framework in Canada via energy audit requirements at the time of sale and standardized labelling for residential energy efficiency could therefore also be expected to benefit Canadian homeowners.

CMHC has proposed to lead the establishment of a data exchange capturing a wide range of climate-housing characteristics, including physical risk, and would be well positioned to work with the Canadian Centre for Energy Information, utilities, and energy auditors to consolidate property-level emission data into a central repository. Implementing this program in Canada could build on the learnings and best practices from the EPC program, including replicability across all relevant jurisdictions informed by a clear legislative framework, timely updates, easy accessibility, and an effective quality control system to ensure accuracy[20,24].

A common, vetted GHG data repository would significantly improve the accuracy, comparability, and transparency of GHG reduction programs.



A model for improved measurement and monitoring toward Canada's net zero goal

Scaling electrification and decarbonizing the energy inputs to real estate

Decarbonization of the real estate sector will primarily be achieved through electrification, with a concurrent increase in the supply of clean power. Both strategies must be facilitated by government policy direction and investment.

With 83% of electricity generated from non-emitting sources such as hydro, nuclear, wind, and solar, Canada has one of the cleanest electricity grids in the world[6]. Electricity, however, accounts for only 38% of residential end-use energy consumption (Figure 3), resulting in 30% of emissions in Canada's housing sector[4]. The remaining 70% (46 Mt CO_2e annually) of emissions are generated from fossil fuel combustion at the point of use, primarily from natural gas (37 Mt CO_2e annually) used for space and water heating[4].

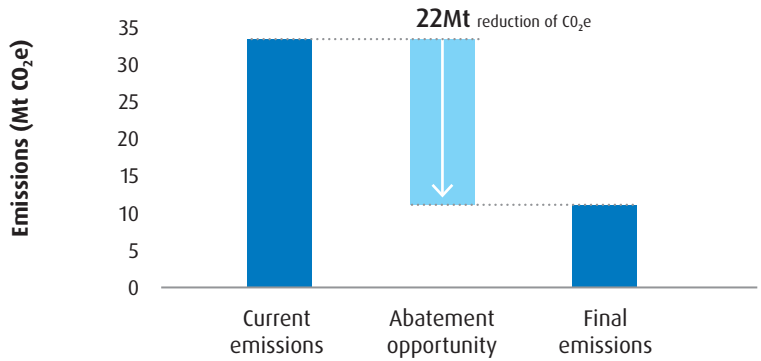
Scaling electrification to displace natural gas in home heating in jurisdictions with low-emitting electricity[25] is one of the higher-impact opportunities to reduce GHG emissions. While natural gas accounts for less than 10% of electricity generation[26], its widespread use persists in residential energy consumption, where it remains the primary source of energy for space and water heating and accounts for up to 95% of residential emissions in provinces with low-emitting electricity grids. An abatement opportunity of up to 22 Mt CO_2e (67% reduction) can be realized annually in these provinces if natural gas is displaced with electric heating (Figure 4).

This figure assumes 100% electrification, however, while natural gas use can realistically be expected to continue for heating and cooking well into the future. More detailed modelling and analysis of electrification pathways can be found in the following reports: Canada's Energy Futures 2021 (Canada Energy Regulator); Canadian Energy Outlook 2021 (Trottier Institute); and, Canada's Net Zero Future (Canadian Climate Institute). These applications are prime candidates for utilization of renewable natural gas (RNG), which can be blended into existing natural gas infrastructure to abate a further 2 Mt CO_2e annually[27] from the residential building sector.

Figure 4: GHG abatement potential of scaling electrification.

Current emissions for Canadian residential real estate, abatement potential, and resultant emission intensity following the electrification of space and water heating for provinces with clean power generation.

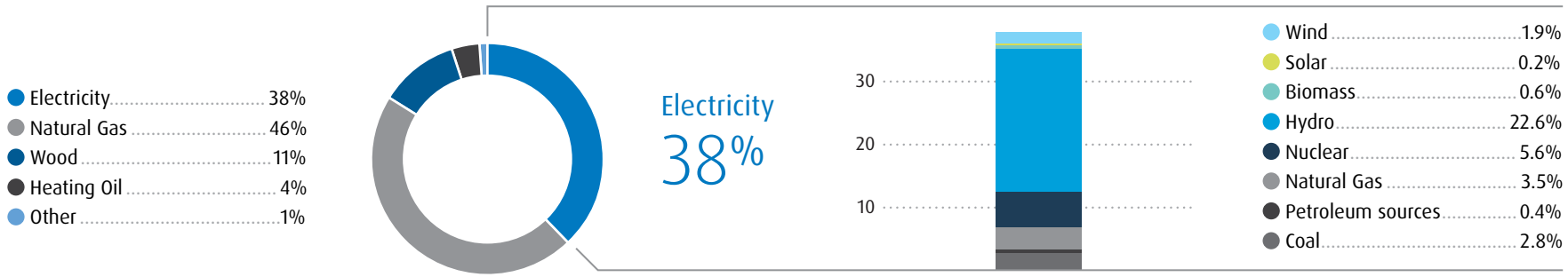
Methodology: The abatement potential was estimated by calculating an electricity emission factor per building type, per province, which replaced natural gas emission factors. This methodology assumes an equivalent rate of energy consumption when switching from natural gas to electricity.



Data sources: Natural Resources Canada Energy Use Database and Environment and Climate Change Canada National Inventory Report

Figure 3: Percent share of fuel types in residential energy consumption and source of electricity generation.

Values reflect average Canadian rates of energy use and power generation.



Data sources: Residential Sector Canada Table 1: Secondary Energy Use and GHG Emissions by Energy Source | Natural Resources Canada and Electricity facts | Natural Resources Canada [PDF]

Heat pumps, which provide more efficient heating for homes than high-efficiency natural gas or conventional electric heating alternatives[28] are a key technology to scale electrification in these jurisdictions. Achieving electrification at the scale required to meet Canada's decarbonization targets, however, will require generation capacity to increase from 145 GW currently to 330–390 GW[29]. Growth can be augmented through on-site solar installations (e.g., solar roofs) to further support non-emitting electricity consumption in individual homes.

Before electrification can make sense, however, implementing regional fuel switching strategies for power sectors with high-emitting grids is required. Provinces have made commitments and set strategic plans for reducing emissions from their electricity grids, including the phase-out of coal powered electricity, scaling of renewables, and reducing the carbon intensity of natural gas with carbon capture and storage. Some areas of Canada, including Quebec and in some parts of BC, are mandating the phase out of oil and natural gas in space and water heating of new buildings[30]. Similar mandates are rolling out in several U.S. cities, as well as countries such as Denmark and Norway.

Policy signals across Canadian jurisdictions would increase consumer certainty on the technologies they should prioritize, thereby accelerating new models of home energy consumption that drive deep decarbonization. Canada's **Energy Futures 2021** report outlines six power generation pathways to achieve net zero, driven by unique combinations of technology and renewable power generation.

The challenge for homeowners seeking to decarbonize their dwelling, and their net-zero aligned lenders, is lack of certainty on which technology will be the most economical, and the lowest emitting, in their region by 2050.

This challenge is shared by real estate developers constructing zero-carbon-ready homes as well[31]. Challenges are exacerbated by lack of clarity around an appropriate decarbonization roadmap for individual homes and costs with little to no payback.

Federal and provincial governments play a critical role in creating the conditions required to increase the supply of clean electricity and, for some provinces, decarbonize their grids. With current electricity projections from the Canadian Energy Regulator falling short of a net-zero aligned pathway[32] governments must work with utilities to increase energy supply, manage peak growth, ensure reliability, and leverage distributed energy resources (e.g., solar rooftops on every suitable house). Governments are also a key driver for incorporating lower-carbon natural gas into the energy supply mix and coordinating gas and electric utility regulations.

An example of this policy direction can be found in Quebec[33] with the launch of a partnership between natural gas and electricity providers. The partnership proposes hybrid home heating options that combine the efficiency and clean fuel supply of electric heat pumps and the reliability of natural gas. Home heating systems can switch from electric to natural gas during times of peak demand. Hybrid home heating systems offer GHG reductions through a scalable model of power consumption for home heating. The technology reduces reliance on fossil fuel-derived energy over time as renewable energy generation capacity grows. This partnership is accompanied by a profit-sharing model whereby electric utilities compensate gas providers for lost revenue.

An accelerated electrification strategy, accompanied by policy certainty on the affordability and competitiveness of power rates, would make it easier for homeowners to commit to energy retrofits. Detailed transition action plans and consistent action by governments would also facilitate decision-making and unlock investment in residential real estate decarbonization.

What does this all mean for homeowners?

When Jane Ambachtsheer and Ugo Menard moved back to Toronto after six years in Paris, they bought an apartment house in High Park to convert to a single-family home. They saw this complete home renovation as the perfect opportunity to make their new home as sustainable as possible. The question was, how to best go about doing that.

Jane and Ugo faced their first challenge right out of the gate, when they discovered how difficult it was to find architects and builders in Toronto with experience in designing and building low carbon dwellings. That's when they opted as a first step to engage an architect specializing in sustainable house design to guide them through the retrofitting process[34].

Electrifying in-space heating through the installation of heat pumps in place of a furnace was an obvious place to start. Jane and Ugo installed two electric heat pumps with ducting for home heating. Next, and less obvious, was the task of identifying and addressing those areas in the building envelope that wasted energy, such as cracks or poor insulation around doors and windows. A negative pressure test showed that the air in their house was turning over up to 15 times an hour, which isn't uncommon in older homes. To maximize energy efficiency, however, a turnover rate of once per hour is required, therefore electrification alone wasn't going to be enough. The couple learned they must expand the width of walls to accommodate thicker insulation, install triple-glazed windows, and apply an airborne crack sealant to fill in all the small cracks.

Other sustainability measures include the use of only FSC-certified wood, pea gravel for paving to promote groundwater recharge, and planting native vegetation in their yard. On the roof, they installed solar panels, which would give them a negative electricity bill over the summer, although payback period for this particular investment will be over 20 years.

New incentives

Building a low-carbon home isn't cheap, and at the time of Jane and Ugo's renovations neither the federal nor provincial government was offering incentives to help homeowners recover the higher associated costs. That is starting to change, albeit slowly, and today's homeowners can access funding through the federal government's **Canada Greener Homes Grant**, which provides up to $5,000 for efficiency retrofits and up to $600 for an **EnerGuide** home inspection. The program, however, caters to those who can afford the total retrofit bill, as only a percentage of each energy efficiency measure is rebated, up to a maximum of $5,000. Homeowners also must have the will and time to commit to the rather onerous paperwork involved.

The Canada Mortgage and Housing Corporation (CMHC) Green Home Program offers rebates on mortgage insurance for owners who build or renovate homes that meet certain energy efficiency criteria. Later this year, CMHC will be rolling out a program for interest-free loans of up to $40,000 for deep home retrofits to improve the home's energy efficiency. This funding can be supplemented through energy rebate programs, which help finance energy efficiency upgrades such as the purchase of more efficient appliances, offered through local utility providers. Information on how you can improve the energy efficiency of your home today is available on the CMHC website.

The professionals listed below can help you navigate these incentives to build or renovate your own low-carbon home.

Energy auditor

A certified home energy auditor will help you identify areas of the home that are leaking energy – including poor insulation, cracks, and old appliances – and recommend the optimal strategy to align GHG reductions with your budget. Home energy evaluations are available through EnerGuide Canada and private energy assessment service providers. Ensure your energy advisor is listed with NRCan Registered Advisors.

Architect

Architects can advise you on how to maximize the distribution and conservation of heating and cooling within your home. Sometimes adjusting the layout of your home can make it more energy efficient, like changing the position of walls to allow for better air flow and making walls wider to accommodate thicker insulation.

Contractor

Your contractor will help implement the decarbonization solutions you've identified. They can also help you navigate energy efficiency standards for those best suited to your goals and budget. A list of home energy efficiency standards can be found at CMHC. Should you choose to electrify the heating in your home, a contractor can advise on the number of heat pumps required, and whether your current insulation should be expanded to maximize the benefits of these heat pumps. Contractors can also help you evaluate different retrofit alternatives, such as the incremental cost of installing heat pumps versus a high efficiency natural gas furnace, the efficacy of electricity in water heating compared to natural gas, and double versus triple glazed windows.

Environmental consultant

Decarbonizing your home may require installation of technologies such as heat pumps that aren't yet widely used in colder climates like Canada. As a result, your usual contractor might not know as much about the energy use benefits, design considerations and costs of these technologies relative to traditional heating through natural gas. An environmental consultant can help you and your contractor fill in gaps and identify the right technologies for your home and budget, such as which heat pump to select, whether it be single source, ducted or geothermal, as each has a different price point and operating range. With its colder climate, Canadians may require integration with a secondary source of energy for days that drop below -30°C.

Developer

When buying a new build, you can ask the developer about options for installing energy efficient appliances as well as opportunities to make the home more energy efficient with better insulation, triple glazed windows, and wall configuration. Installing heat pumps instead of a gas furnace will make the biggest impact in terms of reducing your new home's carbon footprint.

Mortgage provider

Ask your mortgage provider about financing options to help you decarbonize your property.

Conclusion

Canada is committed to achieving net-zero emissions across its economy by 2050, and opportunities to reduce emissions in the housing market should be a key facet of this strategy.

Canada's access to clean electricity gives the country a massive opportunity to decarbonize its real estate sector through energy efficient electrification. Resolution of the key barriers identified can accelerate action by homeowners and their lenders.

Considerable financing is required to achieve this goal, beyond the scale that public spending alone can reconcile. Private capital is also needed. The role of government policy in helping develop new markets for private finance by de-risking investment was highlighted at COP26 as a key success factor to achieving the Paris 1.5°C goal. Canada has a real opportunity to execute on this role today.

As allocators of capital, financial institutions have acknowledged that they have a role to play in economy-wide decarbonization and have committed to align their financing with a net-zero future. This commitment includes calculating financed emissions and tracking and disclosing lending activity against GHG reduction targets. Three key success factors to a successful decarbonization strategy, however, are beyond the scope of financial institutions: policies and government programs designed to effectively crowd-in private capital; centralized data on dwelling-level emissions; and, reductions in the emission intensity of residential energy sources.

Aligning loan portfolios to net zero depends on coordinated efforts among all market actors.

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[14] Estimation methodology: 66 Mt CO_2 eq annual emissions from residential building stock x (900,000 homes ÷ 16,000,000 total dwellings) x range of emission reductions of 40% to 90% realized from deep retrofits.

[15] The insurance mitigates the risk to lenders of payment default by borrowers who can only offer a down payment of 20% or less of the full home value.

[16] Estimate methodology: 66 Mt CO_2 eq annual emissions from residential building stock x (6,080,000 homes ÷ 16,000,000 total dwellings) x range of emission reductions of 40% to 90% realized from deep retrofits.

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[32] Synthesized from analysis in Canadian Energy Regulator, Historical and baseline projection data; Trottier Energy Institute, Net Zero Pathways: Canadian Energy Outlook; and, Electric Power Research Institute, Canadian National Electrification Assessment.

[33] Hydro-Québec and Énergir: An unprecedented partnership to reduce greenhouse gas emissions.

[34] Jane and Ugo worked with Christine Lolley, Principal at Solares Architecture alongside their main architect, Wanda Ely.

BMO Climate Institute Insights

About the BMO Climate Institute

Established in 2021, the BMO Climate Institute is a centre of excellence that bridges climate policy and science with business strategy and finance to unlock solutions for both clients and the bank. Led by a multidisciplinary team with climate-related expertise, the Institute leads BMO's efforts to convene stakeholders and drive thought leadership to advance the low-carbon transition and enhance resilience.

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About BMO Financial Group

Serving customers for 200 years and counting, BMO is a highly diversified financial services provider – the 8th largest bank, by assets, in North America. With total assets of $988 billion as of October 31, 2021, and a team of diverse and highly engaged employees, BMO provides a broad range of personal and commercial banking, wealth management and investment banking products and services to more than 12 million customers and conducts business through three operating groups: Personal and Commercial Banking, BMO Wealth Management and BMO Capital Markets.

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Disclosure statement

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