Manitoba Builds Green

Opportunities for transformational residential retrofits

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Manitoba Builds Green: Opportunities for transformational residential retrofits

September 2024

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Executive Summary

There is now broad recognition of the need to transition from fossil fuels by mid-century. Rapidly tapering fossil fuel usage over the next 25 years is a massive, complex, and urgent challenge. The costs of the energy transition have mounted as we have delayed, but action must be taken now to avoid much greater consequences in the future.

While substantial financial investment is required, climate mitigation also presents myriad opportunities for social and economic benefits, and to address inequalities. This report explores the scope for seizing these opportunities within Winnipeg's building sector—and specifically in the existing residential building stock. Much of Winnipeg's housing is old, and a realistic transition from fossil fuels will require drastic improvements to energy efficiency.

As such, this report investigates the potential to scale up a deep energy retrofit (DER) industry in Manitoba to reduce greenhouse gas emissions, create good jobs, spur green industrial growth, and improve housing quality. DERs are defined here as changes to building infrastructure that improve energy efficiency by at least 50%. The study draws on 15 interviews with labour, industry, policy, and finance experts engaged in the building sector in Manitoba, as well as a review of the latest research and case studies of DERs from across Canada and internationally. Key findings relate to

- reducing greenhouse gas emissions of Winnipeg's residential housing stock in line with the goal of net-zero by 2050;
- making DERs widely accessible and affordable;
- minimizing costly expansion of electricity generating capacity;
- spurring economic development through public leadership;
- creating sustainable jobs and reducing inequities;
- implementing policy changes to support DERs.

We propose a series of recommendations to advance an overall vision for a neighbourhood-level retrofit program with an accompanying industrial and workforce development strategy that could realize a truly just transition by transforming Manitoba into a leader in low-carbon buildings while creating sustainable jobs. This report is a first attempt to draw together expertise on the institutions, policies, and funding mechanisms required to implement DERs in Manitoba at the scale required to achieve net-zero by 2050. Further development and trial-by-doing will be required to customize programs; however, there is no question that thousands of DERs are required to eliminate building sector emissions in Manitoba.

High Upfront Costs of DERS Are Balanced by Significant Social and Economic Benefits

The costs of residential DERs are significant and highly variable, ranging from CAD 100,000 to CAD 200,000 or more for a single detached house. To undertake the 200,000 home retrofits necessary to meet net-zero in Manitoba's building sector by 2050 (8,000 homes per year), an estimated CAD 1.2 billion annual investment (assuming an average cost of CAD 150,000 per home) will be required over the next 25 years (CAD 30 billion total). Current government programs to incentivize energy efficiency improvements are far too small to meet the scale of what is needed. The costs are high, but when compared to the alternative cost of electrifying all building heating and energy requirements without increasing energy efficiency, it becomes clear that retrofits are a much more economical option. This is particularly true as accommodating peak electricity demand in the context of Manitoba's weather extremes will be a challenge. Climate research is unequivocal in saying we need to rapidly taper and ultimately eliminate fossil fuel use by or before 2050—investments in DERs are one way to significantly mitigate the cost of energy transition on utilities and households. Furthermore, while costs are currently high, experiences from elsewhere show that as a retrofit industry is developed in Manitoba, economies of scale, enhanced coordination, and learning-by-doing will help bring costs down significantly.

In Winnipeg, given our specific climate and the character of our housing stock, we need a balanced approach between improving energy efficiency through retrofits and changing how we heat and power homes. In some cases, doing a full DER on an older house may not make economic sense. An expansion of energy audits can show homeowners and policy-makers the right balance of efficiency measures, electrification, and increased generation at the household and aggregate levels. Upgrades to building envelopes will need to be paired with fuel switching to technologies such as heat pumps and district geothermal energy systems to affordably reduce energy use in Manitoba buildings.

Incubating a more cost-efficient, climate-resilient, and innovative retrofit industry needs large-scale government commitment. We need the right policy in place to enable and accelerate DERs, including updating building codes, adopting a retrofit code, and implementing mandatory building energy labelling. Additionally, Manitoba can draw on its experience with the provincial Green Buildings policy to reinstate a procurement approach that would support energy-efficiency upgrades across all publicly owned buildings—including publicly owned housing. Partnerships with First Nations that own housing stock offer a further opportunity. A commitment of this kind from the Manitoba government would provide stable demand for retrofit services at a scale sufficient to kickstart a homegrown industry.

Seizing the economic and employment opportunities of far-reaching residential retrofits requires significant public leadership to capitalize investment and coordinate industrial strategy. Research and experience show that the current market-led approach to energy-efficiency incentives and financing is insufficient. A Manitoba green public bank should be created to finance the upfront costs, which over time could be sustained through energy savings and increased revenue from

the resulting economic growth. Property-assessed clean energy (PACE) loans would allow the investment to be attached to properties rather than homeowners and paid off over time through energy savings. While substantial public investment will be required, the private sector can also be mobilized through supportive financial regulation and emerging financing models, such as green mortgages or community bonds.

While facilitating DERs at scale requires substantial public investment, the economic multipliers of public investments in retrofits are high, in the range of a low estimate of CAD 2.3,[1] to a high of CAD 7 of GDP generated for every CAD 1 of public investment. These investments have the potential to pay for themselves several times over if implemented correctly.

Kickstarting a DER industry in Manitoba also represents a huge workforce and manufacturing opportunity. Economic modelling of investments in building retrofits indicates that thousands of green jobs in the trades, design, manufacturing, and administration must be created every year to meet 2050 net-zero targets. With the right training and workforce development strategy, this also presents an opportunity to advance equity in the workforce. Skilled worker demand created by mass implementation of DERs will require underrepresented groups in the building industry—women, Indigenous Peoples, and newcomers—to be trained and hired. Here, a workforce development strategy and long-term investment should be made in partnership with social enterprises, First Nations, Inuit, and Metis governments and relevant labour market intermediaries.

A DER approach should include a focus on addressing inequality and housing disparities, given the current housing and affordability crises. Designing DER programs for renters (and prioritizing low-income neighbourhoods and social housing) can help reduce energy bills and improve housing quality as well as indoor air quality, with important health ramifications. Moreover, improving energy efficiency through DERs should be one among many strategies to enhance efficiency in housing, such as increasing residential density through reform to zoning and regulations.

Recommendations for Kickstarting a DER Industry in Manitoba Include the Following:

- **Policy and procurement:** Make EnerGuide audits widely available to inform retrofit approaches at the household and aggregate level; leverage publicly owned housing stock or Indigenous-owned housing stock to create a DER procurement strategy; reinstate and expand the Manitoba Green Buildings Policy to include higher energy efficiency as well as a ban on the use of natural gas heating; adopt the latest upgrades to the national building code and expedite the adoption of a retrofit code by 2025; introduce mandatory energy labelling.
- **Capital and financing:** Capitalize and launch a Manitoba Green Bank to administer, on a significant scale, a low- or no-interest lending facility for DERs; pass legislation at the provincial level to enable municipal PACE programs and to allow the province to finance

[1] All dollar figures in CAD unless otherwise noted.

PACE programs directly; ensure that DER incentives and programs prioritize and are accessible to low-income households and renters.

- **Jobs and workforce development:** Pair public investments in retrofits with training and workforce development funding to meet demand; create avenues for worker upskilling, including an expansion of apprenticeships; work with unions and trades institutes to integrate energy-efficient building skills into existing curricula and training modules; partner with social enterprises and First Nations, Inuit, and Metis communities on training and workforce development; make long-term funding available for training and workforce development partners.
- **Stakeholder and institutional support:** Develop a concierge system to serve as a "one-stop shop" for consumers; engage Efficiency Manitoba and Manitoba Hydro to support DERs and fuel switching at scale; develop buy-in for green buildings and DER policies across government and relevant institutions and consider creating a central oversight body for tracking progress and ensuring accountability.

There is a strong rationale for developing DERs at the scale and pace required to meet the climate emergency. With a strategic, publicly led and well-funded DER program, Manitoba could become a leader in net-zero innovation in the buildings sector and serve as an example for other jurisdictions in Canada and internationally.

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1.0 Introduction

The climate crisis requires a massively scaled effort to decarbonize all sectors of our economy, including the buildings sector. Virtually all residential buildings in Manitoba and across Canada require some form of retrofit to meet emissions reduction targets for the sector (Millyard, 2023). The need to retrofit existing buildings for significant reductions in energy use has led to calls for deep energy retrofits (DERs)—changes to building infrastructure that improve energy efficiency by at least 50% (Natural Resources Canada, 2023b). DERs are retrofits that employ a combination of building envelope upgrades to drastically reduce energy use in a building.

In Manitoba, greenhouse gas (GHG) emissions from buildings represent a substantial portion of total emissions, comprising approximately 17% of provincial emissions and 44% of Winnipeg's emissions (City of Winnipeg, 2022; Climate Action Team, 2021; ECCC, 2021). While governments in Manitoba lack current emissions reductions commitments specific to the building sector, in October 2023, the provincial government pledged to create a net-zero roadmap for the province (Government of Manitoba, 2023). Meanwhile, the federal government has committed to reduce emissions 40%–45% below 2005 levels by 2030—targeting 37% reduction in the buildings sector in this timeframe—and to reach net-zero by 2050 (Government of Canada, 2023a). Given the slow pace of climate policy to date, successfully delayed by pressures from the fossil fuel industry (Dembicki, 2022; Farrell, 2016; Oreskes & Conway, 2010), the curve to reach these targets and limit dangerous climate impacts is now incredibly steep.

The scale of retrofits required to substantially cut emissions in the buildings sector is enormous and will require an immediate, ambitious and coordinated effort. To meet Canada's 2030 target, the country must develop a retrofit industry able to decarbonize 600,000 dwellings and more than 30 million square metres of commercial space each year (Canada Green Building Council, 2022; Green Budget Coalition, 2022). The City of Winnipeg's Community Energy Investment Roadmap estimates that over 42,000 retrofits will be required in the city by 2030 to keep in line with a net-zero target (City of Winnipeg, 2022). At the current rate of building retrofits, it would take over 100 years to retrofit the roughly 12 million homes in Canada (Millyard, 2023).

The energy transition in Manitoba's building sector will require a cost-effective balance between building retrofits and expanded renewable energy generating capacity to support fuel switching. Manitoba is projected to require substantial new generating capacity—in part because of the electrification of transportation and home heating but also due to economic and population growth. To help offset the need for huge investments in new, renewable energy generation, buildings must be retrofitted to maximize energy efficiency. While retrofits appear expensive, it is clear that they are economical when compared to the costs of decarbonizing the provincial energy system through increased renewable capacity and storage alone (Houssainy & Livingood, 2021) or relative to the costs of escalating climate impacts if status quo use of fossil fuels continues unaddressed (Bilal & Känzig, 2024; Canadian Climate Institute, 2020; Kotz et al., 2024).

In addition to the long-term economic payoff, a full-scale approach to DERs in Manitoba has huge potential for creating green jobs, growing local low-carbon industries, and improving housing quality. Growing the workforce and the manufacturing capacity needed to meet the challenge of decarbonizing the province's buildings is a significant opportunity. In this pursuit, principles of just transition must be incorporated into planning to ensure that the jobs created provide well-paying, decent work and that affected constituencies and workers in the building sector are engaged in the process.

It is critical that the design of policies and investments to support building retrofits at scale consider addressing the ongoing housing crisis in Manitoba. Manitoba's Right to Housing Coalition estimates that 1,000 new rent-geared-to-income social housing units need to be made available every year for the next 10 years to meet current demand (Bernas et al., 2023). The poor state of housing in Manitoba further increases vulnerability to extreme weather resulting from climate change. While bringing down emissions from existing buildings is the focus of this report, these recommendations must be pursued in tandem with creation of new energy-efficient social housing. A number of measures can be taken by provincial and municipal governments to rapidly build low-carbon social housing (Task Force for Housing and Climate, 2024). Further, energy-efficiency measures can and should prioritize access by low-income and marginalized groups to ensure that the pursuit of sustainable buildings does not worsen inequality. If designed accordingly, retrofits can also have the co-benefit of making buildings more resilient and livable, addressing poor housing conditions and insulating Manitobans from future climate impacts.

Despite the climate imperative, economic efficiencies, and social opportunities in reducing energy demand in buildings, to date, there is no comprehensive federal or provincial approach to achieve the enormous volume of building retrofits required. While a number of federal and provincial policies and incentive mechanisms are in place to encourage the adoption of energy-efficiency technology in buildings, these policies have fallen far short of having sufficient impact at scale. The previous provincial government in Manitoba, for example, made a commitment to "recommission 80 per cent of buildings that are not meeting high-performance energy standards," as well as "undertake deep retrofits for 60 per cent of buildings to meet high-performance standards" by 2030 (Manitoba Sustainable Development, 2017, p. 25). Current and historical rates of retrofits are not nearly in line with these targets. A host of research organizations at the provincial and federal levels have issued calls for a deliberate strategy for the building sector to achieve required emissions reductions through the implementation of retrofits and energy-efficiency technology (City of Winnipeg, 2022; Climate Action Team, 2021; Haley & Torrie, 2021; Millyard, 2023; Sustainable Buildings Canada, 2017b).

Research on energy efficiency and building retrofits makes it clear that the public sector must demonstrate leadership and ambition in its funding and organizational capacity; a market-led approach to retrofitting programs has not proven sufficient to achieve the scale of retrofits required. The task of civil society and government in such times is to make the necessary possible. As Mertins-Kirkwood and Kathen point out, the gap between current investment and what is required "will not be closed through incentives to the private sector alone. Rather than depending

on private partnerships in key areas, governments cannot be afraid to make direct investments in the form of grants, equity stakes and through public institutions such as crown corporations" (Mertins-Kirkwood & Kathen, 2022, p. 38).

This report explores the economic and social opportunities of implementing DERs in Winnipeg, Manitoba, at the scale and pace required, with a focus on cost and financing, labour force opportunities and implications, and enabling policies and institutions. The report also considers the ways that this transition can advance equity, assessing how Manitoba might meet the challenge of decarbonizing buildings in a way that supports a just transition for workers, a fair distribution of costs, and reduces energy poverty in Manitoba's economy.

1.1 Research Approach

The report draws on Canadian and international literature and case studies, as well as semi-structured interviews with 15 stakeholders from across Manitoba's building sector. An advisory committee of five members from Winnipeg's green building community contributed to research questions and generated recommendations for interview participants. Interview participants were chosen to feature representation from Manitoba's construction sector and civil society, as well as policy and finance experts. Information gained throughout the research process reflected the substantial knowledge and expertise on building energy efficiency from Winnipeg's green building community. Interview participants, whose insights and expertise are included throughout this report, include

- Cindy Choy, former Government of Manitoba civil servant
- Dom Constantini, founder, BLDR (Builder Leader)
- Dennis Cunningham, manager of environmental sustainability, Assiniboine Credit Union
- Sean Hogan, executive director, BUILD Inc*
- Curt Hull, project director, Climate Change Connection
- Alex Joseph, senior manager, Green Communities Canada
- Ali Kaboorani, director, Building Efficiency Technology Access Centre
- Allison Lund, energy-efficiency specialist, Efficiency Manitoba*
- Jim Nostedt, engineer, SEEFAR Building Analytics
- Tanya Paulson, executive director, Manitoba Building Trades*
- Evan Proven, vice president, Sun Certified Builders Co-operative*
- Thomas Marois, professor of political economy, McMaster University
- Gio Robson, president, PrairieHOUSE Performance Inc.
- Dudley Thompson, architect
- Laura Tyler, executive director, Sustainable Buildings Manitoba*

*These experts also served on the advisory committee.

2.0 Manitoba Buildings and the Energy Transition

2.1 What Are Deep Energy Retrofits?

A DER is a building retrofit undertaken for the specific purpose of dramatically reducing building energy requirements. In contrast with more modest energy-efficiency measures, a DER typically extends beyond only the replacement of building components, such as installing new windows or doors, and includes a renovation of the building envelope to ensure maximum energy retention. Such building envelope upgrades almost always include adding insulation and air sealing and may be accompanied by mechanical upgrades as well, such as heat pump or solar panel installation. DERs are also distinguished from regular building retrofits by the fact that they often take place in one large construction project rather than the piecemeal approach embraced by many retrofit programs today. That said, intentional and careful planning can also allow a DER to be implemented in phases, making it more affordable and realistic as well as managing its disruption in occupied homes.

A common DER building technique in the Canadian context is the Larsen Truss model, in which additional walls are built externally to encase the existing wall structure. This approach essentially constructs an additional envelope on the existing structure without necessarily implicating major structural changes.

There is no universal standard for defining DERs in Canada. According to the federal government, a DER must achieve at least a 50% reduction in energy consumption relative to the previous energy-efficiency standard (Natural Resources Canada, 2023b). Other building institutions have more rigorous standards of energy efficiency for their retrofit programs. The international Passive House Institute, for example, aims for a 75%–90% reduction in primary energy use (Passivehouse Canada, 2024). This standard still achieves a level of performance and rate of return to justify the initial investment.

Residential vs. Commercial Retrofits

DERs in residential and commercial sectors are distinct due to notable differences in building types, ownership models, and financial circumstances that characterize commercial properties as opposed to residential ones.

This report focuses on the residential buildings sector, specifically on detached homes, with some consideration of multi-unit residential buildings. Structuring effective programs for DERs in the residential sector has been a challenge as less expertise and financing and fewer programs are available in the residential sector compared with the commercial sector. Commercial building owners often own larger buildings or even a portfolio of buildings, making the energy retrofit

process simpler from a market perspective. In the residential sector, each individual homeowner manages both a unique financial situation as well as a unique building design, complicating the DER process considerably. As a result, residential building retrofit programs have not received adequate research and funding.

Many of the same building retrofit techniques apply to multi-unit residential buildings (MURBs) as to residential houses. Interviews with experienced DER builders as well as DER literature reveal that a focus on air tightness as well as insulation upgrades represent the most promising building upgrades that significantly impact energy efficiency in both MURBs and residential houses (Canada Mortgage and Housing Corporation [CMHC], 2015; RDH Building Engineering, 2012). Financing programs for DER, however, differ because of the different structures of ownership for MURBs and residential houses.

Box 1. Economies of scale: EnergieSprong in Europe

One popular approach to deep energy retrofitting is a model developed in the Netherlands referred to as EnergieSprong. This model centres around streamlining and scaling up the retrofitting process to quickly achieve economies of scale in the program. By bundling retrofit opportunities, EnergieSprong creates a demand volume that motivates suppliers and constructors to invest in large-scale technical solutions (Sustainable Buildings Canada, 2017b). This method notably leverages prefabrication and off-site assembly to minimize tenant disruption and complete the retrofit within as few days as possible. The EnergieSprong model faces limits in the Canadian context because of the many unique building types and design shapes in Canada's residential housing stock that complicate mass production and prefabrication. There have been some initial efforts made by Canadian governments to explore the applicability of EnergieSprong in Canada; however, retrofit programs have not achieved critical scale in the country (Sokic, 2022; Sustainable Buildings Canada, 2017a).

2.2 The Potential of DERs in Manitoba

Nearly all of Canada's roughly 12 million homes require some form of energy-efficiency retrofits because of the historically low standard of energy efficiency (Millyard, 2023). Houses built in the past 30 years comprise about one third of Canada's building stock and will need only minor retrofits compared with the major retrofits required of Canada's older housing stock (Millyard, 2023).

Winnipeg had, as of the 2021 Census, 199,120 single detached houses and an additional 25,000 semi-detached or row houses (Statistics Canada, 2023). Manitoba has the oldest housing stock in Canada, with 16% of homes built prior to 1946 (Green Economy Network, 2020). This older building stock represents a unique challenge for energy efficiency as these structures were not constructed according to modern building energy codes and have relatively poor energy efficiency

(City of Winnipeg, 2018). Emissions from the buildings sector in Manitoba have dropped considerably since 1990 as a direct result of increased energy-efficiency standards achieved by provincial and federal programs (Climate Action Team, 2021). In Manitoba, building emissions in 2018 were 17% lower relative to 1990, despite the thousands of buildings that were constructed in that time (Climate Action Team, 2021).

Manitoba's extreme climate is also relevant in the context of building retrofits, as temperatures can swing by extremes of more than 70°C throughout annual weather cycles. The extreme cold in the winters provides a significant challenge for the heating of spaces as buildings substantially increase their peak heating demand at this time. In a future where building heating will be sourced increasingly from renewable electricity, accommodating this peak demand will be a challenge. Investments in DERs are one way to mitigate the impact of peak demand on Manitoba's electricity grids. At the same time, the wide range of seasonal temperatures suggests energy-efficiency measures could have faster payback and more impact on occupant comfort than in more mild climates. Climatically, Manitoba is an ideal setting for energy-efficient building, as these measures would benefit both winter heating efficiency and also lighten summer cooling load.

Box 2. Climate resilience in Manitoba

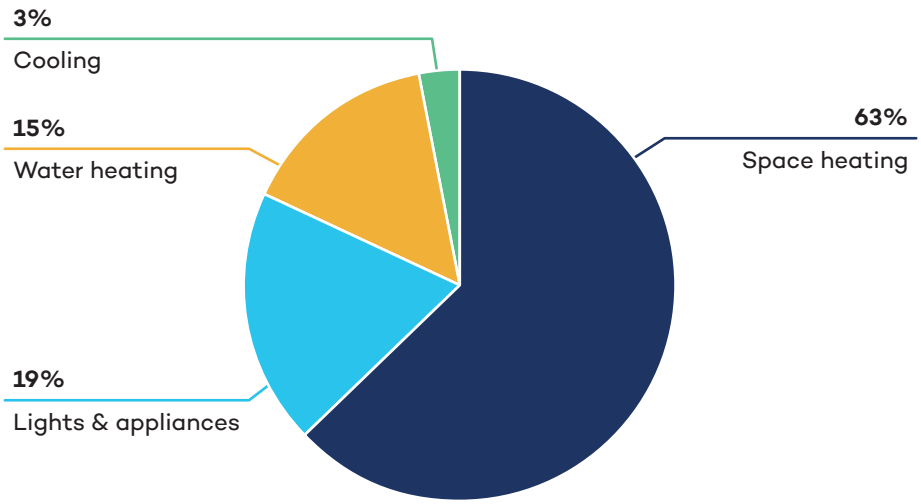
Manitoba's northern latitude means that the province is projected to warm at a rate much faster than the global average under climate change. Average annual temperatures in Western Canada have increased by twice the global average since 1950, and average winter temperatures have already increased by roughly 4°C (City of Winnipeg, 2022). In Winnipeg, the number of hot days exceeding 30°C is expected to increase from an average of 14 per year historically to 31 per year towards mid-century (City of Winnipeg, 2022). Climate impacts are also affecting Manitoba Hydro's generating capacity; extreme drought conditions resulted in a loss of approximately CAD 250 million for the crown corporation in 2021 (Manitoba Hydro, 2022).

Measures to increase energy efficiency in buildings must also increase climate adaptation and resilience to future intensifying climate impacts. Under extreme heat, DERs reduce the need for air conditioning as homes with improved air tightness and insulation retain temperature better throughout temperature extremes. Other simple upgrades that can be undertaken for climate adaptation for homeowners include planting trees for shade along the south and west facing walls, or installing climbing plants on walls and balconies (Intact Centre on Climate Adaptation, 2023).

Upgrades to increase adaptation in the form of flood protection include the installation of window wells that sit at least 10–15 cm aboveground as well as ensuring downspouts are directed 2 m away from the building foundation. More advanced flood protection measures might include the installation of rain gardens, yard grading corrections, and backup sump pump equipment (Intact Centre on Climate Adaptation, 2023).

Natural gas-powered heating accounts for 55% of building heat in Manitoba, with electric resistance heating providing the remaining 45% (Climate Action Team, 2023). Space heating produces most carbon emissions from the buildings sector in both Canada and Manitoba. National data shows that space heating consumes 63% of residential energy use, water heating consumes 15%, cooling 3%, and lights/appliances 19% (Figure 1) (Millyard, 2023). Data from the City of Winnipeg's Community Energy Investment Roadmap demonstrates that space heating dominates residential energy use in the Manitoba context as well (City of Winnipeg, 2022).

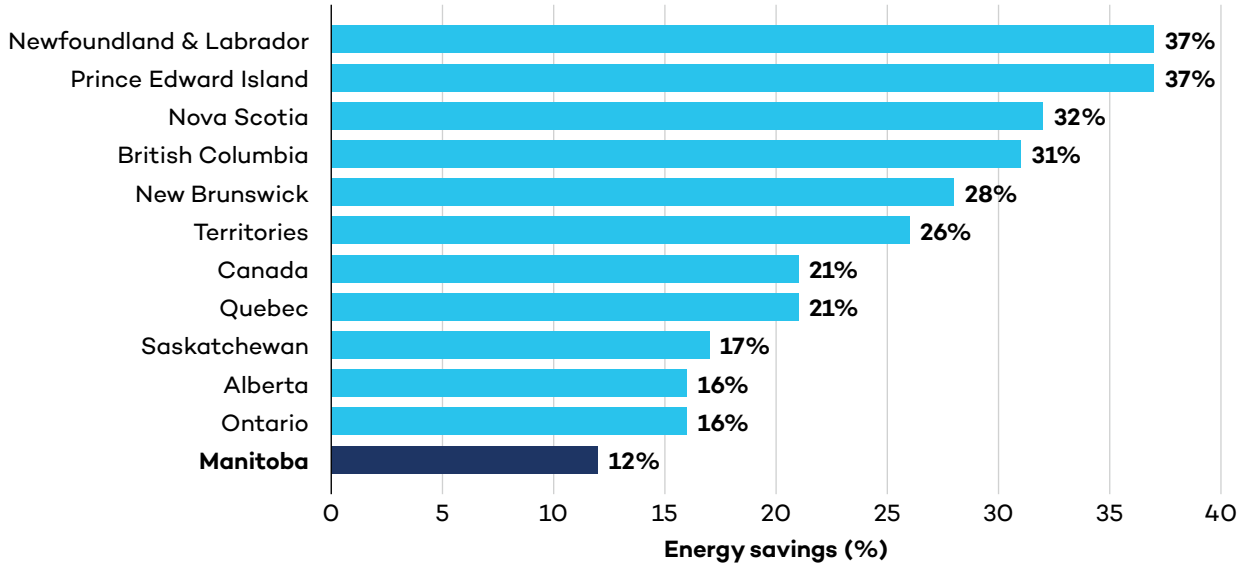
Figure 1. Canadian data on residential energy use



Source: Millyard, 2023, p. 5.

Manitoba currently lags behind other provinces in terms of the quantity and quality of energy-efficiency measures implemented in the province (Clean Energy Canada, 2024). In Efficiency Canada's latest national energy-efficiency scorecard, Manitoba is ranked eighth in the country with 29 out of a possible 100 points (Efficiency Canada, 2023a). While the province was commended for some of Efficiency Manitoba's progressive programs, such as heat pump incentives as well as the Indigenous Community Energy Efficiency Program, the lack of high-performance building codes set the province back (Efficiency Canada, 2023a). Specific policies that Manitoba could adopt from other Canadian provinces are discussed in Section 3. As shown in Figure 2, Manitoba's average energy savings per retrofit is markedly lower than in other provinces.

Figure 2. Average energy savings per retrofit by province, 2022



Source: Millyard, 2023, p. 20.

2.3 The High Price of DERs

The most significant economic factor that impacts the success of energy-efficiency programs is that DERs involve very high upfront costs. Retrofit Canada cites a range of CAD 100,000–200,000 for a one-shot, net-zero retrofit (Retrofit Canada, n.d.). The Pembina Institute estimates a deep retrofit for a detached home at CAD 100,000-150,000. However, our interviews with local Winnipeg retrofitters suggested that the range could extend as high as CAD 400,000. Homeowners can be charged as much as CAD 300 per square foot for a retrofit. This variability in cost may be due in part to the wide range in cost of replacing finishes, fixtures, and appliances, which may be packaged into a DER, though they may be less relevant to the energy-efficiency impact of the project.

These costs are very high compared to the value of houses in Winnipeg but can be expected to decline as the DER industry grows. As discussed above, costs for DER over the life of the EnergieSprong program in the Netherlands have declined, and are projected to decline further, as a result of the program's coordination of the retrofit process, economies of scale from aggregation and prefabricated manufacturing, and learning-by-doing. Their cost estimate per retrofit in 2020 was USD 72,000 (for a 1,000 sq. ft average unit), and it was estimated this could be brought down to USD 48,000 (Jacobs et al., 2015). In North America, The Rocky Mountain Institute's REALIZE program showed that the costs of wall units for DERs fell by between 37% and 55% over the decade between 2008 and 2018, suggesting that significant cost reductions are possible (Rocky Mountain Institute, 2018). Manitoba-based DER builders confirmed that preliminary

investments in prefabrication have been shown to reduce costs by tens of thousands of dollars and that further investments in prefabrication show promising potential to reduce costs even further.

Nonetheless, the very high costs now—and considerable costs in the future—present a significant barrier. It is possible that a financial return would not be seen within a homeowner's lifetime, even when considering increased property value and other factors. This complicates the approach to financing, a topic that this report addresses below.

2.4 Current Incentives for Energy Efficiency Upgrades

There are a number of federal and provincial incentives and policies to support building retrofits. The federal Canada Green Building Strategy, published in July 2024, provides strategic direction and introduces some new supports for accelerating retrofits and developing the green building workforce and industry of the future (Natural Resources Canada, 2024b). Major federal programs include the Green and Inclusive Community Buildings Program, the Greener Neighbourhoods Pilot Program, CMHC's Canada Greener Affordable Housing program, and the Canada Greener Homes Grant (now being replaced with the Canada Greener Homes Affordability Program). Provincial programs include Efficiency Manitoba's Home Energy Retrofits and other programs, Manitoba Hydro's Home Energy Efficiency Loans, and the Manitoba Finance Green Energy Equipment Tax Credit program. For a description of these programs, see Appendix A.

Most current incentives and programs cover only a very small portion of the total cost of a DER and require extensive work on the part of the homeowner to navigate various application systems and processes. As a result, very few residential DERs have been completed in Manitoba, and those were largely privately financed by homeowners, given the limited value of grants available. Scaling up retrofits will be possible only by making it financially feasible for a much greater portion of the population.

Box 3. Lessons from the Canada Greener Homes Grant: A need to focus on the building envelope

While the federal Greener Homes Grant did increase the overall number of retrofits in Canada, recorded energy savings were fairly small. The program resulted in a four-fold increase in retrofits in Canada, with more than 188,000 retrofits completed from 2020 to 2022; however, average energy savings increased only from 17% to 21% in that time (Millyard, 2023). DER comprised only roughly 6% of total retrofits completed in 2022, meaning that the vast majority of participants are undertaking superficial retrofits that have little impact on overall energy savings. It is widely understood by the retrofit industry that the most popular retrofits tend to be window or door replacements, which are much simpler to undertake in comparison with DER but do not significantly impact energy savings. A retrospective analysis of the Greener Homes Grant from 2023 found that the "Greener Homes program is inadvertently moving homeowners away from envelope upgrades, which have declined significantly since the program was introduced, in favour of heat pump and solar installations" (Millyard, 2023, p. 3). Canada's Greener Homes Grant came to an end in March of 2024 as funding was exhausted much more quickly than was expected (Langager, 2023).

The main reason that the Greener Homes Grant did not achieve higher levels of emissions reductions through DERs is that program funding was too limited (Millyard, 2023). Building envelope work, which is the most effective way to increase energy efficiency, is the costliest retrofit option. Heat pumps and solar PV systems cost thousands or tens of thousands of dollars while building envelope retrofits cost hundreds of thousands of dollars (Millyard, 2023). With a maximum amount of CAD 5,000, the Greener Homes Grant cannot cover these expensive building retrofits. Limitations of the Greener Homes Grant have been clearly observed as the program "does not work for low-income households or First Nations communities" (Millyard, 2023, p. 14). A significantly expanded program is required to achieve the levels of building retrofits we need for our climate targets.

3.0 Delivering DERs at Scale in Manitoba

3.1 A Manitoba-Made Approach to Residential DERs

As discussed in the introduction, a balance must be found between rolling out wide-reaching DERs and scaling up renewable energy to produce the remaining energy load. Manitoba enjoys the advantage of an almost fully decarbonized electrical grid that can be leveraged for the zero-carbon energy transition. But the conversion of our entire building energy demand to renewable electricity is not currently feasible as it would put an untenable demand on the grid. Implementation of a full DER on each residential building is also not feasible because of financial and resource constraints. Finding the right balance entails considering the cost of materials, labour, embodied carbon of materials, and number of houses. The age of the building, the local market, and DER incentive structures also play an important role. Some houses may not be suitable targets for DERs depending on these factors.

It is important to consider that, in some cases, deep retrofits may not be economical options for lower-value homes. Tearing down smaller, single-family dwellings and replacing them with higher-density MURBs may represent a more cost-effective and energy-efficient option to achieve emissions reductions in the building sector while growing the housing stock, but embodied carbon in the building materials should also be considered.[2]

Thus, figuring out the best way to reduce emissions in a building must be done on a case-by-case basis, depending on the economics of the specific house. Nonetheless, while Manitoba housing may not lend itself as well to the EnergieSprong model, it will still be critical to find economies of scale. Segmenting housing stock into archetypes may represent a suitable plan to administer retrofits on a larger scale. A project in Airdrie, Alberta, found success in implementing retrofits in this way (Retrofit Canada, 2024). A segment of recently built housing was identified that required only simple airtightness retrofitting, ground source heat pumps, and solar installation, without major envelope upgrades, to reach near Passive House standards of efficiency. Tackling the challenge of retrofitting by addressing individual segments of the housing stock allows for greater efficiency to be achieved, as patterns of repetition and consistency can make the workflow more streamlined. Local DER builders have noted that various approaches to retrofitting may be suitable in different contexts, as older homes require alternative methods.

One potential opportunity for a comprehensive DER program would be the widespread implementation of limited energy retrofits. Green Communities Canada notes that “reducing air leakage, adding insulation, and upgrading windows and doors can reduce the amount of energy

[2] Supporting MURB development is also a strategy to combat the housing crisis. According to local builders, one challenge for the North End of Winnipeg is that the at-capacity sewage system cannot accept any new toilets, meaning that redeveloping higher-density buildings in the neighbourhood is not possible. Composting toilets have been suggested as one approach to managing this issue. This example demonstrates some of the complexities inherent to increasing building energy efficiency in Manitoba.

needed to heat houses by more than 50%" (Millyard, 2023, p. 6). DER construction experts in Manitoba recommended these same retrofit practices to achieve a relative energy-efficiency upgrade rather than a full-scale DER. The federal government has embraced the concept of partial efficiency upgrades in its DER definition as it defines DERs as any retrofit that reduces energy consumption by at least 50%. This target represents a more achievable goal for many buildings to aspire toward.

Metrics on costs and energy savings must inform the implementation of any comprehensive DER program. Canada's EnerGuide program has proven to be an important tool in evaluating energy efficiency in residential buildings, and data from this program could be analyzed to design an effective DER program. Quantified energy savings must be demonstrated as proof that climate investments are being efficiently utilized to achieve emissions reductions. Indicators and reporting mechanisms would be required, as well as staff with oversight of the planning.

> **Recommendation:** Provide low- or no-cost EnerGuide audits to increase understanding among households and governments about the best approach to balancing efficiency measures with electrification and increased generation at the household and aggregate levels.

Box 4. Fuel switching: Heat pumps as a key complement to DERs

Ground source heat pump (GSHP) technology, often referred to as geothermal technology, represents an economical option for heating and cooling buildings in Manitoba as a complement to the DER process. The major advantage of GSHP technology is that it is a much more energy-efficient heating system relative to a conventional electric system, using only one-quarter to one-third of the electricity required by conventional electric heating systems (Nichol, 2021). Because almost half of all buildings in Manitoba (45%) are heated with electric resistance heat, mass conversion to geothermal has the potential to generate significant energy savings and displace natural gas heating. Each electric-heat home that is converted to geothermal reduces peak load on the Manitoba energy grid by roughly 7-8 KW, and each fossil fuel conversion to heat pumps adds roughly 3-4 KW to the load (Climate Action Team, 2023). This means that transitioning a home away from electric heating can create enough peak load savings to support the conversion of two homes away from natural gas. Calculations show that a large-scale geothermal conversion could produce energy savings of hundreds of megawatts, roughly equivalent to the production of the CAD 1.3 billion Wuskwatim hydro dam (Climate Action Team, 2023). Around 3,000 buildings in Manitoba, less than 1%, currently are heated with geothermal technology (Climate Action Team, 2023).

Air source heat pump (ASHP) technology has also developed substantially in recent years and increasingly represents a viable option for home heating in a cold climate such as Manitoba. ASHPs are typically a more affordable option than GSHPs and can sometimes be more easily implemented than GSHP technology. Advantages and disadvantages of both GSHPs and ASHPs must be considered for their appropriate uses in building systems in Manitoba.

Uneven taxes on natural gas compared with electricity—with natural gas taxed at 5% plus the carbon tax while electricity is taxed at 14.5% (including a city tax and PST) in residential buildings that heat with natural gas—reduces the incentive for transitioning from fossil fuels. Natural gas infrastructure costs are assigned to the property and amortized over decades, threatening our transition from fossil fuels, while geothermal infrastructure must be paid in full and upfront by the property owner. If the scales were not tipped in favour of natural gas heating, heat pump technology could be the more economical choice for residential building heating (Climate Action Team, 2023). Some tax credits are available for heat pump installation in Manitoba (Government of Manitoba, 2024a).

3.2 Policies to Support DERs: Procurement, building codes, and mandatory labelling

Procurement and Public Policy

The only way to achieve the ambitious emissions reductions required of the buildings industry is for the public sector to take a bold position in the procurement of DERs. Procurement, in this sense, refers to the ability of the government to act as a major purchaser of DER services, thus providing scale and stability on the demand side. Market-based policy options alone will not be sufficient to achieve the enormous scale of retrofits required for our climate targets as "[t]here is simply no example of a market-based transformation that comes close to resembling the scale and complexity demanded by the global replacement of fossil-fuel based infrastructure" (Buller, 2022, p. 36).

A growing body of literature considers the importance of public procurement with specific reference to the climate crisis. Governments have historically achieved transformative economic projects through bold procurement policy. The economist Mariana Mazzucato has highlighted many international examples of public procurement strategies that are targeted to achieve "mission-oriented" objectives across the United States, the United Kingdom, and Scandinavia (Mazzucato, 2020). Perhaps the most prominent example is NASA's Apollo program, which featured extensive public procurement to achieve ambitious project goals on tight timelines (Mazzucato, 2020). Similarly, strong procurement policy must be strategically leveraged by the buildings industry to achieve the significant volume of DERs required to achieve our climate targets. Research considering the vast scale of building retrofits required in the Canadian context has referenced this literature, calling for a transformation of current market and policy structures by embracing bold and ambitious goal setting by the public sector (Haley & Torrie, 2021). Some have pointed to the record mobilization of public goods in World War II—when the government created 28 Crown corporations to control manufacturing and prevent private sector profiteering—as an example of the kinds of procurement policies needed to respond to the climate crisis (Klein, 2020).

Box 5. The history of Manitoba's Green Buildings Policy

Manitoba set a benchmark in Canada by mandating a minimum standard of LEED Silver efficiency rating for government buildings through the Manitoba Green Buildings Policy, introduced in 2007 as a pioneering move in building energy efficiency. This requirement extended to any building project seeking public provincial funding, effectively incentivizing compliance with this ambitious environmental standard. The success of this initiative was attributed to its timely introduction and the fact that it imposed no financial burden on entities not seeking government funding. The program was instrumental in providing local practitioners with unique opportunities to undertake innovative projects, incubating specialized expertise and industry capacity for energy-efficient building practices. However, with changes in the public service and shifts in political priorities, the policy has not been upheld in recent years.

A Manitoba DER industry could be jumpstarted and supported while improving the quality and energy efficiency (and thus long-term affordability) of publicly owned or Indigenous-owned housing. Manitoba buildings experts have highlighted an opportunity that stands out with Manitoba Housing, the largest landowner in the province. By initially targeting the housing stock owned by entities such as Manitoba Housing or First Nations communities, the government can utilize its purchasing power to drive demand for DER services. This strategy is not only feasible from an investment standpoint, given the long-term ownership outlook of these organizations and the extended payback period associated with DER investments, but it also introduces an equity dimension by potentially uplifting living conditions for populations experiencing energy poverty.

The initiation of a public DER program would serve as an economic catalyst to cultivate a skilled workforce and develop the organizational capacities required for large-scale retrofit implementation. Barriers of cost and expertise could be addressed by the program. This approach could lead to more firms entering the market to seize on the economic opportunities from DER projects.

> **Recommendation:** Leverage publicly owned housing stock or Indigenous-owned housing stock to create a DER procurement strategy.

Alongside a general procurement strategy, the Manitoba Green Buildings Policy should be reinstated to specifically target public buildings such as schools, hospitals, and government buildings. This policy must be mainstreamed across departments through a firm mandate within government to raise awareness and solidify buy-in of the policy. Lessons from previous Green Building Policy implementation indicate that having a mechanism central to government that provides oversight and ensures policy rules are met is essential to its success and longevity.

> **Recommendation:** Reinstate and expand the Manitoba Green Buildings Policy to include higher energy efficiency as well as a ban on the use of natural gas heating.

Box 6. Case study: Toronto Community Housing Corporation

The Toronto Community Housing Corporation's (TCHC) deep energy retrofitting project aims to transform a poorly performing 80-year-old mid-rise MURB into a high-performance building, with a goal of developing a prototype for buildings in the TCHC portfolio and similar buildings across Canada, which represent 18% of the housing stock in Canada (TCHC, 2023). The TCHC will also retrofit two adjacent "sister buildings" on the same site as its initial building. The TCHC selected DER for high-rise and mid-rise buildings by filtering buildings that required energy-efficiency upgrades, building repairs needs, and accessibility upgrades (Natural Resources Canada, 2023a). This selection process reflects a holistic approach to retrofitting. The project included mechanical system retrofits such as energy-efficient ventilation systems, monitoring and verification with networking of building automation systems. Lighting and electrical system upgrades include installing control systems and LED lighting. Improvements to durability of envelope and roofing systems, recladding and insulation, and new high-performing window systems are also a part of the retrofitting process.

The project is expected to demonstrate how DERs are not primarily a design and technology endeavour but instead a mass mobilization of the workforce and wraparound supports (TCHC, 2023). The process is designed to have positive effects for tenants as well as making accessibility improvements in common areas and tenant units to provide opportunities for all tenants to engage in community life within the site (Natural Resources Canada, 2023a). A planned project services team was created to serve as support and as a communication channel for tenants living in the buildings (TCHC, 2023).

Building Codes

Building codes are a key regulatory tool in building energy efficiency, both for new buildings and renovations. While the focus of this study is on retrofits to bring the existing building stock up to a high level of efficiency, a critical step in the net-zero building transition is to ensure all new buildings are being built to a high standard of efficiency by adopting stronger building codes.

All Canadian provinces, with the exception of Saskatchewan, agreed to use a standardized building code system with the adoption of the 2016 Pan-Canadian Framework on Clean Growth and Climate Change. New codes were released in 2021. These codes introduce a series of performance-based tiers, with Tier 1 being the lowest and Tier 5 at the highest. The tiers use a referenced approach to energy targets, with Tier 3 being approximately 50% more ambitious than Tier 1 (oiAirFlow, 2020).

Manitoba recently regressed to a lower level of building efficiency, Tier 1 building codes, and is far behind other provinces in this regard. This means new buildings today are still being built with poor efficiency and will need to be retrofitted in the coming years in order to reach net-zero, a much more expensive and resource-intensive process than building efficiently from the

start. Manitoba's regressive building codes represent a serious setback in progress on emissions reductions in the buildings sector because integrating efficiency into a new build is less expensive than retrofitting later in a building's life cycle. There is a need to ensure new buildings are ready to switch to geothermal or electric as this is not currently common practice.

British Columbia provides a good example of regulatory adoptions that Manitoba should follow. It has a step code that lays out a clear timeline for strengthening regulations that can allow industry to adapt and upskill workers to meet new efficiency standards. The 2024 federal budget encourages provinces and territories to adopt forthcoming changes to the National Building Code, a requirement to be eligible for funding through the new CAD 6 billion Canada Housing Infrastructure Fund to support new housing and densification.

Sustainable buildings experts in Manitoba have stressed that it is essential that Manitoba adopt a retrofit code that mandates efficiency when buildings are renovated. Manitoba is currently slated to introduce a retrofit code in 2030, and this timeline should be expedited. Alternatively, Manitoba could adopt the national building code, the Alterations to Existing Buildings code, which is slated to be released this year (Efficiency Canada, 2023b). In any case, Manitoba should set out a clear roadmap through engagement with industry and workers so that stakeholders can anticipate and prepare for updated building codes with enough lead time to adapt. Regulations, such as building codes, must be accompanied with sufficient accountability and reporting to ensure they are fully effective.

In addition to mandating more stringent energy performance standards, it should also be required that energy-efficiency measures accompany other interventions more likely to be sought by a homeowner, such as upgrading finishes. This serves not only to increase the uptake of energy-efficiency measures but also to significantly reduce their costs and minimize their disruption, as they could be viewed as an upgrade to another intervention.

> **Recommendation:** The province should immediately adopt at least Tier 3 building codes for residential buildings and expedite the adoption of a retrofit code by 2025, to reduce energy consumption, lower energy bills, and reduce future demand for public investment in retrofits. Additionally, an improved building code should prohibit the use of natural gas heating systems, regardless of the tier.

Mandatory Energy Efficiency Building Labelling

Interviews with sustainable buildings experts highlighted that the lack of a clear market incentive for improving building energy efficiency is a major challenge. One solution to this is mandating energy labelling on houses and buildings so that prospective buyers can consider the energy costs associated with a building as part of the total cost of buying and owning a home. Introducing energy labelling, perhaps through legislation to mandate labelling during home sales, would give prospective building owners information on GHG emissions and energy performance of a building, creating an important market signal (Clean Air Partnership, 2022). This is a relatively

low-hanging fruit policy that is gaining attention across Canada. In a survey of Canadian industry experts, the Pembina Institute found that mandatory energy labelling was the second highest supported policy mechanism to promote building energy efficiency (Blue & Agar, 2024).

Energy labelling is widely understood to be an effective way to promote energy efficiency in the buildings sector. Energy labelling has been mandatory for all buildings across all 28 European Union member states since 2006 (City of Edmonton, 2019). In the United States, support for energy labelling is advancing much more slowly, with 30 cities and 10 states enacting energy benchmarking requirements as of 2019 (United States Department of Energy, 2019).

As of 2022, no Canadian jurisdiction has mandated energy labelling (Clean Air Partnership, 2022). This is despite a commitment by the federal government to enact energy labelling requirements in its 2016 Pan-Canadian Framework on Clean Growth and Climate Change (Government of Canada, 2016). The 2024 federal budget commits a further CAD 30 million over 5 years to developing a national approach to home energy labelling. The cities of Edmonton and Calgary are in the process of enacting energy labelling policy at the municipal level; however, provincial response may overrule these municipal changes (Boothby, 2024).

> **Recommendation:** Introduce mandatory energy labelling, perhaps through legislation to mandate labelling during home sales, to give prospective building owners information on GHG emissions and energy performance of a building and create market value for improved efficiency.

Additional Policy Considerations

A number of other related issues arose in expert interviews regarding complementary policy changes needed to accelerate residential retrofits in Manitoba.

- **Permitting.** Inefficiencies and hurdles in the current permitting process will be a barrier to scaling up retrofits if left unaddressed. There is a need to clean up and streamline the permitting process for DERs specifically and to improve coordination between different levels of government.
- **Zoning.** Some existing DERs in Manitoba have encountered issues related to zoning. For instance, there may be a need to adapt zoning bylaws to allow for thicker exterior walls, in some cases reducing the margin on the property line so as not to compromise internal living space. This would also require allowances from fire codes that require certain setback distances. Such flexibilities have been introduced in Vancouver.
- **Finding key moments of intervention.** From a materials and efficiency perspective, retrofits are most likely to get uptake when modifications to the building envelope are already being made, such as during renovations. It is critical to ensure that building owners are aware of energy-efficiency measures at these moments.

3.3 Financing Manitoba DERs: Costs, payoffs, subsidies, and mechanisms

Balancing the Costs of Energy Efficiency and Energy Generation

The level of investment in DERs must be determined together with investment in expanding renewable energy generation to find the most economical balance of the two. Projections for required additional generating capacity to meet peak winter electricity needs through mid-century vary based on projected decarbonization; however, models projecting widespread decarbonization estimate more than doubling generating capacity. The Manitoba Hydro Integrated Resource Plan, for example, projects 8,000 MW of additional capacity will be required by 2042 under a scenario in which most building heat and transportation is electrified, amounting to CAD 54 billion in net system costs for capital and operations over the next 20 years (Manitoba Hydro, 2023, pp. 63–65). The Manitoba Climate Action Team projects heating and transportation electrification will require over 10,000 MW of additional peak capacity—a figure that could be reduced considerably through DERs (Climate Action Team, 2023).

All of the energy roadmaps that have been developed for the province[3] recognize the need for energy efficiencies, primarily in the building sector. The savings achievable through energy-efficiency measures with an optimal mix of renewable energy capacity, relative to a baseline of zero energy efficiencies, are very large—predominantly because of the very large storage costs required by variable generation sources like wind and solar. For example, Houssainy and Livingood (2021) find that for International Falls, Minnesota (the closest climate to Winnipeg's in their study), with no energy-efficiency gains and a mix of 83% wind and 17% solar generation, the total investment cost per square foot of building space required to meet electricity demand without fossil fuels would be a staggering USD 2,186. In contrast, using their optimized mix of energy efficiency and renewable capacity, which involves 68% energy efficiencies and 100% wind generation, the cost per square foot drops to a much more manageable USD 57.

The optimized mix of efficiency and renewables for Manitoba is not yet clear. This report examines the efficiency side of the equation, but this must be brought together with costs of expanding wind, solar, and geothermal in order to determine the most economic approach.

Economic Costs of DERs in Manitoba

The costs of retrofitting Canadian homes to bring them into line with the necessity of net-zero societies by 2050 are significant and should not be downplayed or minimized. As discussed, leaving the cost to be borne by individual homeowners on their own is not a viable course of action; the public sector needs to step in. The scale of current federal and provincial incentives, loans, and grant programs are vastly insufficient for the task at hand.

[3] See Dunsky, 2023, Manitoba Climate Action Team, 2023; Manitoba Hydro, 2023.

Research from the Pembina Institute that builds on previous economic analysis of building retrofits by Dunsky Energy Consulting and Efficiency Canada finds that Canada needs to invest approximately CAD 400 billion in building retrofits over the next 20 years to eliminate on-site combustion of fossil fuels by 2050, breaking down to CAD 10 billion–15 billion in public investment for residential retrofits and CAD 6 billion for commercial and institutional buildings every year for the next 20 years (Dunsky Energy Consulting, 2018; Efficiency Canada, 2020; Kennedy & Frappé-Sénéclauze, 2021). The Pembina Institute report breaks these investments down by province, finding that Manitoba needs to invest CAD 800 million annually to achieve net-zero by 2050.

We estimate that for Manitoba, using a cost-per-house of CAD 150,000 for energy savings between 40% and 80%, and with a target of 8,000 homes per year (200,000 single-detached houses, semi-detached houses, and row houses, excluding apartments, total retrofitted over 25 years), the total annual investment would be on the order of CAD 1.2 billion (Statistics Canada, 2022). To put that in perspective, the annual retrofit costs for Winnipeg would represent about 4.9% of the total 2024 provincial budget—CAD 150 million less than the combined budgets of Housing, Addictions and Homelessness (CAD 794 million), and Transportation and Infrastructure (CAD 560 million) in that year. This is by no means unimaginable, given the costs of failing to achieve our climate targets (World Economic Forum, 2023), but it's crucial to identify how it can be sustainably financed. We turn to this question later, but want to first enumerate the economic upsides of this public investment.

Economic Benefits of DERs in Manitoba

Substantial investments in green buildings would be an economic engine for the province, generating jobs, creating demands for goods and services, generating household savings on energy costs, and boosting provincial GDP. While the capital investments needed to retrofit buildings at the pace to meet climate targets are an order of magnitude higher than the boldest commitments made to date, economic models repeatedly confirm that these are sound investments—even without accounting for the huge economic costs of doing nothing to prevent climate change. This is public spending that will produce a net economic benefit for the province.

The ratio between investment and the resulting economic activity created by that investment is captured by the "multiplier effect." Among forms of investment in green energy, energy efficient building retrofits consistently rank among the best for job creation and GDP growth (IEA, 2020; Hanna et al., 2024). This is because of the labour intensity of building retrofits, as well as demand created for locally produced manufactured goods. In many cases, additional tax revenue and social spending reductions offset the initial cost of program spending over time. For instance, the Pembina Institute finds that CAD 10 billion–15 billion in public investment for residential retrofits and CAD 6 billion for commercial and institutional buildings every year for the next 20 years nationally would, in turn, create CAD 48 billion in economic development and 198,000 person-years of employment every year (Kennedy & Frappé-Sénéclauze, 2021, p. 18). Under this model, program spending would be covered twice over through increased tax revenue. In

Manitoba, the authors estimate that CAD 800 million annual building retrofit investment in Manitoba would produce CAD 1.7 billion in provincial GDP and 7,100 job years every year.[4]

The Pembina Institute model is built upon an economic multiplier of CAD 2.3 of additional GDP for every CAD 1 invested in building retrofits. The Dunsky Energy Consulting analysis of building retrofit investments in Canada's 2016 Pan-Canadian Framework Agreement identifies a multiplier of between a CAD 4 and a CAD 7 increase in GDP for every dollar invested in building retrofits, with the range reflecting the depth of retrofit undertaken. A similar analysis of multiplier effects created by public infrastructure spending finds that form of public investment generates CAD 1.43 for every CAD 1 spent, providing a useful comparison (Broadbent Institute, 2015).

Key to these models is that a significant portion of the investment (50%–75%) must be grants or other subsidies, to free up household energy cost savings. The Dunsky model also notes that there are diminishing economic returns after a certain level of energy efficiency has been achieved, indicating policy measures should aim for the correct balance of retrofit and switching household power to renewable sources. Energy modelling and embodied carbon analysis are critical for helping identify this balance in any given building.

The "net-zero scenario" set out in the City of Winnipeg's Community Energy Investment Roadmap also analyzes the economic effects of investing in building retrofits, fuel switching, and transportation electrification, among other areas. The roadmap indicates an investment of CAD 23 billion (or around CAD 800 million per year) between 2022 and 2050 is required to achieve the net-zero scenario. Between 2022 and 2050, the report projects CAD 53.7 billion in energy, maintenance, and other savings, netting out to a positive economic impact of roughly CAD 35.6 billion, or CAD 1.2 billion per year (City of Winnipeg, 2022).

Examples from other jurisdictions also provide evidence of net economic benefit from investments in building retrofits. For instance, Germany's KfW development bank, the largest public bank in Germany, offers loans for residential, commercial, and institutional building retrofits and energy-efficient construction. These loan programs are aligned with the German Federal Government's net-zero buildings strategy, offering favourable terms to promote energy efficiency. The German Federal Government provides program funding to support these favourable terms as well as administrative program costs. Over many years, the program costs invested into KfW retrofit programs have more than paid for themselves through additional tax revenue and reduced costs in other areas (Kuckshinrichs et al., 2010). In 2016, EUR 1.95 billion in KfW loan program costs induced EUR 21.3 billion in total investment in building retrofits and energy-efficient construction (induced investment refers to spending that would not have been profitable without program costs creating favourable terms). This EUR 21.3 billion investment created EUR 7.4 billion in additional sales, income, and corporate tax revenue, paying for program costs more than three times over (Kuckshinrichs & Aniello, 2018).

[4] These figures are averaged over the life of investments. A lag will be present between program spending and economic development effects.

Subsidies Will Still Be Required

Part of the policy discourse around efficiency upgrades is that these investments are, over the long-term, profitable for building owners, but that the large upfront capital investment and long-term payoff dissuade owners from making the "rational" choice to invest in energy conservation. Critical to this argument are cost-benefit analyses that show that incremental savings on monthly energy bills are large enough to pay for the initial cost of energy-efficiency upgrades within a period short enough for the owner to benefit from lower energy bills once the investment is paid off.

The abrupt closure of the low-interest rate era and increases in renovation costs over the last 2 years, alongside government commitments to keep energy prices stable, reduce the economic viability of energy-efficiency upgrades on the private market, particularly when upgrading older buildings. Cost-benefit analyses of energy-efficiency upgrades to apartment buildings in Germany built between 1945 and 1979 show that under current market conditions, building upgrades are unlikely to pay for themselves through energy bill savings within 75 years (Galvin, 2024).

At the same time, other payback models show that DERs can be economical in Manitoba when the total cost of building ownership is taken fully into consideration.[5] While simple payback is a common measure of economic viability, it has limitations as it overlooks the long-term financial benefits of improving building resiliency. By considering the extended life expectancy and reduced maintenance costs of energy-saving installations and conducting a comprehensive cash flow analysis over a 60-year period, the economic impact of retrofits becomes clearer. With that said, these calculations are highly sensitive to interest rate increases, making concessionary financing likely to be necessary over the coming years.

Changes to the economics around building retrofits mean that public subsidies need to be reoriented. In the German example, interest rate reductions to below 1% or a mix of low interest rates and direct grants rendered efficiency upgrades profitable within 25 years (Galvin, 2024). Further, the authors suggest that subsidies in Germany need to shift away from subsidizing the deepest retrofits and instead focus on upgrades that may be more rudimentary but have potential for mass adoption.

With this knowledge in mind, Manitoba must develop a subsidy program for energy-efficient building retrofits that strikes a balance between heating efficiency and fuel switching from natural gas. Cost curves to help identify this point have been developed elsewhere and should be investigated for building types in Manitoba (Hummel et al., 2021). The high multiplier effects of building retrofits outlined above will significantly reduce the net cost of the larger public subsidies required in the current economic climate. Above all, in contrast to the short time horizons and instability of some government subsidy programs, they need to be stable

[5] Jim Nostedt of SEEFAR Analytics has been a leader in total cost of building ownership analysis in Manitoba for decades. For more on this valuation model see: https://seefar-valuation.com/about/

and durable into the foreseeable future in order to incentivize parties on both the demand and supply sides of DERs to invest.

Applying community economic development principles to a building retrofit strategy will maximize the local return on investment from building retrofits, further reducing any pressure on government budgets. Regions that maximize local sourcing of building materials and technology draw in the largest economic benefit from investments in retrofits (Mikulić et al., 2021). Significant gains in building retrofit technology and process innovation can be spurred on by public investments in a large-scale retrofit program, potentially bringing down retrofit costs while creating local economic development. Further, Manitoba is home to a developed social enterprise sector with the potential to meet the employment demands of a retrofit program while reducing government costs on other social expenditures.

Capitalizing a Manitoba Green Bank to Support DERs

The question remains of how to capitalize and finance an annual investment of CAD 1.2 billion over 25 years.[6] What is needed is a financing mechanism that a) is institutionally mandated to achieve the goals of energy efficiency and transitioning from fossil fuels, b) democratically governed and thus responsive to the public interest, c) financially sustainable, d) sufficiently capitalized given the scale of its objectives, e) capable of providing technical assistance and project coordination services, and f) provides long-term, "patient" finance (Semieniuk & Mazzucato, 2018).

Private sector financial institutions do not tick all of these boxes, as they are geared to the maximization of profit and shareholder benefit, rather than to accomplishing goals in the public interest. However, there are private sector financial institutions that have taken a role in some energy-efficiency retrofits. BMO, for example, has a partnership with the Canada Infrastructure Bank to facilitate financing of energy-efficiency retrofits of commercial buildings, where there is a demonstrable business case for doing so (BMO, 2024). Several Canadian banks offer variously discounted interest rates or cash rebates on mortgages for energy-efficient homes as part of a shift to "green mortgages" (Allegard, 2024). Closer to home, credit unions have shown an interest in financing energy-efficient new builds, including cooperative and non-profit housing. There are some niche projects—largely undertaken by wealthier homeowners—that can pay back with a positive return. The private market appears to be developing mechanisms for integrating energy efficiency into new builds or large-scale commercial and residential retrofit financing where a "green premium" can be achieved (higher market value after retrofit), paid for through lower operating costs, investor buy-in, or higher rents (Snieckus, 2024).

However, so far, private financing of residential DERs has been very limited relative to what is required. This is partly because the enabling environment to incentivize more engagement is lacking. Despite recognition of the need to retrofit around 3% of Canada's building stock per

[6] As stated above, CAD 1.2 billion represents 8,000 retrofits per year at an average cost of CAD 150,000. 8,000 retrofits per year for 25 years would achieve the 200,000 retrofits required to meet net-zero by 2050.

year over the next 30 years, the federal Green Buildings Strategy released in July 2024 did not provide a roadmap for achieving this or for getting homes off of natural gas, beyond the pilot programs launched in previous strategies (Haley, 2024). Some of the issues discussed above, such as mandatory labelling, building performance standards, or valuation changes, would make it easier for private finance to take a role. Mandatory energy labelling would help integrate the value of energy-efficiency retrofits into the value of homes, for example. Improving the way that home appraisals value energy efficiency would also help unlock private financing. The private sector—both realtors and lenders—could be a powerful advocate for these positive changes.

Scaling DERs and making them affordable for everybody will require very risk-tolerant, patient, long-term financing at low- or zero-interest rates. Repayment will take place over a very long period, and private lenders that demand returns comparable to what they could obtain by putting their capital elsewhere are unlikely to engage. With highly concessional interest rates and a long amortization, discounted net present values for DER loans are likely to be negative. In other words, some of these loans will be made at a loss to the lender.

A public bank, if designed with the above-listed principles a) through f) in mind, could be fit for the purpose of financing a green and just transition in our building stock. In our view, and based on the dismal experience to date of the Canada Infrastructure Bank in attempting to mobilize private investment for infrastructure, the challenge of a green and just transition is best paid for publicly.

A "Manitoba Green Bank" of this sort would be far from unique or novel. Thomas Marois reports that there are 910 public banks around the world, with a total of USD 49 trillion in assets (Marois, 2021, p. 4). These exist in a huge variety of countries, including Canada and at a variety of scales. Public banks are only as useful in achieving public purposes as their design allows. There are, for example, very serious problems with the design of the Canada Infrastructure Bank (Marois, 2022). However, there are examples of very successful public banks that do exactly what we need to do in Manitoba: make the necessary act of transitioning from fossil fuels—in this case, in the building sector—into an actionable possibility for homeowners of all kinds. The Nordic Investment Bank, jointly owned by the states of Norway, Sweden, Finland, Denmark, Iceland, Estonia, Lithuania, and Latvia, provides a good example of a sustainability-focused public bank. Lending is tied to a review of the environmental objectives of projects and to an assessment of the client's capacity to deliver on them. Interest rates are, in some cases, tied to achieving environmental outcomes, with lower rates for greater impact.

The Manitoba Green Bank would partner with existing institutions like Efficiency Manitoba, Manitoba Hydro, other levels of government offering incentives for energy efficiency, home retrofitters, or a future entity like the proposed Climate Emergency Secretariat (see Climate Action Team 2023) to pursue its climate objectives. A public bank could become a hub for retrofit projects, helping coordinate the process for homeowners, bringing together institutions and expertise on energy audits, manufacturing, construction, total cost of building ownership, energy systems, building, permitting, and financial incentives.

The key advantage of a public bank is that its design and implementation allow political choices about goals and about how the institution remains financially sustainable. Their mandates can specify the social and environmental goals of the institution, as well as ensure democratic, inclusive governance. Though they frequently do, they do not have to generate a high or even moderate return on assets. Public banks generate annual returns on assets as low as 0.01% but can also generate returns comparable to private commercial banks (Marois & Guengen, 2019). Instead of focusing only on returns, a green public bank can and should operate on a triple bottom line, consisting of progress toward a green and just transition, democratic governance, and financial sustainability (Marois & Guengen, 2019).

Ultimately, the scale of the subsidy provided by the public through the Green Bank would be dependent on the specific structure of loans—designed to balance affordability and deep GHG reductions with the long-term financial sustainability of the Green Bank. What seem like minor differences in structure make a big difference over time. To take a basic example, to offer a CAD 200,000 loan at zero interest, paid back over 60 years, at a discount rate of 3%, the subsidy is about half the value of the initial loan. Charging just 2% interest on the loan cuts that in half, so the subsidy is about a quarter of the loan's initial value. The appropriate balance between interest rate and particular retrofit subsidies to make loans affordable while ensuring the financial sustainability of the Green Bank will need to be negotiated within the bank itself; however, governments capitalizing the bank should anticipate subsidy rates of at least 25%.

Such a bank could be capitalized directly by government, or the capital could be borrowed by government or backed by a sovereign guarantee. In the former case, government might fully capitalize by purchasing equity in the bank, but more likely it would capitalize a portion in cash—say half, in the first year—with the remainder available as "callable capital." The callable portion would be made available if and when needed, thus allowing the bank to begin lending with a smaller immediate draw on government resources. Starting with just a portion of the capital in hand allows a public bank to "get its feet wet" and then scale up as it learns by doing, becomes a repository of expertise, and builds demand for its grants, loans, and knowledge.

Capitalization could also come from government borrowing on financial markets at the low interest rates available to governments, or the bank itself could borrow the funds backed by a government guarantee. However, this would influence the interest rates that the bank was able to offer to homeowners in order to meet the goal of financial sustainability. Charging zero interest to homeowners while paying interest on the loans used to capitalize the Green Bank would significantly increase the scale of the public subsidy.

Manitoba need not be the sole owner of the bank. The federal government, which desperately needs to scale up its own progress toward climate targets and thus its investments in climate-friendly buildings, could and should become a partner in the bank with an ownership stake. The City of Winnipeg and other municipalities might also consider becoming partners. Further, the province could consider innovative models such as "community bonds," which have been used to support affordable housing elsewhere in Canada (Duhatschek, 2024).

The capital pool loaned out by the Manitoba Green Bank will, of course, be partially replenished on an ongoing basis through repayment of the loans. The long amortization period diminishes the rate at which this happens, so there will be a need for ongoing public capitalization of the Manitoba Green Bank. With zero-interest loans, for example, and a 60-year amortization, in the tenth year of the program, CAD 200 million in funds will be returned to the pool, with a total of CAD 1.1 billion repaid over that first decade. Throughout the full span of the program, the amount of new funds required to capitalize the next year's lending declines each year by about CAD 20 million.[7]

> **Recommendation:** Capitalize and launch a Manitoba Green Bank to administer, on a significant scale, a low- or no-interest lending facility for DERs (and for other aspects of just and green transition in Manitoba). The bank should be mandated to operate on a triple bottom line and act as a hub of expertise and institutions to streamline the DER process for households.

Property Assessed Clean Energy Financing Mechanisms

Property-assessed clean energy (PACE) loans offer a good model for structuring loans for home retrofitting. While PACE loans can work for either commercial or residential property, here we focus on residential (sometimes called R-PACE) loans. The key aspect of PACE loans is that they attach to the property, not to the owner, so the obligation of repayment transfers to the new homeowner if the property is sold. They enable homeowners to take on energy efficiency or clean energy retrofits without the large upfront outlays that would otherwise be required. Homeowners pay the PACE loan back, generally over a long time period, usually on their property tax bill. The additional costs of paying the loan back are significantly mitigated by the energy cost savings from the newly efficient house; however, balancing out upfront costs with energy savings depends heavily on interest rates, subsidies, and the price of energy. As natural gas prices rise, particularly as the price applied to its associated GHG emissions rises, the energy cost savings of a DER will grow. The time frame for repayment of the loan should be tied, as recommended in Manitoba's *Road to Resilience*, to the useful life of the upgrade, generally from 25 to 60 years (Climate Action Team, 2023). Although 60 years is an unusually long repayment period, retrofits that attend to the whole building envelope should be aiming for at least that as the lifespan, if not decades longer. These are significant undertakings, and homeowners are unlikely to undertake them on a shorter rotation, even though some finishes, windows, and doors might be replaced more frequently.

[7] These calculations assume the full amount of capital (CAD 1.2 billion) is lent out annually, 1/60th of the total loaned out returns annually (60-year amortization), and the interest charged is 0 percent. All figures are undiscounted.

Loan repayments would return to the bank to replenish the capital pool. These loans should be made on highly concessional terms, with low interest rates and grants applied to various aspects of the upgrade. Nova Scotia, Alberta, and Ontario all have legislation enabling PACE loans and have, or have had (in the case of Alberta) PACE programs of varying size and scope (Kennedy et al., 2020). However, Canada lags considerably behind the United States, where PACE loans are much more common.

> **Recommendation:** Pass enabling legislation at the provincial level to enable municipal PACE lending. Promote R-PACE loans as a means of financing DER, including through the Manitoba Green Bank. PACE legislation should allow the province to enable PACE financing directly rather than require municipal approval.

Designing Successful and Equitable Incentives

Programs and incentives should be designed carefully in order to be accessible and not to inadvertently worsen income and wealth inequality. For instance, incentives that are only available to homeowners can increase the value of a house, thus increasing equity for homeowners but not being accessible to renters. Similarly, programs that require large upfront investment by the participant for a long-term payoff are not accessible to people without the savings to invest. The recent federal Oil to Heat Pump Affordability Grant is one example of a no-cost program that eliminates the barrier of upfront investment for the homeowner.

On the whole, where programs exist that are designed to support retrofits in low-income households in Canada, they often focus on facilitating energy upgrades but do not fully account for the multiple determinants and risks of energy poverty (Baggio, 2023). Baggio (2023) makes three recommendations for designing more holistic retrofit programs for low-income households for more equitable outcomes:

- integrate multiple determinants of energy poverty (e.g., household composition, tenure, immigration status, educational background) into program design. For example, British Columbia's Empower Me retrofit program was specifically designed to target multi-ethnic and multilingual communities, increasing program uptake by overcoming language and accessibility barriers.
- provide tailored energy retrofit solutions that have sufficient flexibility to allow them to be more accessible.
- expand program outreach to include broader health, safety, and comfort considerations. For instance, embedding mould or asbestos remediation into the retrofit plan to ensure these housing safety issues are addressed at the same time as energy efficiency.

Given that nearly two-thirds of low-income Canadians are renters, retrofit programs that are accessible to tenants are essential. However, as Haley and Kantamneni (2023, p. 3) report, "rental energy efficiency faces added complications due to landlord–tenant power relationships

and potential impacts on rents and eviction." Thus, it is important to ensure that retrofit policies for rental properties have safeguards to protect tenants' rights and prevent evictions. Haley and Kantamneni recommend that governments should play a role in making retrofits attractive to tenants and landlords. The authors recommend that programs for rental retrofits include the following:

- foundational no-cost upgrades, with a significant portion offered at no cost to the tenant or landlord in order to maintain housing affordability. The report suggests financing solutions to pay for no-cost upgrades, such as on-bill payments, green leases, and energy service agreements.
- an "affordability covenant" that the landlord must sign as an agreement to maintain rental housing at an affordable level, share the benefits of energy cost savings with the tenant, protection from eviction, and other protections.
- early and robust engagement with tenants, respecting their rights to legal counsel, prior and informed consent to the retrofit, as well as to maintain residence and tenure.
- upholding tenants' right to information on energy performance of the house.

> **Recommendation:** Ensure that DER incentives and programs prioritize and are accessible to low-income households and renters, taking into consideration determinants of energy poverty, broader health and safety elements of housing, and tenants' rights and security.

3.4 Job Creation and Workforce Development

The labour intensity of building retrofits presents one of the greatest challenges and opportunities when it comes to transitioning Manitoba's buildings from fossil fuels. Although building retrofits are short term in nature, the volume of work required to meet 2050 net-zero targets will provide years of work. In a tight labour market, a workforce development strategy will be needed to meet this demand and ensure that workers are set up for long-term employment rather than short-term, low-paid work.

The Employment Potential of Building Retrofits

An ambitious building retrofit program has the potential to generate a large number of well-paying jobs that could significantly offset the costs of public investment. Meta-analysis of the employment generating potential of low-carbon technologies found that "gross jobs per USD million invested are found to be highest on average for wind power and building energy efficiency interventions, across 14 studies in which this metric was identified" (Hanna et al., 2024, p. 145). Across these 14 studies, an average of 20 jobs were created per USD 1 million.

As noted previously, research indicates that an CAD 800 million annual investment in building retrofits in Manitoba would create 7,100 annual "job years" (Kennedy & Frappé-Sénéclauze, 2023). An analysis from the consultancy Delphi Group finds that to meet 2030 and 2050 emissions targets, Manitoba must retrofit 26 million m^2 of building space, requiring 77,000 person years of employment (2,750 per year between 2022 and 2050) (Delphi Group, 2022).[8] Similar figures on building retrofits and labour demand have been found in Europe (Mella & Werna, 2023). While these figures are daunting, 2.3% of the Canadian workforce already works in sectors that are directly related to energy-efficient building retrofits, creating a large base for future expansion (Eco Canada, 2019).

While this demand for work presents an opportunity to create good jobs, meeting this demand will require an expansion of the existing construction labour force, spotlighting the need for broader workforce development strategies than are currently present. BuildForce Canada projects that 9,100 workers, or about 20% of Manitoba's construction workforce, are likely to retire by 2033, potentially creating skill shortages (BuildForce Canada, 2024). Based on forecast trends of construction demand, workforce development, and retirements, BuildForce projects a shortfall of 2,900 workers by 2033, meaning Manitoba already needs to ramp up workforce development just to meet a business-as-usual scenario. Between 2013 and 2020, new registrants and completions in construction-related trade apprenticeship programs declined precipitously, recovering somewhat over the last 2 years (BuildForce Canada, 2024, p. 17). To scale up residential retrofits without taking much-needed workers from other sectors of the construction sector, hundreds more skilled tradespeople will need to be trained in Manitoba annually over the next decade. This will require significant investments in training and apprenticeship programs, as well as policy to bring underrepresented workers into the construction workforce (see more on this below). Newcomers have been underrepresented in the construction sector in Manitoba over the last few decades (see more on this below): attracting immigrants with trades skills and ensuring newcomers can access construction training programs funded by federal training dollars are two areas that should be a priority.

Finally, building retrofits require professionals to guide building owners through the planning, auditing, and execution of building retrofits, including performing energy audits and accessing programs available through Efficiency Manitoba (see more of the "concierge" concept in Section 3.5). The need for professionals with knowledge of the sector to perform these services provides an opportunity to expand retraining programs for workers leaving the on-site construction side of the business as they age or find themselves unable to perform physical work full-time.

> **Recommendation:** Public investments in energy-efficient building retrofits should be paired with training and workforce development funding to ensure enough skilled workers are trained to meet demand.

[8] This study covered only industrial, commercial, institutional, and large-scale residential buildings.

Ensuring Decent Work in DERs

Manitoba labour experts have noted that the jobs created during building retrofits tend to be concentrated in construction, design, and manufacturing. Amongst building trades, demand for heating, ventilation, and air conditioning trades, contractors, electricians, carpenters, and glaziers will be especially elevated (Delphi Group, 2022). Historically, average wages in these occupations have been above the national median wage (Kennedy & Frappé-Sénéclauze, 2021), providing an attractive mix of good wages and lower barriers to entry than occupations requiring a university degree. Most occupations in energy retrofit work require some trades training or a trades diploma, and it is possible to integrate much of the work specific to energy-efficient building into existing trades curricula or teach it on the job (Bowen et al., 2018). The on-site nature of design, construction, and installation means the proportion of employment that is local tends to be higher than for other forms of low-carbon energy development.

Though average wages in the trades have tended to be above the median, this cannot be taken as a given. Some of the trades and building sector experts we spoke with expressed concern around the use of short-term training programs to stream people into construction work, but with few opportunities for skill development. This has left workers stuck in low-skill, low-wage positions.

To ensure that investments in energy-efficient building retrofits create high-quality, long-term employment, an emphasis should be placed on skilled trades development. This can be done through expanding spaces for apprenticeships, trades training programs, and working with building trades unions on training. Further, the ministry responsible for workforce development should work with trades training institutions to integrate energy-efficient building retrofit training into current curricula. This ensures that once demand for building retrofit work winds down, workers will be able to transition into other jobs in the skilled trades.

> **Recommendation:** Workforce development and training programs supporting energy-efficient building retrofits should focus on creating avenues for worker upskilling. This should include an expansion of apprenticeships.

> **Recommendation:** Work with unions and trades institutes to integrate energy-efficient building skills into existing curricula and training modules.

Advancing Equity in the Workforce

The underrepresentation of women, Indigenous People, and newcomers in the construction industry has long been identified as an issue (BuildForce Canada, 2024; Kennedy & Frappé-Sénéclauze, 2021). In Manitoba, women make up about 13% of the construction labour force as a whole and just 5% of on-site tradespeople. Indigenous People make up 17% of the provincial construction labour force, below the share of Indigenous People in Manitoba (18%) but above Indigenous representation across all industries (12%). Immigrants, meanwhile, made up 16%

of Manitoba's construction labour force while representing 24% of the labour force across all industries (BuildForce Canada, 2024).

Underrepresentation of women, Indigenous People, and newcomers in the construction industry is not only an issue from an equity standpoint but creates a barrier to the continued expansion of the construction labour force. Indigenous Manitobans and newcomers are two of the fastest-growing demographic groups in the province, a trend that is only forecast to accelerate over the next decade. If the construction and retrofit industry wants to expand sufficiently to meet retrofit demand, addressing workforce equity should be a priority.

From a policy perspective, Manitoba should look to engage the province's well-developed workforce integration social enterprise ecosystem to grow the provincial construction labour force. Social enterprises such as BUILD, Purpose Construction, Purpose Homes, and BNRC Construction (formerly BEEP) help workers with multiple barriers to employment gain training and experience through construction work. Many of these social enterprises already have experience with green building projects in Manitoba (Bernas, 2013; Fernandez, 2015). A lack of stable funding for the training programs these social enterprises offer has been noted as a primary limitation to expanding these organizations. One interviewee from BUILD construction reported that last year, the social enterprise received 800 applications for its 25 apprenticeship positions. This anecdote makes clear the huge potential for social enterprises to expand the construction labour force.

Further, Manitoba should engage with First Nations to develop training and development programs in the north and on reserves. These investments in training both have the potential to build local labour forces for construction and retrofits in rural and remote communities while also creating local economic development. The Atoskiwin Training and Employment Centre at Nischawayasihk First Nation has been successful in building a construction labour force on reserve with the potential to meet local housing construction needs while also servicing other communities in northern Manitoba (Deane, 2020). Expanding this model requires long-term investment in training facilities and programming at First Nations. Further, collaboration needs to be fostered between trade unions, First Nations, and training institutes to help workers from these programs gain skilled trades apprenticeships (Linklater, 2024). Collaboration between Indigenous communities and the International Union of Operating Engineers, Local 793 in Ontario could provide important lessons in this regard (Fernandes, 2024).

Policies and investments to meet the unprecedented challenge of the energy transition provide an opportunity to address social inequalities if designed intentionally to do so. On the other hand, policies that do not include social considerations risk worsening inequality. For example, research has found that workforce support programs introduced during the coal transition primarily benefited white, Canadian-born male coal workers and did not sufficiently support the largely racialized workforce of supporting sectors that were indirectly impacted (Mertins-Kirkwood & Deshpande, 2019). Energy-efficient building retrofits present a significant opportunity to reduce existing labour market inequalities.

Recommendation: Stabilize and increase workforce training funding for workforce integration social enterprises and other organizations who work alongside low-income communities, individuals who face barriers to employment, Indigenous organizations, and newcomer-serving organizations.

Recommendation: Use social procurement practices on publicly funded retrofit projects to expand opportunities for underrepresented workers, including tools such as community benefits agreements, workforce hiring targets, and/or set asides for social enterprises.

Recommendation: Collaborate with First Nations and make long-term funding available for training and workforce development programs on reserves and in northern communities.

3.5 Fostering Stakeholder and Institutional Support for DERs

Another consideration for developing a widespread and successful DER industry in Manitoba is ensuring that stakeholders—residents and building owners, and relevant institutions—are engaged in the process.

Public Education and Buy-in

There is a lack of awareness of the benefits and available incentives for DERs and efficiency among homeowners. Efficiency Manitoba has a central role to play in public education on energy efficiency in Manitoba. Part of the challenge is illustrating the value of efficiency and retrofits, given common societal preferences for new buildings. Since energy-efficiency retrofits do not inherently provide aesthetic or visual improvements, there is a need to improve energy literacy among stakeholders so that the less visible benefits are understood. These include potential substantial improvements to indoor air quality, with important health ramifications. In order for a large-scale DER program to be successful and sustained over time, significant public support must be developed. Mandatory energy labelling is one tool that could support consumer awareness, but a larger public campaign should accompany this.

Even where consumer knowledge and desire to improve energy efficiency exist, the current landscape of financing, incentives, regulations, and technical information is incredibly complex and difficult to navigate. Information and support need to be streamlined into a single point of contact for homeowners interested in pursuing a DER. A concierge system that would help people navigate the various processes, programs, and expertise needed to pursue a DER would be very valuable. Creating standardized approaches for different archetypes of housing in Manitoba would also support a more streamlined process for building owners and residents.

Another challenge is a lack of public trust in the construction sector and the need for accountability. Efficiency Manitoba's program to have a list of preferred suppliers that they recommend is a valuable tool, and it could be accompanied by a system to report any misconduct by companies. Another way to ensure private sector accountability is through mandatory energy assessments and labelling, using EnerGuide scores to ensure compliance with buildings codes and a certain level of efficiency.

> **Recommendation:** Develop a concierge system to serve as a "one-stop shop" for consumers to access information, supports, and financing for DERs.

Developing the Capacity in Key Institutions

Efficiency Manitoba is a key institution for supporting energy efficiency in Manitoba. It has a mandate to reduce electricity and natural gas load used in Manitoba year over year, but that does not specifically include emissions reductions. An updated mandate in March of 2024 included some promising initiatives but did not include emissions reductions (Government of Manitoba, 2024b). The resources available to Efficiency Manitoba to provide funding, undertake public education, and develop programming would need to be scaled up significantly as part of a DER investment. There also needs to be more flexibility to allow Efficiency Manitoba to run DER programs that are not financially self-sustaining. For instance, since natural gas in residential buildings is taxed at a lower rate than electricity, switching off natural gas may not appear to be economical, even though it is essential. Incorporating other indicators of benefits beyond cost savings would allow wider DER support.

In coordination with a Manitoba Green Bank, Efficiency Manitoba could play a central role in raising awareness and understanding of a PACE program and developing and hosting a concierge system that could serve as a "one-stop shop" for consumers. The organization could also continue to play a key role in developing indicators, tracking progress on energy savings, and ensuring accountability for retrofit investments.

Manitoba Hydro, the provincial crown corporation responsible for energy in the province, also has an important role to play in advancing the energy transition. An ambitious push to achieve our climate targets by decarbonizing the buildings sector represents an opportunity for Manitoba Hydro to realize its full potential as a public energy provider. In particular, Manitoba Hydro will play a key role in expanding renewable electricity generating capacity to support household fuel switching and transitioning from natural gas heating, to be paired with building DERs. While Manitoba Hydro has been effective at generating renewable energy through 15 hydro dams across the province, it will need to expand into alternative technologies, such as wind and solar. Manitoba could draw lessons from other provincial crown corporations, such as Hydro Quebec, that have invested heavily in diversifying their energy supply. The organization could also take on exploring the potential for demand-side energy savings provided by GSHP technology. Alternatively, some have proposed the establishment of a new geothermal utility in Manitoba

to facilitate the mass installation of GSHP in the province (Climate Action Team, 2023). Many of these ideas could be embraced as an alternative to relying on natural gas electricity generation, as suggested in Hydro's recent Integrated Resource Plan proposal (Manitoba Hydro, 2023). Manitoba Hydro used the most natural gas on record in 2023 due to drought conditions that significantly decreased hydroelectric production. Increased electricity demand from decarbonization and continued drought conditions are anticipated to increase pressure on Manitoba's grid into the future (Rutgers, 2024). While the Integrated Resource Plan leaves the potential for new natural gas power generation on the table, Manitoba Hydro should chart a path in line with net-zero, including no new fossil fuel generation and a timeline for phasing out fossil fuels on the grid. As the sole provincial utility, Manitoba Hydro is in a unique position to lead innovative approaches to decarbonization in a changing energy landscape.

Colleges and universities also have a role to play in scaling up training programs and bringing energy efficiency into existing programs for trades and related professions. Manitoba's Red River College currently hosts the Building Efficiency Technology Access Centre, which supports building technology innovation and research (Red River College, 2024). There is currently a low value placed on climate awareness and the importance of energy efficiency for tradespeople, architects, and engineers. As a result, the imperative emissions reductions through energy efficiency have not been embraced by the mainstream of the construction industry. One challenge for education and training institutions is the uncertain future landscape for jobs in their area. Sudden cuts to EnerGuide inspector positions over the past decade, for example, have had a negative impact on the industry as they impede the development of a robust retrofit industry. Educational institutions may be reluctant to invest in training programs when the job market is destabilized by insecure funding.

> **Recommendation:** Engage Efficiency Manitoba and Manitoba Hydro to support DERs and fuel switching at scale by expanding their mandates to cover DERs and GHG emissions reductions, better resourcing DER programming and education, and exploring opportunities for wind, solar, and geothermal energy generation.

Strong Governance for Green Buildings Oversight

Manitoba buildings sector experts emphasized that it is critical to have a strong mandate for building decarbonization within and across government and relevant institutions. As detailed above, implementing DERs at the scale required to meet emissions targets requires comprehensive policy change and creation, and substantial public investment. To ensure success and coordination among these components, sufficient buy-in and resourcing within the Government of Manitoba and the City of Winnipeg are essential.

Internal government education and support are particularly important in the context of procurement policy, given that the buildings sector intersects with many government departments. Priorities related to low-carbon buildings need to be mandated across government

and associated with deliverables and performance indicators. There should also be mechanisms for accountability, ideally including a body close to central government that provides oversight and ensures that targets and regulations related to sustainable buildings are met.

> **Recommendation:** Develop buy-in for green buildings and DER policies across government and relevant institutions, and consider creating a central oversight body for tracking progress and ensuring accountability.

Box 7. Case study: The City of Toronto's approach to DERs

Toronto City Council's 2021 Climate Action Strategy outlines nine key policy actions that the City will take to accelerate the uptake of retrofits by home and building owners while maximizing potential benefits and minimizing potential harms to building owners and tenants (City of Toronto, 2022). A Climate Advisory Group was created to provide advice, facilitate ongoing communication, mobilize all sectors and communities toward Toronto's climate strategy, and guide the strategy's implementation (City of Toronto, 2022). To implement the strategy, the City took a collaborative approach with building owners, labourers, and other levels of government. The City of Toronto required building owners to report and disclose their buildings' GHG emissions performance and to conduct energy and emissions audits to inform retrofit roadmaps aimed at net-zero emissions. It also established GHG performance targets for all buildings and played an active role in providing support to reduce the complexity associated with building retrofits by expanding enhanced retrofit financing for building owners and streamlined the permitting and approval process for deep retrofits.

4.0 Summary of Recommendations

Policy and Procurement

- provide low- or no-cost EnerGuide audits to increase understanding among households and governments about the best approach to balancing efficiency measures with electrification and increased generation at the household and aggregate levels;
- leverage publicly owned housing stock or Indigenous-owned housing stock to create a DER procurement strategy;
- reinstate and expand the Manitoba Green Buildings Policy to include higher energy efficiency as well as a ban on the use of natural gas heating;
- immediately adopt at least Tier 3 building codes for residential buildings and expedite the adoption of a retrofit code by 2025, to reduce energy consumption, lower energy bills, and reduce future demand for public investment in retrofits. An improved building code should prohibit the use of natural gas heating systems, regardless of the tier;
- introduce mandatory energy labelling, perhaps through legislation to mandate labelling during home sales, to give prospective building owners information on GHG emissions and energy performance of a building and create market value for improved efficiency.

Capital and Financing

- capitalize and launch a Manitoba Green Bank to administer, on a significant scale, a low- or no-interest lending facility for DERs (and for other aspects of just and green transition in Manitoba);
- pass enabling legislation at the provincial level for PACE lending. PACE legislation should allow the province to enable PACE financing directly rather than require municipal approval. Promote R-PACE loans as a means of financing DER, including through the Manitoba Green Bank;
- ensure that DER incentives and programs prioritize and are accessible to low-income households and renters, taking into consideration determinants of energy poverty, broader health and safety elements of housing, and tenants' rights and security.

Jobs and Workforce Development

- public investments in energy-efficient building retrofits should be paired with training and workforce development funding to ensure enough skilled workers are trained to meet demand;
- workforce development and training programs supporting energy-efficient building retrofits should focus on creating avenues for worker upskilling. This should include an expansion of apprenticeships;

- work with unions and trades institutes to integrate energy-efficient building skills into existing curricula and training modules;
- stabilize and increase workforce training funding for workforce integration social enterprises and other organizations who work alongside low-income communities, individuals who face barriers to employment, Indigenous organizations, and newcomer-serving organizations;
- use social procurement practices on publicly funded retrofit projects to expand opportunities for underrepresented workers, including tools such as community benefits agreements, workforce hiring targets, and/or set asides for social enterprises;
- collaborate with First Nations and make long-term funding available for training and workforce development programs on reserves and in northern communities.

Stakeholder and Institutional Support

- develop a concierge system to serve as a "one-stop shop" for consumers to access information, supports, and financing for DERs;
- engage Efficiency Manitoba and Manitoba Hydro to support DERs and fuel switching at scale by expanding their mandates to cover DERs and GHG emissions reductions, better resourcing DER programming and education, and exploring opportunities for wind, solar, and geothermal;
- develop buy-in for green buildings and DER policies across government and relevant institutions and consider creating a central oversight body for tracking progress and ensuring accountability.

5.0 Conclusion

The scale of investment in DERs must be commensurate with the scale of the challenge of transitioning from fossil fuels. As increasingly urgent calls and alarms from the scientific community and international agencies attest, the time we had to deal with climate change through small, market-dependent, incremental change and tweaking marginal incentives is past, frittered away by the sowing of false uncertainty about climate change and political neglect. The old adage "go big or go home" seems apt, except for the fact that if we don't go big, many millions will be left without a home.

There are, of course, many aspects to the challenge of transitioning in a truly just way to a fossil-free economy, and here we have covered just one. Buildings represent such a significant share of energy consumption and basins of carbon sequestration that they warrant outsized attention in responding to the climate crisis. It is necessary to limit the amount of energy-generating capacity we'll need to build in order to cut natural gas out of the equation—a non-negotiable part of the transition to net zero. And it is strategic because retrofits are a massive potential economic and job-generating powerhouse. With smart design and financing, along with adequate ambition, Manitoba's public sector could incubate a DER industry that employs thousands of local workers in good jobs doing necessary work to help stave off climate catastrophe. Further, it could make housing more affordable by helping cut energy costs, upgrade the (often substandard) quality of public and Indigenous housing, and help Manitobans who have barriers to labour market participation find an on-ramp through training and apprenticeship.

The costs are high. An investment of CAD 1.2 billion dollars to capitalize a public bank is, for a provincial government the size of Manitoba's, not insubstantial. These costs must be assessed relative to the future costs of doing nothing and failing to meet our net-zero targets, and to the costs of alternative action, like meeting an unaltered increase in energy demand through renewable buildout and storage alone. On both of these comparisons, investment in energy efficiency fares very favourably. Further, this pool of capital will be replenished over time as loans are paid back. Manitoba can draw inspiration from examples of how DERs have been financed sustainably in other jurisdictions, through public financial institutions that would not only provide low- or no-interest loans for DERs but would develop knowledge and expertise about the process and integrate the various actors required to make DER work efficiently and effectively.

We have many of the foundational pieces in place in Manitoba to embark on a large-scale retrofit campaign that is accessible to all homeowners and provides benefits and protections for renters. Efficiency Manitoba and Manitoba Hydro are important assets that, with coordination and enhanced mandates, can mobilize their expertise and resources to help Manitoba transition our building stock away from fossil fuels. Lessons learned from previous and current programs and policies for green buildings standards, public procurement, and energy-efficiency incentives provide guidance for how to move forward with ambition and due care. The province has union and social enterprise training institutions to help get the workforce ready for the job. It also

has builders, architects, and engineers with expertise in the specifics of retrofitting Manitoba's housing stock. Some of these pieces need to be scaled up and tweaked so that they work in concert with one another.

What is most needed to build momentum is demand. The public sector has to step up to help generate and support that demand so that meaningful energy-efficiency improvements become desirable, straightforward, and affordable for everyone. Key to that effort are

- education for building owners, via tools like energy labelling and universally available energy audits;
- coordination, via creating a concierge public service to bring together auditing, financing, access to incentives and grant programs, and service providers;
- affordable, long-term financing through a public bank designed specifically for this purpose; and
- procurement policy aimed at providing a stable client for retrofit providers at large scale, by retrofitting public- and Indigenous-owned housing.

With an ambitious, well-coordinated effort to facilitate DERs at scale, Manitoba can tackle a large portion of regional GHG emissions, improve housing conditions, generate green jobs and industries, and become an international leader in energy efficiency.

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Appendix A. Existing Incentives for Building Energy Efficiency

Table A1. Federal incentives for residential energy efficiency

Title	Description
Canada's 2030 Emissions Reduction Plan	Canada's 2030 Emissions Reduction Plan aims to reduce energy costs to homes and buildings using a Canada Green Buildings Strategy, which helps to set out new policy, programs, and incentives to initiate a retrofit of existing building stock to achieve net-zero (Government of Canada, 2023c).
Green and Inclusive Community Buildings Program	The Green and Inclusive Community Buildings Program supports retrofits, upgrades, and repairs for existing public community buildings as well as the construction of new community buildings Canada (Government of Canada, 2023b).
Greener Neighbourhoods Pilot Program	The Greener Neighbourhoods Pilot Program focuses on adopting the EnergieSprong model to retrofit clusters of low-rise housing across Canada. This pilot program focuses on aggregating similar homes and buildings of an entire neighbourhood in an effort to boost demand for deep energy retrofit (DER) projects (Natural Resources Canada, 2023a).
Canada Greener Affordable Housing	The Canadian Mortgage and Housing Corporation's Canada Greener Affordable Housing program offers funding opportunities by providing forgivable loans and low-interest loans to help finance building retrofits aimed at deep reductions in energy consumption. The funding is focused on public housing organizations such as non-profit housing organizations, public housing agencies, and rental co-operatives and excludes private market housing organizations (Canadian Mortgage and Housing Corporation, 2023).
The Canada Greener Homes Grant	The Canada Greener Homes Grant is the most widely known federal subsidy for residential building retrofits. The program was launched in 2021 as an initiative for private homeowners to retrofit their homes and was paired with EnerGuide, Canada's energy efficiency rating system (Natural Resources Canada, 2024a). The homeowner pays for a pre- and post-retrofit EnerGuide evaluation to demonstrate retrofit effectiveness (Natural Resources Canada, 2024a).
Canada Greener Homes Affordability Program	Announced in 2024, the Canada Greener Homes Affordability Program will replace the sunsetting Canada Greener Homes Grant. It was funded for CAD 800 million over 5 years, starting in 2025–26, to support retrofits for low- to median-income households, available to renters or homeowners. This funding is designed to be more targeted to low-income households than the Greener Homes Grant.

Source: Authors.

Table A2. Provincial incentives for residential energy efficiency

Organization	Title	Description
Efficiency Manitoba	Home Energy Retrofits	Efficiency Manitoba's residential DER program leverages EnerGuide audits to reimburse DER projects for homeowners. To receive support, projects must be doing multiple upgrades at once, not only windows or insulation for instance, and they require that at least 50% of the estimated energy savings of the project be derived from building envelope components. The programs pays based on results: CAD 75 per gigajoule up to the reference house, and CAD 150 per gJ beyond the reference house (Efficiency Manitoba, 2024a).
Efficiency Manitoba	Various programs	Additional building energy efficiency programs offered by Efficiency Manitoba include the Home Insulation Rebate, Energy Efficiency Assistance program, Métis Energy Efficiency program (Efficiency Manitoba, 2024b).
Manitoba Hydro	Home Energy Efficiency Loan	Manitoba Hydro supports DERs by offering utility loans and credits. The Home Energy Efficiency Loan is applicable for homeowners and band-owned homes with approved credit ratings (Manitoba Hydro, 2024). This option offers no down payment for energy retrofits and 7.1% annual interest rate for a maximum of 5 years or up to 15 years for qualified technologies (Manitoba Hydro, 2024).
Manitoba Finance	Manitoba Finance Green Energy Equipment Tax Credit program	Another option for Manitobans who have implemented energy retrofitting in their buildings is the Manitoba Finance Green Energy Equipment Tax Credit program. This program provides tax credits to those who install a geothermal heat pump system. The tax credit program includes a 7.5% tax credit on Manitoba manufactured geothermal heat pumps for buildings in Manitoba and a 15% tax credit on the remainder of the capital costs of the geothermal system, not including the heat pump, if the workmanship is certified by the Manitoba Geothermal Energy Alliance, Inc. (Government of Manitoba, 2024a).

Source: Authors.

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