

Affordable Home Energy for All

How Alberta can help its most
vulnerable households escape
energy poverty

January
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revised February 2025

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The Pembina Institute recognizes that the work we steward and those we serve span the lands of many Indigenous Peoples. We respectfully acknowledge that our organization is headquartered in the traditional territories of Treaty 7, comprising the Blackfoot Confederacy (Siksika, Piikani and Kainai Nations); the Stoney Nakoda Nations (Goodstoney, Chiniki and Bearspaw First Nations); and the Tsuut'ina Nation. These lands are also home to the Otipemisiwak Métis Government (Districts 5 and 6).

These acknowledgements are part of the start of a journey of several generations. We share them in the spirit of truth, justice and reconciliation, and to contribute to a more equitable and inclusive future for all.

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1. Introduction

As cost-of-living and affordability concerns continue to rise across Canada, there is a growing understanding of the impact of energy costs on households. Although this impact varies across provinces and territories, a significant portion of Canadians struggle to meet their energy needs and are experiencing energy poverty.

Energy poverty describes the financial struggle or inability of households to heat and cool their homes and to power their appliances. For this report, we use the measure established by the Canadian Urban Sustainability Practitioners (CUSP), which considers households spending 6% or more of their income on energy needs as experiencing energy poverty.¹ Up to 20% of Canadians are experiencing energy poverty,² including 16% of Alberta households or more than 230,000 homes.³ These households often have lower income levels and poorer quality housing.

The terminology used to describe the challenges with access to and affordability of household energy is often mistakenly used interchangeably or not clearly understood. Energy poverty is a condition resulting from numerous interconnected factors while energy affordability is the ability to pay energy costs.

In April 2024, the Pembina Institute published the report *Better Buildings for All* emphasizing the level of investment required to address energy poverty through deep retrofits and home energy efficiency. We modelled the cost of providing deep retrofits and heat pumps to low-income households facing energy poverty — i.e., those who would face the greatest challenge in paying for retrofits. At a national level, this equated to \$2.8 billion per year from 2025 to 2050.⁴ In this report, we apply that same model solely to Alberta households and explore province-specific needs and barriers to improving energy affordability, as well as opportunities to prioritize the households most in need.

¹ Canadian Urban Sustainability Practitioners, “The Many Faces of Energy Poverty in Canada.” <https://energypoverty.ca/>

² M. Riva et al., “Energy poverty: an overlooked determinant of health and climate resilience in Canada,” *Canadian Journal of Public Health* 114 (2023), 422–431. <https://doi.org/10.17269/s41997-023-00741-0>

³ Efficiency Canada, “Energy Poverty in Canada.” <https://www.efficiencycanada.org/energy-poverty-in-canada/>

⁴ Jessica McIlroy, Betsy Agar and Emma Harris. *Better Buildings for All: Relieving energy poverty through deep retrofits* (Pembina Institute, 2024). <https://www.pembina.org/reports/better-buildings-for-all-corrected.pdf>

Investment in retrofits by Alberta is essential for lifting low-income households out of energy poverty, tackling rising energy costs, and making homes safer and healthier to live in as climate impacts worsen. Shifting government and utility expenditures from short-term energy relief measures to comprehensive home upgrades can provide long-term economic, environmental, and health benefits, especially for low-income households facing energy poverty.

2. Factors contributing to energy poverty

2.1 Household demographics

While there is no singular cause of energy poverty, it is generally understood to be the result of a combination of household income, utility costs, and housing conditions (such as energy efficiency levels and quality of construction and maintenance). Internal household factors such as occupant demographics, needs and behaviours also affect the relative burden of energy costs compared to household income.⁵ Research shows that those who struggle with higher energy costs often also face greater health issues and struggle to secure stable and affordable housing. In addition, they are more likely to be unable to pay for the retrofits needed for more efficient heating and cooling.

Newcomers to Canada, seniors, single-parent households and renters are all more susceptible to struggles with energy affordability.⁶ Canada lags behind other jurisdictions in collecting data on the number of households experiencing energy poverty, but demographic data on households and populations can help us identify those who are most vulnerable to it. For example, Statistics Canada 2021 census data show that about 15% of Albertans are 65 or older, 21% have a mother tongue other than English or French, and 28% of households rent.⁷

2.2 Building quality

Energy poverty can be compounded by a building's condition and quality, which are affected by the building vintage (i.e., the code or performance standard it was built to meet) and age, and the age and efficiency levels of space and water heating equipment and household appliances.

Newly constructed buildings are required to meet codes and standards that reside outside of the residents' control and result in improved efficiency and performance levels. Improving the

⁵ Mylene Riva, Sophie Kingunza Makasi, Philippe Dufresne, Kimberley O'Sullivan, Megan Toth, "Energy poverty in Canada: Prevalence, social and spatial distribution, and implications for research and policy," *Energy Research & Social Science*, 81 (2021), 102237. <https://doi.org/10.1016/j.erss.2021.102237>

⁶ Abhilash Kantamneni, Brendan Haley, and Laura Tozer, *Efficiency+: Policy Recommendations for Making Energy Poverty Initiatives Work for Those Most in Need* (Efficiency Canada, 2024). <https://www.efficiencycanada.org/wp-content/uploads/2024/05/Efficiency-Policy-Recommendations-for-Making-Energy-Poverty-Initiatives-Work-for-those-Most-in-Need.pdf>

⁷ Statistics Canada, "Census Profile, 2021 Census of Population." <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E>

quality of existing buildings is more challenging and costly, requiring direct action by homeowners or building owners. Residents or tenants who do not own their own homes often face increased challenges in addressing retrofits.

Building codes are updated to increase energy efficiency and enhance performance requirements and construction practices over time. Alberta automatically adopts updates to the national building codes within 12 months of their release.⁸ The province's most recent update came into effect on May 1, 2024, bringing Alberta's building codes into alignment with Tier 1 (of 5) of the 2020 National Building Code.⁹ By adopting the lowest allowable building code (Tier 1), however, Alberta is continuing the problem of low-quality buildings that are expensive to operate, more vulnerable to extreme weather damage, and will require deep retrofits in the future.

Equipment efficiency is regulated by the federal *Energy Efficiency Act*, which sets standards for all regulated equipment imported into Canada or shipped across provincial and territorial borders for sale or lease.¹⁰ Some provinces set energy efficiency standards that regulate efficiency of equipment sold within their borders. Alberta introduced an energy efficiency act in 2016,¹¹ which established Energy Efficiency Alberta with the intention of increasing the awareness and development of efficiency practices and services, however, it was repealed in 2020.¹² As with building codes, the efficiency of equipment and appliances has increased over time through technical improvements and market advancement.

The performance of buildings and equipment declines with age, making poor performing homes increasingly costly to heat and cool over time. Alberta currently has no performance or efficiency standards for existing buildings or space heating and cooling.

⁸ BILD Alberta, "The National Building Code - 2023 Alberta Edition." <https://bildalberta.ca/building-codes/>

⁹ Kevin Lockhart, "Provincial and Territorial Tiered Energy Code Adoption Landscape," *Efficiency Canada*, April 23, 2024. <https://www.efficiencycanada.org/better-building-codes-2/>

¹⁰ Natural Resources Canada, "Guide to Canada's Energy Efficiency Regulations." <https://natural-resources.canada.ca/energy-efficiency/energy-efficiency-regulations/guide-canadas-energy-efficiency-regulations/6861>

¹¹ Government of Alberta, *Energy Efficiency Alberta Act*, SA 2016, c E-9.7. *Energy Efficiency Alberta Act*. Available at <https://www.canlii.org/en/ab/laws/stat/sa-2016-c-e-9.7/latest/sa-2016-c-e-9.7.html>

¹² Government of Alberta, "Implementing red tape reduction." <https://www.alberta.ca/implementing-red-tape-reduction>

2.3 Energy market

The range of household energy sources and supply contracts creates challenges in determining who is struggling to pay for energy and to what extent. Furthermore, the nature of energy as a commodity, along with the rate structure, can greatly impact household energy costs and affordability, especially for vulnerable Albertans.

One of the most significant determinants of household energy bills is the cost of energy supplied to the home, which varies with the local utility rate. Most homes in Alberta have appliances, lighting and cooling equipment that is electrically powered, and 82% are heated using natural gas.¹³ The energy market in Alberta is deregulated, making it unique in Canada, with electricity and natural gas providers prices determined through a regulatory process and competitive retailers selling energy to customers based on real-time pricing markets.¹⁴ This energy market structure allows households to choose their energy provider through service contracts and to choose between a variable or fixed energy rate. This leads to a wide range of home energy providers, billing structures and contract options, making it time consuming and complex to navigate all the choices.

Fixed-rate service contracts offer stability and predictability. However, getting access to a low fixed rate can depend on a household's credit rating. Households with poor credit ratings often do not qualify for fixed rates, resulting in energy bills subject to the greater fluctuations and cost spikes experienced with variable contracts. These households already experiencing income or affordability challenges are further burdened by energy costs.

Alberta households that are unable to secure a fixed-rate contract or successfully select a competitive electricity retailer are given a default rate. This rate is known as the Regulated Rate Option (RRO). On January 1, 2025, it will be renamed the Rate of Last Resort (ROLR), which is intended to simplify the retail energy market and contract process for customers.¹⁵ The ROLR will be the default fixed energy rate set by the Alberta Utility Commission (AUC) and can be increased by no more than 10% every two years, regardless of the commodity price.

¹³ Statistics Canada, "The heat is on: How Canadians heat their home during the winter," *StatsCAN Plus*, January 13, 2023. <https://www.statcan.gc.ca/01/en/plus/2717-heat-how-canadians-heat-their-home-during-winter>

¹⁴ Utilities Consumer Advocate, "How Wholesale Electricity Pricing Works." <https://ucahelps.alberta.ca/electricity-market-pricing.aspx>

¹⁵ Government of Alberta, "Making utility bills more affordable." <https://www.alberta.ca/making-utility-bills-more-affordable>

3. Tools to improve energy affordability

3.1 Retrofit funding programs

Government and utility programs' ability to directly address energy poverty have been limited, in part due to the complexity of factors that could lead to energy poverty. General retrofit and home energy rebate programs provide financial supports that result in improved efficiency and decrease energy requirements, resulting in decreased energy costs. These programs most often require upfront payments that are reimbursed, a process that presents accessibility challenges for those facing financial struggles. While there are income-qualified retrofit and home energy upgrade granting programs in some provinces, targeting those who need greater financial assistance, they generally do not specifically target households experiencing energy poverty.

Retrofit programs provide rebates or loans to building owners and homeowners to (1) retrofit building envelopes to decrease demands for heating or cooling or (2) upgrade heating equipment with more efficient, low-carbon alternatives, such as heat pumps that also provide cooling. It should be noted that low income and supported housing has often been under invested in and therefore requires greater levels of upgrades and improvements.

Albertans can currently access federal government funding through low-cost loans available through the Canada Greener Homes Loan program. Non-market, multi-unit residential building owners can access retrofit supports through the Canada Mortgage and Housing Corporation's Greener Affordable Housing Fund. At the local government level, the Clean Energy Improvement Program helps alleviate upfront costs for energy efficiency and renewable energy upgrades by assigning payments to the property tax bill. Twenty-two Alberta municipalities are currently participating in the program.¹⁶ Rebate programs have been available for some city residents through programs such as the City of Medicine Hat's HAT Smart program¹⁷ and Edmonton's Home Energy Retrofit Accelerator (HERA).¹⁸ Local government home energy programs are often oversubscribed, which is partly due to municipalities having limited funding and the lack of top-up funding from other levels of government.

¹⁶ Alberta Municipalities, "A new way to pay for renovations that make a difference," *Clean Energy Improvement Program*. <https://ceip.abmunis.ca/>

¹⁷ Medicine Hat, "HAT Smart." <https://www.medicinehat.ca/en/home-property-and-utilities/hat-smart.aspx>

¹⁸ Edmonton, "Home Energy Retrofit Accelerator." https://www.edmonton.ca/programs_services/environmental/energuide-for-homes

The only program currently targeting energy affordability and upgrades to directly address energy poverty is the Home Upgrades Program (HUP), designed and delivered by the Kambo Energy Group and Alberta Ecotrust Foundation. The program is delivered in partnership with municipal governments, with financial support from the federal government and non-government funders.¹⁹ This includes the cities of Calgary and Edmonton who have strategies aiming to address inequity and affordability of household energy. HUP offers free energy upgrades to households in energy poverty living in detached houses, duplexes and town houses that were built before 1998.

At present, the Province of Alberta does not provide financial supports to homeowners and building owners for energy efficiency or adaptation measures.

3.2 Utility bill relief programs

To decrease the cost of energy bills, utilities can implement customer payment-relief and income-qualified support programs. These include providing bill rebates or grants, deferring bill payments or setting up payment plans.

In place from November 2022 to March 2024, the Alberta government's Affordability Action Plan established a package of relief measures to cut energy costs for households and businesses, including electricity and natural gas rebates for directly billed customers, as well as a deferred payment program during winter price spikes. To temporarily relieve costs, electricity rebates were automatically applied to the bills of eligible households between July 2022 and April 2023. To mitigate high price spikes during winter, the electricity deferred payment program capped the price per kilowatt hour that could be charged to customers, deferring the payment of any costs above that threshold over the following 21 months. The Natural Gas Rebate Program acts in a similar manner, with households receiving an automatic rebate on regulated natural gas bills if the rates exceed a set threshold.²⁰

While these programs do provide short-term financial relief to households, they are not a sustainable financial solution to addressing energy poverty and affordability, nor do they improve the quality of buildings and energy efficiency.

3.3 Demand-side management programs

Utilities across Canada and in other jurisdictions are investing in demand-side management (DSM) programs, recognizing that energy efficiency and shifting energy demand can provide a

¹⁹ Kambo Energy Group, "Home Upgrades Program." <https://www.homeupgradesprogram.ca/>

²⁰ Government of Alberta, "Natural Gas Program." <https://www.alberta.ca/natural-gas-rebate-program>

valuable resource to the utility system and offset costly investment in utility infrastructure. The primary benefit of DSM actions to the utility is increased system capacity created from energy conservation. DSM is the lowest cost resource with additional benefits related to load balancing, system reliability, and improved system flexibility. DSM programs help consumers to reduce their energy costs and give utilities additional tools to reduce infrastructure investments, which ensures asset optimization and long-term grid resiliency.

By adopting demand-side resources, participating customers can reduce household energy costs and utilities can keep rates lower than otherwise possible for all ratepayers. For example, DSM measures by Efficiency Nova Scotia in 2023 resulted in energy savings equivalent to 1.5 times the energy produced at one generating station.²¹ This lowered customer utility bills even in the face of rising energy costs. Alberta is currently one of the only jurisdictions in North America where energy efficiency and DSM measures are not included in the utility system. Clear policy and regulatory mandates that allow Alberta utilities to invest in DSM programs are needed to enable utilities to effectively manage the electricity needs of Albertans.

A provincial DSM policy unlocks consumer choice and sends pricing signals that prioritize efficiency, while reducing the costs of generation infrastructure investment. Without a policy directive, Alberta utilities will continue to be years behind in the implementation of the necessary technologies and programs to support electrification and emissions reduction, which are critical to achieving future economic prosperity for all Albertans.

3.4 Retrofit accelerators

Retrofit accelerators are initiatives or programs that have been emerging across Canada to speed up the process of retrofitting or upgrading buildings to improve their energy efficiency. They can assist in the following ways:

- Help governments to align regulations and incentives and to communicate the benefits of public investments.
- Help building owners to understand the value and benefits of retrofits, reducing owners' uncertainty, and aid owners in navigating any complexities in the retrofitting process.
- Pull together accessible and affordable financing by presenting a clear business case for investment.
- Create clear demand pathways to accelerate market development and scaling.

²¹ Efficiency One, *Annual Report 2023: Transforming the Way People Use Energy* (2024). <https://ens-efficiency-one-prod-offload-647701102377-ca-central-1.s3.ca-central-1.amazonaws.com/wp-content/uploads/2024/05/01153926/2023-Annual-Report.pdf>

The Pembina Institute launched a retrofit accelerator in 2021 — the collaborative B.C.-based Reframed Initiative, taking inspiration from the Netherlands-based Energiesprong market transformation program.²² Reframed brought together dozens of professionals in a design lab and asked them to reimagine retrofitting six buildings to substantially reduce energy use and carbon emissions, while also prioritizing non-energy-related benefits such as climate adaptation and resilience, and occupant health and well-being.²³

Natural Resources Canada (NRCan), building on the work of grassroots accelerators, launched the Deep Retrofit Accelerator Initiative to fund organizations that help owners of commercial, institutional or multi-unit residential buildings with “deep” retrofits (i.e., whole-building approaches).²⁴ NRCan has partnered with 13 organizations across the country to set up concierge services and assist with market research and capacity building to scale up building decarbonization, including Four Winds & Associates supporting Alberta’s Indigenous communities, and Alberta Ecotrust Foundation.

The Alberta Ecotrust Retrofit Accelerator officially launched on September 24, 2024, with the goal of reducing emissions, energy use and operating costs of multi-unit, commercial and institutional buildings, while making retrofits accessible. The program provides coaching services to building owners on how to make sustainable upgrades to their buildings and connects them with funding sources and service providers.²⁵

²² Energiesprong Global Alliance. *Energiesprong homepage*. <https://energiesprong.org/>

²³ Betsy Agar and Rajeev Kotha, *Reframed Initiative: Outcomes and analysis: A study of six best-in-class deep retrofit schematic designs* (Pembina Institute, 2024). <https://www.pembina.org/pub/reframed-initiative-outcomes-analysis>

²⁴ Government of Canada, “Deep Retrofit Accelerator Initiative,” June 24, 2024. <https://natural-resources.canada.ca/energy-efficiency/buildings/deep-retrofit-accelerator-initiative/24925>

²⁵ Alberta Ecotrust Foundation, “Alberta Ecotrust Retrofit Accelerator.” <https://albertaecotrust.com/initiatives/alberta-ecotrust-retrofit-accelerator>

4. Investment to improve energy affordability

Earlier this year we did research and modelling to understand the level of investment needed for deep retrofits of Canadian households that were low income and experiencing energy poverty in order to achieve net-zero emissions by 2050. The results were reported in *Better Buildings for All* and served as the foundation for the modelling discussed here.²⁶

Looking at the Alberta-specific findings, we find:

- An estimated 6% of low-income households are also experiencing energy poverty in Alberta (proportion calculation can be found in Appendix B of *Better Buildings for All*).
- The rate of 6% of households experiencing energy poverty was applied to all housing archetypes: single-family detached, single-family attached, and apartments, as categorized by Statistics Canada.
- Buildings constructed before 1996 were assigned deep retrofit measures plus space and hot water heat pumps.
- Buildings constructed after 1996 were given only space and hot water heat pumps.

The retrofit and equipment costs were estimates originally defined in our report *Canada's Renovation Wave* and are summarized in Table 1.²⁷

Table 1. Costs assigned in the retrofit model

Housing type	Deep retrofit	Heat pump (space)	Heat pump (domestic hot water)	Deep retrofit + heat pumps
Single-family detached dwelling	\$80,000	\$16,000	\$3,000	\$99,000
Single-family attached dwelling (e.g., townhouse)	\$80,000	\$16,000	\$3,000	\$99,000
Apartment (cost per unit)	\$90,000	\$16,000	\$3,000	\$109,000

²⁶ Jessica McIlroy, Betsy Agar and Emma Harris. *Better Buildings for All: Relieving energy poverty through deep retrofits* (Pembina Institute, 2024). <https://www.pembina.org/pub/better-buildings-all>

²⁷ Madi Kennedy and Tom-Pierre Frappé-Sénéclauze, *Canada's renovation wave: A plan for jobs and climate* (Pembina Institute, 2021). <https://www.pembina.org/pub/canadas-renovation-wave>

Our modelling revealed that an estimated \$5.3 billion is needed to provide deep retrofits to low-income households in Alberta that are also experiencing energy poverty. Rolled out over 25 years, this level of investment (\$212 million per year) is significantly higher than funds committed to date, and would increase GDP by \$850 million per year and add 42,000 job years, as summarized in Table 2.

Investing in retrofits could save households 6,600 TJ of energy per year and on average \$65 million in annual utility costs. In the short term, fuel-switching heating systems to electric heat pumps would nominally decrease carbon emissions, with reductions increasing over time as Alberta decarbonizes its electrical grid.

Table 2. Impacts from energy poverty deep retrofits

	Attached homes	Detached homes	Apartments
Average rate of retrofit (6% of building stock)	195/yr	1380/yr	410/yr
	Deep retrofit impacts		
Investment needed by 2050	\$5.3 billion		
Annual utility cost savings by 2050 ^a	\$65 million/yr		
Annual fuel savings by 2050	6,600 TJ/yr		
Annual change in electricity demand by 2050	1,070 TJ/yr increase		
Annual reductions in carbon emission by 2050	195 kt CO ₂ e/yr		
Average annual GDP growth ^b	\$850 million/yr		
Full-time jobs created by 2050 ^c	42,700 job years		

Notes:

^a Used default energy price of 2020\$/GJ for residential end use from Canada Energy Regulator, *Canada's Energy Future 2020* (<https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2020/index.html>). This price does not reflect the high rates that can affect low-income households, as described in section 2.3 of this report.

^b Used \$4 in GDP growth for every dollar spent based on 2018 modelling by Dunskey and the Center for Spatial Economics and referenced in Efficiency Canada, *Less is More* (2018). <https://www.efficiencycanada.org/less-is-more/>

^c Based on 8 jobs per million spent from BuildForce Canada, "Construction Key Indicators." <https://www.buildforce.ca/en/construction-key-indicators/>

5. Recommendations

Local and provincial governments and utilities in Alberta should take action to help its most vulnerable households escape energy poverty. Albertans, like many Canadians, have been experiencing high household energy costs and have concerns about the overall cost of living and climate-related extreme weather events. The quality of residential buildings is critical to addressing the intertwined crises of affordability, housing and the impacts of extreme weather.

The following are among the ways that improving building quality through retrofits can help:

- Energy efficiency saves Albertans and utilities money.
- Well-sealed and well-ventilated buildings protect indoor air quality, providing a healthy living environment.
- Well-insulated buildings protect Albertans from extreme heat and cold, especially during power outages.

Below we present our recommendations on how governments and utilities in the province can grow the retrofit economy and ensure Albertans have safe and healthy homes.

Prioritize reducing energy poverty

The Government of Alberta should determine the scale of energy poverty in the province and define actions to overcome it.

Recommendation 1: Collaborate with local governments to define energy poverty and collect the data needed to determine the number of households, including building types, that are facing energy poverty.

Recommendation 2: Develop a provincial strategy to reduce energy poverty in Alberta that includes timelines and targets and progress reporting.

Invest in a resilient Alberta

Retrofitting buildings is a once in a lifetime opportunity given the long equipment lifetimes and renewal cycles. Consequently, outcomes should be maximized during the process. Deep retrofits are an opportunity to tackle climate mitigation and adaptation, reduce energy costs, and make homes healthier and safer, all while growing the province's GDP and creating jobs. The Government of Alberta should consider the following recommendations in partnership with other levels of government and provincial utilities.

Recommendation 3: Establish a province-wide retrofit program with cross-cutting objectives on climate resilience, energy efficiency and energy affordability.

Recommendation 4: Build a robust, sustained fund for 100% publicly funded deep retrofits to lift households out of energy poverty and make their homes more resilient.

Recommendation 5: Leverage and invest in retrofit accelerators already helping Alberta's households.

Leverage a sophisticated industry

The Alberta building industry has the skill and sophistication to meet high-performance building standards. Provincial regulations and standards for existing buildings and equipment can accelerate market transformation.

Recommendation 6: Use regulatory and performance standards, such as alterations to existing buildings or retrofit codes, highest efficiency equipment standards, and standards of maintenance bylaws, to provide all Albertans with safe and resilient homes.

Get ahead of energy poverty

Utilities play a critical role in actions to prevent energy poverty and support home energy affordability. To have the greatest impact, provincial government and utility energy bill support efforts should shift from short-term relief to long-term actions.

Recommendation 7: Identify how to update utility rate structures to avoid energy poverty impacts.

Recommendation 8: Implement regulation to enable DSM to establish the governing framework for utility programs and actions that support customers in reducing energy use.



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