Making Net-Zero Retrofits Work For Energy-Poor Households

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About Efficiency Canada

Efficiency Canada is the national voice for an energy-efficient economy. Our mission is to create a sustainable environment and better life for all Canadians by making our country a global leader in energy efficiency policy, technology, and jobs. Efficiency Canada is housed at Carleton University's Sustainable Energy Research Centre, which is located on the traditional unceded territories of the Algonquin nation.

The views expressed, as well as any errors or omissions, are the sole responsibility of the authors.

Executive summary

Achieving net-zero emissions by 2050 is a cornerstone of Canada's climate strategy. With over two million households in Canada affected by energy poverty, retrofitting buildings for energy efficiency and adopting low-carbon energy solutions can simultaneously reduce greenhouse gas emissions and combat this issue.

Excluding energy-poor households from net-zero retrofitting programs may worsen existing inequalities, miss emissions reduction opportunities, and weaken public support for climate policies.

Aligning energy poverty alleviation, energy efficiency, and decarbonization goals can provide multiple benefits, including lower energy costs, better living conditions, and enhanced resilience to extreme weather. Without integration, these goals risk high upfront costs, missed cost savings, and unintended consequences such as rent increases or displacement.

These risks emphasize the importance of policies and retrofit programs prioritizing energy-poor households. Making retrofits affordable enhances quality of life and supports climate goals.

However, implementing net-zero retrofits for energy-poor households presents significant challenges, including high upfront costs, fragmented policies, workforce shortages, and limited access to data. These obstacles disproportionately affect vulnerable Canadians, particularly low-income households, seniors, renters, rural communities, and Indigenous groups.

This paper recommends the following actions to address these challenges and maximize opportunities:

- **Deliver no-cost retrofits to energy-poor households** to eliminate financial barriers and provide equitable access to energy efficiency.
- **Introduce flexible and innovative financing options** for middle-income households, such as on-bill financing and Property Assessed Clean Energy (PACE) programs.
- **Invest in disadvantaged and vulnerable communities** to address systemic inequities and improve housing and living conditions.
- **Establish a national definition of energy poverty** and consistent metrics to identify vulnerable households and monitor program effectiveness.

- **Align energy poverty reduction with national climate goals** to connect housing, energy, and health priorities with emissions reduction efforts.
- **Protect renters with strong tenant protections** to prevent rent hikes and ensure housing stability after retrofits.
- **Expand workforce training programs** to build local capacity, create sustainable jobs, and support retrofitting in rural and Indigenous communities.
- **Integrate non-energy benefits into retrofit programs** by funding pre-retrofit repairs and aligning energy efficiency with health and housing initiatives.
- **Establish a National Energy Poverty Advisory Hub** to collect energy poverty data, track progress, and offer clear recommendations for policymakers.

Résumé

L'atteinte de la carboneutralité d'ici 2050 constitue une pierre angulaire de la stratégie climatique canadienne. Plus de deux millions de ménages au Canada sont en situation de précarité énergétique. L'amélioration des bâtiments aux fins d'efficacité énergétique et l'adoption de solutions écoénergétiques à faible teneur en carbone peuvent donc à la fois réduire les émissions de gaz à effet de serre et améliorer la situation de ces ménages.

L'exclusion des ménages en situation de précarité énergétique des programmes carboneutres d'amélioration du rendement énergétique pourrait aggraver les inégalités actuelles, faire manquer des occasions de réduction des émissions et affaiblir le soutien public quant aux politiques climatiques.

L'harmonisation des objectifs de réduction de la précarité énergétique, d'efficacité énergétique et de décarbonisation peut procurer de multiples avantages, notamment des coûts énergétiques moins élevés, de meilleures conditions de vie et une résilience accrue aux conditions météorologiques extrêmes. Sans intégration, ces objectifs risquent d'entraîner des coûts initiaux élevés, des économies de coûts manquées et des conséquences imprévues comme une augmentation de loyer ou un déplacement.

Ces risques soulignent l'importance des politiques et des programmes d'amélioration du rendement énergétique qui accordent la priorité aux ménages en situation de précarité énergétique. Rendre les améliorations du rendement énergétique abordables améliore la qualité de vie et favorise l'atteinte des objectifs climatiques.

Cependant, la mise en œuvre d'améliorations carboneutres du rendement énergétique pour les ménages en situation de précarité énergétique présente des défis importants, notamment des coûts initiaux élevés, des politiques fragmentées, des pénuries de main-d'œuvre et un accès limité aux données. Ces obstacles touchent de façon disproportionnée les Canadiens vulnérables, en particulier les ménages à faible revenu, les personnes âgées, les locataires, les collectivités rurales et les groupes autochtones.

Le présent document recommande de prendre les mesures suivantes afin de relever ces défis et de profiter au maximum des possibilités :

- **Offrir des améliorations du rendement énergétique sans frais aux ménages en situation de précarité énergétique** en vue d'éliminer les obstacles financiers et de donner un accès équitable à l'efficacité énergétique.
- **Mettre en place des options souples et novatrices en matière de financement** pour les ménages à revenu moyen, comme le financement sur facture et les programmes d'énergie propre évaluée pour les propriétés.
- **Investir dans les collectivités défavorisées et vulnérables** pour remédier aux inégalités systémiques et améliorer les conditions de logement et de vie.
- **Établir une définition nationale de la précarité énergétique** et des paramètres uniformes en vue de déterminer les ménages vulnérables et de surveiller l'efficacité du programme.
- **Harmoniser la réduction de la précarité énergétique avec les objectifs climatiques nationaux** afin de coordonner les priorités en matière de logement, d'énergie et de santé et les efforts de réduction des émissions.
- **Protéger les locataires en leur offrant de solides protections** pour éviter les hausses de loyer et assurer la stabilité liée au logement après les améliorations du rendement énergétique.
- **Élargir les programmes de formation de la main-d'œuvre** en vue de renforcer les capacités locales, de créer des emplois durables et de soutenir les améliorations du rendement énergétique dans les collectivités rurales et autochtones.
- **Intégrer les avantages non énergétiques aux programmes d'amélioration du rendement énergétique** en finançant les réparations préalables aux améliorations et en harmonisant l'efficacité énergétique avec les initiatives de santé et de logement.
- **Établir un centre consultatif national sur la précarité énergétique** de façon à recueillir des données associées à la précarité énergétique, à suivre les progrès et à offrir des recommandations claires aux décideurs.

Introduction

Climate change poses an urgent global challenge, prompting nations to commit to ambitious emissions reduction targets. Canada has enshrined its commitment to achieve net-zero greenhouse gas emissions by 2050 through the Canadian Net-Zero Emissions Accountability Act, establishing a legally binding process to set national emissions-reduction targets and develop corresponding plans (Canada, 2021).

A key element of this transition is the decarbonization of the building sector. Energy retrofits are comprehensive upgrades that enhance energy efficiency in existing buildings. They are essential for reducing carbon emissions and meeting Canada's climate goals. Retrofitting older, energy-inefficient housing stock is particularly vital, as the residential sector accounts for 47 per cent of building sector emissions in Canada, excluding electricity (NRCan, 2024b).

A complementary challenge is addressing energy poverty, which affects two million Canadian households. It occurs when households lack sufficient energy to maintain well-being at home. This issue stems from low incomes, high energy costs, and poor-quality housing, such as inadequate insulation or leaky windows. Energy poverty often intersects with other challenges, including poor health, limited access to social services, and systemic inequality. Vulnerable groups include low-income households, rural communities, seniors, renters, newcomers, and Indigenous populations. Many live in older, inefficient homes that require more energy, increasing costs and deepening their hardship.

There are several ways to combat energy poverty, such as boosting household incomes through social policy, lowering energy prices through utility rate design, or providing households with fuel subsidies. However, these measures offer only temporary relief (Charlier, Legendre, and Risch, 2019).

Energy retrofits are a long-term solution, reducing bills and improving the health and well-being of households in need.

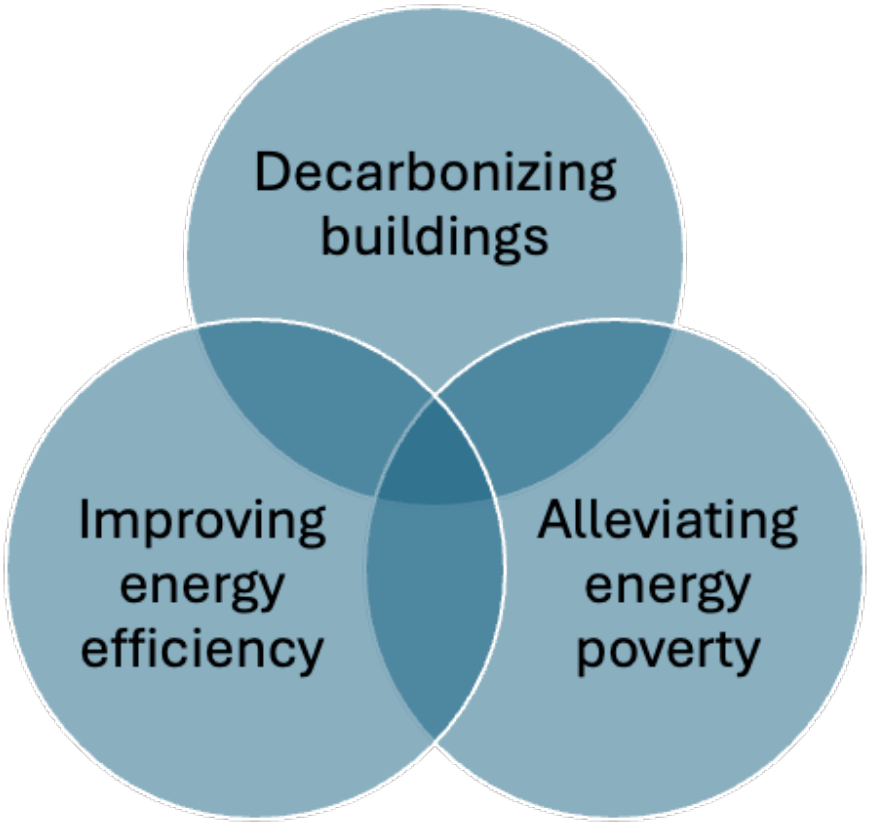

Figure 1. Synergies between anticipated outcomes of retrofits

In principle, there are synergies between the three anticipated outcomes of energy retrofits; decarbonizing buildings, improving energy efficiency, and alleviating energy poverty. Decarbonizing buildings involves transitioning to low-carbon technologies and renewable energy sources to reduce greenhouse gas emissions. Efficiency retrofits improve building performance by reducing energy consumption through upgrades like insulation, air sealing, and advanced HVAC systems, leading to cost savings and enhanced comfort. Reducing energy consumption in buildings helps free up electricity and grid capacity needed to decarbonize other challenging sectors such as transportation and industry. Measures to end energy poverty ensure that vulnerable households have equitable access to affordable energy, improving health and quality of life.

When these three goals are integrated, retrofits can provide comprehensive benefits, such as reducing emissions, lowering energy costs, and enhancing living conditions for those most in need, all while contributing to broader climate and equity objectives.

However, when these goals are not aligned, participating households may face significant risks. For instance, focusing solely on decarbonization without addressing

energy efficiency can leave poorly insulated homes susceptible to extreme weather and increased energy bills. Similarly, cost-effective efficiency retrofits that focus on shallow upgrades may fail to improve housing, health outcomes, or reduce emissions for energy-poor households. Finally, neglecting affordability and equity in retrofits risks deepening energy poverty and excluding vulnerable populations. Integrating these goals is key to avoiding financial strain and ensuring net-zero retrofits benefit all Canadians.

Methodology

This paper draws on a mixed-methods approach that combines a review of relevant academic and grey literature with insights gathered through discussions with practitioners actively coordinating net-zero retrofits to address energy poverty.

The literature review focused on academic studies and reports from other jurisdictions, including examples of energy poverty mitigation programs and retrofit initiatives. This review provided a foundation for understanding the broader context identifying key barriers, opportunities, and risks while highlighting best practices from existing programs.

In addition to the literature review, we engaged with practitioners at conferences and events, holding open discussions to gather real-world insights. These conversations focused on the synergies, opportunities, barriers, and risks participants faced in delivering retrofit programs. Practitioners included municipal climate professionals, energy efficiency program administrators, program delivery agents, community groups, and retrofit installers. Their firsthand experience provided valuable insights, highlighting the practical challenges and successes of aligning net-zero retrofits with energy poverty reduction.

This combination of literature review and practitioner engagement allowed us to integrate academic studies and program reviews from other jurisdictions with the practical experiences of Canadian practitioners. The findings and recommendations presented are evidence-based and grounded in real-world applicability in Canada.

Energy poverty, energy efficiency and net-zero retrofits: a converging challenge

Understanding energy poverty in the context of retrofits

Energy poverty, the inability to afford or access energy for basic needs, is a growing socio-economic issue in Canada and worldwide. It extends beyond affordability to include structural inequities like poor housing quality and limited access to energy-efficient technologies (Bouzarovski and Petrova, 2015; Das, Martiskainen, and Li, 2022).

Health, education, and economic participation often intersect with energy poverty, deepening its impacts (Middlemiss et al., 2018). For example:

- Households experiencing energy poverty are more susceptible to health risk factors such as excess winter and/or summer mortality if they live in low-quality housing (El Ansari and El-Silimy, 2008; Ormandy and Ezratty, 2012).
- Energy poverty is responsible for the increased risk of poor respiratory and cardiovascular health in individuals with pre-existing conditions (El Ansari and El-Silimy, 2008; Baudu, Charlier, and Legendre, 2020; Charlier and Legendre, 2022).
- Energy poverty is documented to create emotional distress, frustration, fear, and social isolation, particularly among renters (Middlemiss et al., 2018; Longhurst and Hargreaves, 2019).

Energy poverty also exacerbates underlying vulnerabilities, and experiences of energy poverty vary between households. For instance, underheated homes can lead to decreased mobility in seniors, increasing the risk of falls, which can lead to serious injuries or even fatalities (García-Esquinas et al., 2016). In rural Canada, households relying on unregulated fuels such as propane or fuel oil for heating are often at a greater risk of severe energy poverty (Bhanji et al., 2023). Unlike households using regulated utilities like electricity or natural gas, these families do not benefit from winter moratoriums, which prevent disconnections during cold weather. Without these protections, rural households are more vulnerable to interruptions in heating supply, particularly during the harsh winter months, exacerbating the financial and physical stress associated with energy poverty. These disparities highlight the need for targeted policies that address the unique challenges faced by different households.

The cost of inaction

Failing to include energy-poor households in net-zero retrofitting programs undermines Canada's progress towards net-zero targets and deepens socio-economic inequalities. Canada risks missing significant opportunities to reduce emissions if the two million households facing energy poverty are excluded from retrofitting programs.

Low-income households often reside in energy-inefficient homes, significantly contributing to residential greenhouse gas emissions. As households with the ability to pay for retrofits transition to clean energy, energy-poor households will bear the rising costs of maintaining outdated and expensive fossil fuel infrastructure (IEA, 2022). Equitable access to retrofits fulfills the principle of "leave no one behind." It ensures that Canada's climate action delivers private benefits — lower bills and better living conditions — alongside public benefits like decarbonization.

Policies that primarily benefit wealthier households while neglecting those in need may cause public backlash and reduce trust in climate initiatives (Patterson, 2023). Inclusive retrofitting is a practical necessity for achieving Canada's net-zero targets and fosters public support if it provides transformative benefits for our most vulnerable populations.

Canada can significantly reduce emissions, foster trust in climate policies and advance a fair energy transition by targeting energy-poor households with net-zero retrofits. However, implementing such targeted energy retrofits practically presents unique risks, challenges, and opportunities.

The opportunities

Well-designed comprehensive retrofits can improve energy efficiency, transition inefficient homes to low-carbon systems, and deliver multiple benefits for households and communities.

Improve quality of life, health and well-being

Efficient heating and cooling systems address thermal discomfort, reducing the risk of heat stress or cold-related illnesses (Middlemiss et al., 2023). Improved indoor temperatures due to retrofits have also reduced absences from school or work (Howden-Chapman et al., 2012; Thomson et al., 2013). More comfortable dwellings

increase usable space at home, allowing for greater privacy and improved social relationships (Grey et al., 2017).

Studies show that better home insulation improves self-reported health outcomes, such as decreased wheezing and lower reports of respiratory symptoms among children (Howden-Chapman et al., 2012). Systematic literature reviews prove that heating and improved ventilation were consistently associated with improved quality of life and well-being (Ige et al., 2019).

These findings are reinforced by insights from our key informants, who report similar outcomes in their post-retrofit surveys. Low-income retrofit program participants frequently emphasize the qualitative benefits of retrofits — such as increased comfort, satisfaction, and a renewed sense of pride in their homes — which resonate strongly with participants, though financial relief remains significant. This enhanced satisfaction builds trust in the effectiveness of retrofit programs and fosters a positive reputation for these initiatives. Satisfied participants are likelier to recommend these programs to friends, family, and neighbours, amplifying word-of-mouth outreach and encouraging greater community participation.

Improve housing and financial outcomes

Energy retrofits can lower heating bills, helping households save money while making homes more comfortable. More money in the pocket enables households to allocate resources more effectively, improving resilience to other stressors (Riva et al., 2023). Our data snapshots[1] demonstrate that nearly two-thirds of Canadian households facing energy poverty fall within the lowest after-tax income quintile. By enhancing energy efficiency and reducing energy bills, these households can experience meaningful financial relief, improving their capacity to manage other critical expenses.

Our data snapshot also shows that more than three million Canadian households dedicate a significant portion of their shelter costs solely to energy expenses, exacerbating the housing affordability crisis. Key informants highlight that in provinces such as Ontario[2] and British Columbia[3] unpaid utility bills can result in evictions, as they

[1] See Appendix – data snapshot.

[2] Landlords in ON requiring a tenant to pay money for unpaid utilities, may file an application to end a tenancy and evict the tenant (ONLTB 2021).

[3] Landlords in BC may treat unpaid utilities as unpaid rent and serve a 10-day Notice to End Tenancy (BCGOV 2022).

are treated similarly to unpaid rent. This shows that retrofits offer financial savings and improved housing affordability and stability for energy-poor households, mitigating the risk of eviction and fostering long-term security.

The risks

While net-zero retrofits hold the potential to address energy poverty, reduce energy use and advance climate goals simultaneously, energy-poor households participating in energy retrofit initiatives face considerable risks if these goals are not well integrated into program design.

Modest savings and benefits

A systemic review of residential retrofit program evaluation suggests that residential energy retrofits may deliver more modest energy and cost savings than anticipated by program designers (Giandomenico, Papineau, and Rivers, 2022). This is particularly salient for households experiencing energy poverty due to "prebound" and "rebound" effects (Vilches, Barrios Padura, and Molina Huelva, 2017).

The pre-bound effect occurs when households already self-ration energy use before retrofits, meaning improvements allow them to heat their homes adequately but do not lower energy usage. Similarly, the rebound effect happens when households use energy savings to increase consumption, such as heating more rooms or maintaining higher temperatures. This poses a significant financial risk for low-income households, as the high capital costs of retrofits may not translate into the expected financial savings, potentially leaving them with additional debt burdens.

Unintended consequences and displacement risks

A narrow focus on efficiency gains or emission reductions can have negative unintended consequences for energy-poor households. Energy-saving measures in airtight buildings and thermal insulation without installing mechanical ventilation can impair health. Energy efficiency retrofits without adequate consideration for ventilation can increase indoor radon, which can cause lung cancer (Wang, Wang, and Norbäck, 2022). Policies incentivizing fuel switching (e.g., transitioning from heating oil to electric heat pumps) without addressing affordability can leave energy-poor households susceptible to higher electricity costs. While these changes may reduce emissions, they could increase monthly energy expenses for already-stretched households.

Lower-income Canadians may be vulnerable to increased costs from grid-wide electrification without other policy interventions (Doler and Winter, 2022). In rental housing, the landlord's recovery of capital costs for retrofits can lead to rent increases or higher utility expenses for tenants, particularly in regions lacking robust tenant protection policies. Additionally, installing in-suite measures can disrupt tenants' daily lives and, in some cases, result in evictions if the retrofitting process is extensive, further exacerbating housing insecurity for renters (Kantamneni and Haley, 2023).

Key informants noted that retrofit programs often avoid engaging private landlords due to concerns about displacement risks and reputational harm. However, working with landlords and property managers of large buildings could help scale retrofits and meet program targets. Instead, efforts often focus on affordable and community housing providers, which are regulated to protect tenants, maintain stability, and prevent cost pass-throughs. This approach aligns retrofitting initiatives with broader equity goals.

Inclusion and exclusion errors

Eligibility criteria for energy retrofit programs may result in misalignments in program targeting, where resources either reach unintended beneficiaries (inclusion errors) or fail to reach those in need (exclusion errors). In retrofit programs, inclusion errors happen when non-energy-poor households qualify for rebates due to emission-focused and administratively simple designs. In rental housing with utilities included, landlords may receive funding and lower costs without passing savings to tenants.

Exclusion errors arise when energy-poor households are left out of programs, such as those who fail to meet narrowly defined eligibility criteria or are unaware of, unable to, or unwilling to enroll in programs they are eligible for. These errors undermine the effectiveness of programs by misallocating resources and leaving the most vulnerable unassisted.

In summary, the abovementioned risks underscore the need for policies and retrofit programs that prioritize the needs of energy-poor households to ensure retrofits achieve affordability, improved quality of life, and climate goals. Without interventions tailored to the needs of energy-poor households, Canada's transition to net zero risks excluding those who would benefit most from efficiency upgrades.

Barriers to aligning net-zero retrofits with energy poverty reduction

While net-zero retrofits hold the potential to address energy poverty and advance climate goals simultaneously, several systemic barriers impede their widespread adoption.

Economic and financial barriers

The up-front cost of retrofits represents a significant obstacle, particularly for energy-poor households already burdened by high energy costs (Schleich, 2019; Riva et al., 2023). This barrier is further exacerbated by factors such as:

Limited access to financing

While federal and provincial programs like the Canada Greener Homes Initiative offer subsidies to homeowners, these programs often require co-payments or pre-financing that exclude the most vulnerable. Low-income homeowners can be unwilling to go further into debt to access energy-efficient upgrades (Middlemiss et al., 2018). For senior-led households, borrowing more debt means financial vulnerability, delayed retirements, and reduced well-being (Uppal, 2019).

Vulnerable households, such as those with disabilities, long-term illnesses, or single parents, may struggle to work more hours or supplement their income to pay off debt. Many newcomers have difficulty accessing credit and loans because their credit history may not be recognized in Canada (Government of Canada, 2023). Some cultural beliefs, such as certain religions prohibiting receiving money or paying interest, can also pose challenges for newcomers to accessing financing to retrofit their homes (Prosper Canada, 2015).

Current retrofit funding mechanisms often rely on short-term grants or pilot programs. These stop-and-start initiatives fail to provide the stability needed for sustained, large-scale retrofitting efforts (Streimikiene et al., 2020; Tozer, MacRae, and Smit, 2023; Tozer et al., 2024).

Split-incentive problem and rental housing insecurity

Renters face unique challenges with energy poverty. Landlords in private rental housing may hesitate to invest in retrofits since tenants, not owners, benefit from lower energy bills, perpetuating inefficiencies in rental housing stock (Walker and Day, 2012; Petrov and Ryan, 2021; Papantonis et al., 2022).

Concerns about the costs of retrofits being passed down to tenants through increased rents or evictions may impede tenants' buy-in to retrofit measures (Kantamneni and Haley, 2023). Private rental housing is also systematically excluded from Canada's energy retrofit programs, incentives, and rebates (Kantamneni and Haley, 2023).

Policy and coordination barriers

Effective implementation of retrofitting programs requires coordination across multiple institutions. However, fragmented policies and inadequate integration of energy poverty metrics into climate strategies hinder progress.

Fragmented responsibilities

In Canada, housing and energy policies fall under different jurisdictions. While federal programs such as the Oil to Heat-pump program[4] set overarching goals, low-income energy efficiency programs are managed at the provincial level, and municipalities oversee local housing initiatives. When housing and energy policies are managed by different levels of government, programs can become disjointed, leading to inconsistent design and delivery (Das et al., 2022; Tozer, MacRae, and Smit, 2023; Tozer et al., 2024). Reviews of Canadian energy efficiency programs highlight the multifaceted challenges low-income energy retrofit programs face in achieving net-zero objectives. Challenges include a narrow focus on energy efficiency gains, administrative and intergovernmental silos, constraints of cost-effective measures, and lack of emphasis on non-energy benefits such as equity, climate, and health-oriented outcomes (Kantamneni and Haley, 2022; Tozer et al., 2024).

Evidence from European Union energy poverty initiatives underscores that retrofit strategies overlook structural injustices perpetuating energy poverty, limiting their long-term impact. These injustices include systemic issues such as income inequality, inadequate housing policies, and disparities in access to essential services, which

[4] Canada Greener Homes Initative - Oil to Heat Pump Program.

retrofits alone cannot resolve. Key challenges lie in bridging the gap between high-level policy commitments and actionable, localized solutions that address these root causes. Additionally, meaningful progress requires collaboration with non-energy sectors such as social policy, housing, health, business, and regional development (Bouzarovski, Thomson, and Cornelis, 2021). Integrating these sectors ensures that retrofit programs go beyond technical fixes to tackle the broader socioeconomic factors contributing to energy poverty, enabling more equitable and sustainable outcomes.

Our key informants echo these challenges, describing significant limitations when implementing energy efficiency programs at the ground level. Despite their direct interaction with households, program mandates often restrict them to narrowly defined measures, leaving little flexibility to address the broader needs of energy-poor households. For instance, privacy laws and program boundaries frequently prevent energy efficiency practitioners from referring vulnerable households to other social services, such as food assistance or mental health support, even when such needs are evident.

Many retrofit programs are already working to expand their outreach through community partnerships and local event sponsorships. However, structural issues such as liability concerns, unclear terms of reference, and fear of overstepping mandates create hesitation and barriers to closer integration. This disconnect limits the ability of energy efficiency programs to act as a gateway to comprehensive support systems, reinforcing the siloed nature of interventions and leaving many underlying issues of energy poverty unaddressed. Addressing these barriers will require rethinking program design to foster more integrated, cross-sector collaboration.

Lack of uniform metrics and definitions

Net-zero retrofit programs rarely incorporate energy poverty metrics, such as energy burden or housing inefficiency, to identify and prioritize the most vulnerable households (Bouzarovski and Petrova, 2015; Kyprianou et al., 2019). Despite its prevalence, Canada lacks a nationally recognized definition of energy poverty, which complicates efforts to identify affected households and prioritize them for retrofitting programs (Kantamneni and Haley, 2024; Tozer et al., 2024).

Studies show the challenge of identifying and prioritizing households in need of retrofits, as labeling them “vulnerable households” often oversimplifies their complex realities. This approach fails to account for the nuanced and interlinked factors

contributing to energy poverty, such as housing quality, income instability, health challenges, and access to social supports (Wright, 2004; Ormandy and Ezratty, 2012; Mould and Baker, 2017). Without addressing these underlying vulnerabilities, programs risk overlooking households facing the most severe and multifaceted forms of energy poverty.

Our key informants emphasize the tension between using simplified, income-based eligibility for easy administration and the need for precise data to reduce errors. While income thresholds offer a straightforward qualification method, they often overlook critical factors like poor housing, health issues, or high energy costs. As a result, many households with urgent needs are left ineligible. Furthermore, most energy efficiency programs are constrained by mandates prioritizing technical goals, such as reducing emissions or energy consumption in kilowatt-hours, without explicitly addressing social equity or vulnerability considerations. This narrow focus can overlook the broader, multidimensional challenges faced by energy-poor households, limiting programs' ability to deliver transformative outcomes. Addressing these gaps will require a shift toward more integrated, equity-focused program design and delivery approaches.

Insufficient and inaccessible data

Without detailed data on where energy poverty is most severe and which groups are most affected, it is harder to design effective programs. Canada lacks national multidimensional data on energy poverty, leaving gaps in understanding where energy poverty is most severe and which demographics are most affected. The lack of localized data also hampers coordination between federal, provincial, and municipal governments.

For instance, while many provinces in Canada have introduced low-income energy efficiency programs, they often operate without comprehensive data on energy-poor households, leading to duplication or missed opportunities (Das et al., 2022; Tozer et al., 2024). Tools, such as Efficiency Canada's energy poverty maps and Canada Urban Sustainability Practitioners' (CUSP) Energy and Equity Explorer, rely on and are limited to custom energy poverty data requests from Statistics Canada. This data must be recompiled with each new census, creating delays and gaps in accessibility. CUSP's tool has not been updated since 2016, highlighting the need for more consistent data integration from utilities, local retrofit initiatives, and other sources.

Technical and practical barriers

Delivering retrofits at scale also faces significant technical and operational challenges, particularly in underserved regions.

Capacity gaps in the workforce

Canada faces major workforce shortages, especially in rural, remote, and Indigenous communities, limiting net-zero retrofits. These projects need skilled professionals like energy auditors, HVAC technicians, carpenters, and electricians trained in energy-efficient technologies. However, demand for these experts far exceeds supply, creating a bottleneck in scaling retrofit programs (Hoicka and Das, 2021; Nippard et al., 2024).

Building trust with vulnerable communities is crucial for the success of retrofitting programs. Many energy-poor households, including seniors, newcomers, and Indigenous communities, have experienced predatory practices or scams from unqualified contractors and companies with promises of energy rebates and services. This history of exploitation adds a layer of complexity to workforce development, and programs will need to prioritize building relationships with trusted organizations and begin engaging workers from within these communities. Organizations addressing energy poverty frequently encounter complex challenges, such as supporting mental health needs, assisting households in accessing entitled benefits, or overlapping with social services to provide family support. These tasks demand substantial personal skills, professional expertise, and resources (Middlemiss et al., 2018).

Our key informants echo these challenges, noting the difficulty of finding workers with technical retrofitting expertise and community-based skills, particularly within the community. They express strong interest in a government-led workforce and apprenticeship program to build a pipeline of skilled professionals equipped to address these intersecting needs.

Unaddressed pre-retrofit repairs

Many older homes, particularly in low-income housing, require pre-retrofit repairs, increasing the process's complexity and cost. However, retrofit programs often focus solely on energy-related measures, such as reducing energy use or emissions, and lack the mandate to address pre-retrofit repairs (Tozer et al., 2024). As a result, households in the poorest quality homes — those needing repairs for issues like mould, moisture,

electrical problems, or structural deficiencies — are often excluded from efficiency programs (Kantamneni, Haley, and Tozer, 2024). Addressing these non-energy issues is essential to making more homes eligible for energy-saving programs.

Limited engagement with vulnerable and 'hard to reach' communities

Vulnerable populations often lack awareness of available retrofitting programs or face administrative hurdles, such as complex application processes. This limits participation, particularly among seniors and non-English-speaking households (Middlemiss et al., 2018). Accessing programs is burdensome for vulnerable households, with complex applications and lack of language support creating significant barriers, especially for low-income and immigrant applicants (McIlroy and Agar, 2024).

Additionally, newcomers to Canada may have negative attitudes toward government programs and be less trusting of authority if they have had harmful experiences with such groups in their home country (Abraham, private communication, 2024). Immigrants may not seek the necessary support, fearing that such information will be used against them.

Other vulnerable groups, such as Canadians experiencing disabilities or long-term conditions, are also more likely to report low confidence in institutions and legacy media (Government of Canada, 2024). Households are less likely to access energy efficiency programs without targeted outreach through trusted networks. Many hesitate due to financial concerns, fear of losing control over energy systems, or potential cost increases. Negative past experiences and the stigma of seeking assistance or accepting free support further discourage participation (Middlemiss et al., 2023).

Addressing these barriers is critical to scaling net-zero retrofits and ensuring equitable distribution. Without targeted interventions tailored to their specific needs, energy-poor households risk being excluded from Canada's climate transition. This exclusion could perpetuate inequities and reduce the effectiveness of net-zero retrofitting programs.

Recommendations for making net-zero retrofits work for energy-poor households

Achieving Canada's net-zero goals while addressing energy poverty requires bold, coordinated action. By prioritizing equity, leveraging trusted partnerships, and building a comprehensive national framework, Canada can align retrofitting programs with its climate and social equity objectives.

This section outlines key strategies to enable equitable net-zero retrofits in energy-poor communities.

Economic and financial enablers

Offer turnkey no-cost retrofits

Providing free, start-to-finish retrofitting services for energy-poor households removes financial barriers and ensures equal access to energy-efficient upgrades (McIlroy and Agar, 2024). Our data snapshot[5] shows that households in Canada's lowest quintile of incomes account for nearly half of all households experiencing energy poverty and cannot afford up-front costs or to finance a loan.

Governments at all levels can play a role in enabling turnkey, no-cost retrofits. The federal government can focus on acting as an enabler that enhances the scale and scope of existing provincial and municipal programs. Instead of restricting federal funding to a narrow list of pre-determined and prescriptive measures, as seen in programs like the Oil to Heat-Pump Affordability Program, the federal government could offer greater flexibility to existing programs. This approach would allow existing programs to prioritize the necessary measures to achieve deeper energy savings and expand support to more energy-poor households.

With flexible funding, existing programs can expand eligibility criteria and relax cost-effectiveness testing for qualifying energy-poor households. Flexible funding from federal or provincial programs can 'buy down' some program costs, enabling utility low-income energy efficiency programs to reach more households, achieve deeper savings per household, and, in some cases, enable fuel-switching measures.

[5] See Appendix – data snapshot.

While the specific details of the Canada Greener Homes Affordability Program (NRCan 2024a) have not yet been made public, participants familiar with the program indicate that it is designed to offer flexibility, with the federal government setting high-level goals while allowing provinces and local delivery partners to tailor implementation to local needs. This approach aligns with the idea that the federal government should act as an enabler, enhancing the scale and scope of existing provincial and utility retrofit programs.

The Better Homes Energy Savings Program in British Columbia is another example of a flexible program that uses significant federal and provincial funding to enhance its offerings. With $103 million in federal funding and $151 million in provincial contributions, the program expanded eligibility to include middle-income households and increased support for key measures (BCGOV 2024). Notable improvements include raising heat pump rebates from $9,500 to $16,000, offering a northern B.C. top-up of up to $3,000, and increasing electrical service upgrade rebates to $5,000, ensuring broader access and deeper energy savings.

Flexible financing for middle-income households

Middle-income households in Canada also experience energy poverty, accounting for 30 per cent of all energy-poor households.[6] Targeted support for this group is critical, as they often fall between eligibility for low-income programs and the financial means to self-fund retrofits.

The federal government can continue to provide zero-interest loans for retrofits in middle-income households and small-scale rental properties. Provincial governments can introduce innovative financing models, such as on-bill financing. This allows households to pay for retrofits through their utility bills, with costs offset by energy savings, eliminating upfront burden.

Municipal governments can continue to offer financing programs through mechanisms such as Property Assessed Clean Energy (PACE), which allows homeowners to finance retrofit costs through their property taxes, with repayment tied to energy savings. Additionally, collaboration across federal, provincial, and municipal levels can ensure financing programs are well-coordinated and widely promoted, bridging gaps and ensuring middle-income households are not overlooked in the transition to net zero.

[6] See Appendix – data snapshot.

The Federation of Canadian Municipalities' Community Efficiency Financing is a strong example of municipalities using flexible funding to address affordability and energy poverty in local climate initiatives. It provides funding for studies, pilot projects, and capital initiatives, helping municipalities design, test, and expand residential energy retrofit programs based on local needs.

For close to 50 years, the Weatherization Assistance Program (WAP) in the United States has provided stable core program funding to states, territories, and Indigenous communities for energy efficiency upgrades for low-income households. The funding directly flows to a national network of over 700 local implementers and community action agencies that do the work. The program sets high-level guidelines, such as requiring taking a whole-home approach to retrofits, establishing income-eligibility criteria or the performance of quality assurance sampling, and requiring homeowner/occupant education.

The program offers implementers flexibility in choosing eligible upgrades within these broad guidelines. It offers a wide range of ways to use the funding in line with the local circumstances and priorities of the communities they serve. For example, in the program year 2023, the U.S. federal funding amounted to an average adjusted cost per home of USD 8,250. However, states like Illinois leverage this funding to invest up to USD 16,000 in energy-related repairs and upgrades per eligible household. Reporting requirements are streamlined, and program timelines are flexible.

Dedicate and prioritize stable long-term investments in disadvantaged communities

Federal policies should focus retrofit efforts on low-income households, prioritizing investments that enhance affordability, resilience, and progress toward net-zero climate goals. This approach ensures low-income households are at the forefront of retrofits, aligning the Green Buildings Strategy with equity, diversity, and inclusion principles.

Long-term funding is required to ground program priorities in broader objectives of energy poverty, housing and health outcomes, and long-term and multi-year goals. Multi-year funding commitments avoid boom-bust dynamics that have previously disrupted energy efficiency supply chains and broken participant trust. The need for stable funding support is another reason for a multi-level governance approach: a

federal program that encourages provincial-specific program designs will institutionalize these programs within provincial policy systems and thus provide an added layer of resilience.

The Justice40 initiative, established under the Biden administration in the United States, mandates that 40 per cent of federal climate-related investments benefit disadvantaged communities, including those disproportionately affected by energy poverty. Justice40's success lies in its focus on equity, ensuring that funds are allocated to communities with the greatest need. Canada can adopt a similar model by ensuring a significant percentage of federal retrofit funding is allocated to low-income and energy-poor households, particularly in rural, northern, and Indigenous communities.

Establishing clear energy poverty and equity metrics, similar to Justice40's approach, would enhance retrofit programs in underserved communities across Canada.

Policy and coordination enablers

Aligning net-zero goals with energy poverty reduction will require coordination across different orders of government and different delivery partners.

This section outlines key factors that can enable this alignment.

Define energy poverty and measure it regularly

The lack of a consistent definition of energy poverty in Canada hinders efforts to target the most vulnerable households.

The European Union defines energy poverty as "a household's lack of access to essential energy services that provide basic levels and decent standards of living and health, including adequate heating, hot water, cooling, lighting, and energy to power appliances, in the relevant national context, existing social policy and other relevant policies, caused by a combination of factors, including but not limited to non-affordability, insufficient disposable income, high energy expenditure and poor energy efficiency of homes" (EPRS, 2023).

To operationalize this broad definition and facilitate targeted policy-making, the EU Energy Poverty Observatory (EPOV) identifies four primary indicators of energy poverty:

- Two consensual-based measures.
    1. Self-reported inability to keep homes adequately warm.
    2. Arrears on utility bills.
- Two expenditure-based measures.
    3. High energy expenditure relative to income and
    4. Low absolute energy expenditure.[7]

These indicators, complemented by 19 secondary indicators (e.g., energy prices, thermal discomfort, and building stock features), provide a comprehensive framework for understanding energy poverty. This approach combines multiple indicators for diverse vulnerabilities and data availability (EPOV, 2023) according to each EU member state's national context.

A similarly broad definition in Canada would allow regions to develop locally specific policy actions. For example, some areas, such as rural regions or Atlantic provinces, might prioritize helping residents transition off expensive heating oil, while others might prioritize tenant protections during extreme heat events.

To track progress, Canada must implement standardized metrics for measuring energy poverty, going beyond a single metric — such as energy cost burdens — to capture dimensions like energy costs relative to income, indoor housing conditions, and health impacts. These metrics should guide resource allocation and evaluate program effectiveness.

Civil society organizations have stepped in to address this gap without such an integrated national government-backed resource. Efficiency Canada's energy poverty maps (Efficiency Canada, 2024) and CUSP's Energy and Equity Explorer (CUSP, 2019) tool provide valuable insights to practitioners. However, these tools rely on custom Statistics Canada data requests, which must be updated with each census, creating delays and gaps. Compounding these challenges, Canada lacks a formal definition of energy poverty, forcing civil society to rely on proxy indicators. While these proxies are helpful, they offer an incomplete picture, limiting their effectiveness in fully capturing the scope and nuances of energy poverty. These efforts are further constrained by limited integration with other key data sources, such as utility and public health data,

[7] Defined as the percentage of persons living in households whose expenditure on residential energy is more than two times lower than the national median expenditure on residential energy. See https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Main_Page.

highlighting the need for consistent, government-supported metrics to better capture and address energy poverty in Canada.

Set national energy poverty reduction targets and integrate them into climate action

The federal government should consider setting and committing to national energy poverty reduction targets. This will ensure that energy poverty remains high on the policy agenda of current and future governments. Clear targets create a benchmark against which progress can be measured, holding governments and stakeholders accountable for their actions and commitments.

National targets would help allocate resources effectively, focusing efforts where needed most and driving investments in energy-efficient retrofits and renewable energy solutions for low-income and marginalized communities. By doing so, the federal government can simultaneously reduce greenhouse gas emissions, enhance the quality of life for vulnerable populations, and build public support for ambitious climate initiatives by demonstrating tangible benefits for everyday Canadians.

The United Kingdom offers a promising example by addressing energy poverty through legally binding climate targets to ensure that, wherever feasible, fuel-poor homes achieve a minimum energy efficiency rating of B and C by 2030.[8] This strategy ties energy poverty reduction to concrete improvements in housing efficiency, tackling the root causes of high energy costs for vulnerable households. Embedding this commitment into law provides long-term policy focus, consistency across successive governments, and accountability in meeting goals related to energy poverty, housing quality, and climate action. Canada should adopt a similar approach by setting national targets for eliminating energy poverty and assigning clear accountability to the Minister of Natural Resources. Additionally, Canada could establish an independent body, similar to the U.K.'s Committee on Fuel Poverty, to monitor progress and ensure transparency.

[8] Properties in the UK are required to acquire an Energy Performance Certificate (EPC) before being sold or rented. EPCs show a property's current energy efficiency rating, ranging from A-G, with A being the best.

Protect renters and housing security

Affordability covenants can be implemented to cap rent increases for retrofitted units to ensure that energy retrofits do not inadvertently displace tenants or increase or increase housing insecurity. Affordability covenants are legally binding agreements that ensure tenants in retrofitted buildings are protected from rent increases that could negate the financial benefits of energy efficiency upgrades. These covenants can cap rent increases, tying them to inflation or other pre-determined limits. Hence, tenants directly benefit from lower energy costs without facing displacement due to rising housing costs.

Retrofits funded by public subsidies or incentives can inadvertently lead to renovictions, where landlords pass on the costs of upgrades to tenants through significant rent hikes or evictions (Kantamneni and Haley, 2023). To mitigate such risks, landlords can be required to sign affordability covenants. These contracts limit the landlord's ability to raise rents if they receive public funding for energy retrofits. Such measures ensure tenants benefit directly from energy savings without facing financial displacement due to rising rents. For instance, the Affordable Housing Energy Program in Efficiency Nova Scotia (Efficiency NS, 2023) provides technical and financial support to private market-rent landlords for retrofits. In return, landlords must make "every effort to maintain affordable rental rates" for current or future tenants throughout the contract. Kantamneni and Haley (2023) provide further examples of affordability covenants in retrofit programs in other jurisdictions and how they are enforced.

Retrofit program delivery agents should partner with non-profits and advocacy groups to support renters during retrofits. These partnerships can help tenants understand their rights, navigate retrofitting procedures, and report non-compliance. The federal government can lead by setting renter-friendly standards for private rental housing retrofits, including requirements for affordability covenants, eviction protections, and meaningful tenant engagement.

While examples of tenant engagement in retrofits exist in Canada (Pembina Institute, 2020), the federal government can establish standardized frameworks and templates to ensure affordability and tenant inclusion, even as rental housing remains under provincial jurisdiction.

One example of such a framework is a 'tenant bill of rights in a net-zero future' as outlined in (Kantamneni and Haley 2023). A rights-based approach can guide policies

and programs to align with national net-zero and housing goals, ensuring tenants are informed and protected throughout retrofits.

These rights include:

- access to clear energy performance information before and after retrofits.
- prior, informed consent on retrofit plans through active tenant engagement.
- protection of residence and tenure during and after retrofits, including minimal disruption and return guarantees.
- collective bargaining and access to legal counsel for tenant advocacy; and the right to well-being at home, including non-structural upgrades and emerging rights like cooling amidst climate change.

These principles establish a fair framework for tenant-focused energy efficiency retrofits in a net-zero future.

Technical and practical enablers

Expand community-based workforce training

To address workforce gaps, the federal government can promote cross-border learning and support provinces in linking energy, housing, and health policies. Examples include enhancing training and workforce development, decision support tools on retrofit standards, and business support for contractors undertaking whole-home retrofits.

> The U.S. WAP provides a robust example of capacity building in the sector. It allocates part of its budget to annual conferences and workforce learning opportunities. The program offers technical modules on retrofitting various building types, energy modelling tools, and administrative support. It also shares best practices on procurement, program design, and delivery, along with guidance for targeting households most in need. Additionally, WAP enhances supports through external funding sources and coordinates interventions with health, housing and senior care institutions.

Federal and provincial governments can establish regional training hubs dedicated to retrofitting skills, focusing on energy-efficient technologies, heat pump installations, and whole-home retrofits. These hubs can address workforce gaps while creating pathways for local employment. Partnering with community colleges and Indigenous

organizations can further enhance these efforts by tailoring training programs to the specific needs of communities, building trust, and increasing workforce diversity.

Canada should follow the U.S. in developing a workforce pipeline for the net-zero retrofit industry of the future by leveraging apprenticeship programs that blend technical training with on-the-job experience. Programs like the U.S. Department of Labor's Home Performance Laborer Apprenticeship (DOL, 2022) and NASCSP's Weatherization Workforce Development (NASCSP, 2021) initiatives demonstrate how targeted apprenticeships can address labour shortages while providing workers with career pathways in energy efficiency. These programs emphasize hands-on training, industry-recognized certifications, and partnerships with labour unions and community organizations, ensuring a skilled and diverse workforce to meet the growing demand for retrofitting homes, reducing emissions, and enhancing energy efficiency.

The Home Performance Laborer Apprenticeship offers a faster, more accessible pathway into the retrofit workforce compared to traditional trades like carpentry, with fewer training hours, full-time pay during training, and a shorter program duration. This approach lowers financial barriers, enabling broader participation from underrepresented groups and new entrants to the workforce. Beyond providing immediate job opportunities, the program serves as a gateway to advanced careers in energy efficiency, such as energy auditors and project managers, equipping participants with foundational skills for long-term growth in the green building sector. Its focus on rapid upskilling and career mobility makes it an effective model for addressing workforce gaps in Canada’s net-zero retrofit goals.

Integrate non-energy benefits into retrofit programs

Federal and provincial governments should expand the scope of retrofit programs to include funding for essential pre-retrofit repairs such as mould remediation, electrical upgrades, and structural improvements. This would ensure that homes in the poorest condition are not excluded from energy efficiency initiatives.

Canada should follow the lead of the U.S. WAP, which establishes a supplementary funding pool specifically for pre-retrofit repairs administered alongside existing energy efficiency programs. This funding can help cover the upfront costs of making homes eligible for retrofits, prioritizing households in severe energy poverty.

Retrofit programs should partner with housing and health agencies to co-fund solutions, addressing energy and non-energy issues for better living conditions. The U.K. offers a compelling example of how partnerships between housing and health sectors can address energy poverty and health-related vulnerabilities through the Cold Homes Toolkits (Citizens Advice 2018). The Health Professionals Cold Homes Toolkit emphasizes health professionals' critical role in identifying individuals at risk of cold-related health issues and connecting them to energy efficiency programs. By leveraging their trusted relationships with vulnerable populations, health professionals can facilitate timely interventions and improve health outcomes while addressing energy poverty.

Similarly, the Local Authority Cold Homes Toolkit highlights how local governments can integrate energy efficiency with health and housing initiatives. It encourages collaboration between housing authorities, health agencies, and social services to create tailored solutions for cold homes and associated health risks, such as referral systems and funding mechanisms.

These toolkits showcase how coordinated efforts can reduce hospital admissions, improve living conditions, and ensure energy efficiency programs reach those most in need. Adopting such an approach in Canada could ensure retrofit programs address vulnerable households' non-energy needs, improving housing and health outcomes.

Establish a National Energy Poverty Advisory Hub

The federal government should create a National Energy Poverty Advisory Hub to centralize data, modelled after the European Union Energy Poverty Advisory Hub (EPAH 2024), to centralize data collection and analysis.

The Energy Poverty Advisory Hub (EPAH) is a key resource for addressing energy poverty across Europe, providing tools, expertise, and tailored support to local governments and stakeholders. A standout feature is its interactive data dashboards, which offer detailed insights into energy poverty metrics across member states, enabling users to identify vulnerable areas and monitor progress. These dashboards complement EPAH’s broader efforts, including knowledge sharing through case studies, guides, and capacity-building initiatives, empowering municipalities to develop effective strategies for alleviating energy poverty and fostering equitable energy transitions.

The Canadian energy poverty hub could produce comprehensive, regularly updated energy poverty maps to identify vulnerable households and regions by integrating information from utilities, housing authorities, and public health organizations. It would establish clear metrics for tracking program impacts, such as reductions in energy poverty, energy savings, and emissions reductions while publishing annual reports to maintain transparency and public trust.

Provincial governments can use insights from the hub to design region-specific retrofit programs that address local conditions and bridge gaps between the housing, energy, and health sectors. By leveraging real-time data, provinces can continuously improve policies and target funding to areas of greatest need.

Localized solutions can focus on vulnerable neighbourhoods at the municipal level, with efforts coordinated alongside trusted community stakeholders. For instance, integrating energy poverty data into tools already used for municipal climate planning — such as ICLEI Canada's Climate Insights mapping tool (ICLEI Canada, 2024) — would enable municipalities to streamline decision-making. This integration ensures municipalities can align energy poverty reduction with ongoing climate action efforts, promoting a cohesive and efficient approach to climate planning in their communities.

The national approach to capacity building can create an integrated strategy to alleviate energy poverty and support Canada's net-zero transition.

Conclusion

Canada's transition to a net-zero future offers a transformative opportunity to address energy poverty, enhance housing affordability, and improve living conditions for millions of households.

Achieving this potential requires a comprehensive approach that bridges the gaps between energy efficiency, housing quality, and affordability. By setting clear energy poverty reduction targets and aligning them with national climate goals, Canada can build a strong foundation for equitable retrofits. However, it is essential to move beyond prevailing retrofitting strategies to targeted interventions that address the specific needs of vulnerable households.

Examples include funding pre-retrofit repairs for mould, moisture, or structural issues. Health-focused measures, such as ventilation upgrades, can help prevent respiratory

problems. Ensuring affordability is also key, with rental protections and covenants preventing displacement after retrofits. Targeted interventions should expand access to tenant advocacy services and ensure community-based workforce training, particularly for rural and Indigenous communities.

Strong federal leadership and collaboration across all levels of government are essential. Municipalities should use flexible funding to address local needs, while provinces expand programs to include marginalized groups. The United Kingdom offers a valuable model by linking energy poverty reduction to legally binding efficiency targets. Likewise, the United States' weatherization programs use innovative apprenticeships to tackle workforce shortages and build trust in program delivery.

Recent Canadian studies (Affordability Action Council, 2023; McIlroy and Agar, 2024) have echoed similar recommendations for advancing net-zero retrofits to address energy poverty. Our work builds on these findings by outlining additional enabling policy pathways. These include tailored policy mixes for different orders of government, recognizing the unique and complementary roles that federal, provincial, and municipal authorities play. For example, the federal government can provide flexible funding, set overarching energy poverty reduction targets, and establish accountability frameworks. Provincial governments can use these resources to design region-specific programs that bridge energy efficiency, housing, and health outcomes. At the same time, municipalities can implement localized solutions that align energy poverty considerations with existing climate action tools like ICLEI Canada's Climate Impacts mapping tool.

Moreover, we emphasize the importance of enabling resources, such as a national energy poverty data strategy, to support informed decision-making and improve program accountability. Integrated, real-time tracking systems and standardized metrics could help bridge data gaps and empower stakeholders to target interventions effectively. Combining these approaches with the insights and momentum from prior studies, we aim to advance a more comprehensive and equitable framework for net-zero retrofits that prioritizes energy poverty reduction alongside housing quality and climate targets.

By integrating these elements, Canada can align its energy poverty reduction and climate policies, ensuring that no household is left behind in the transition to a sustainable, equitable net-zero future.

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Appendix — data snapshot

Energy poverty in Canada, by income

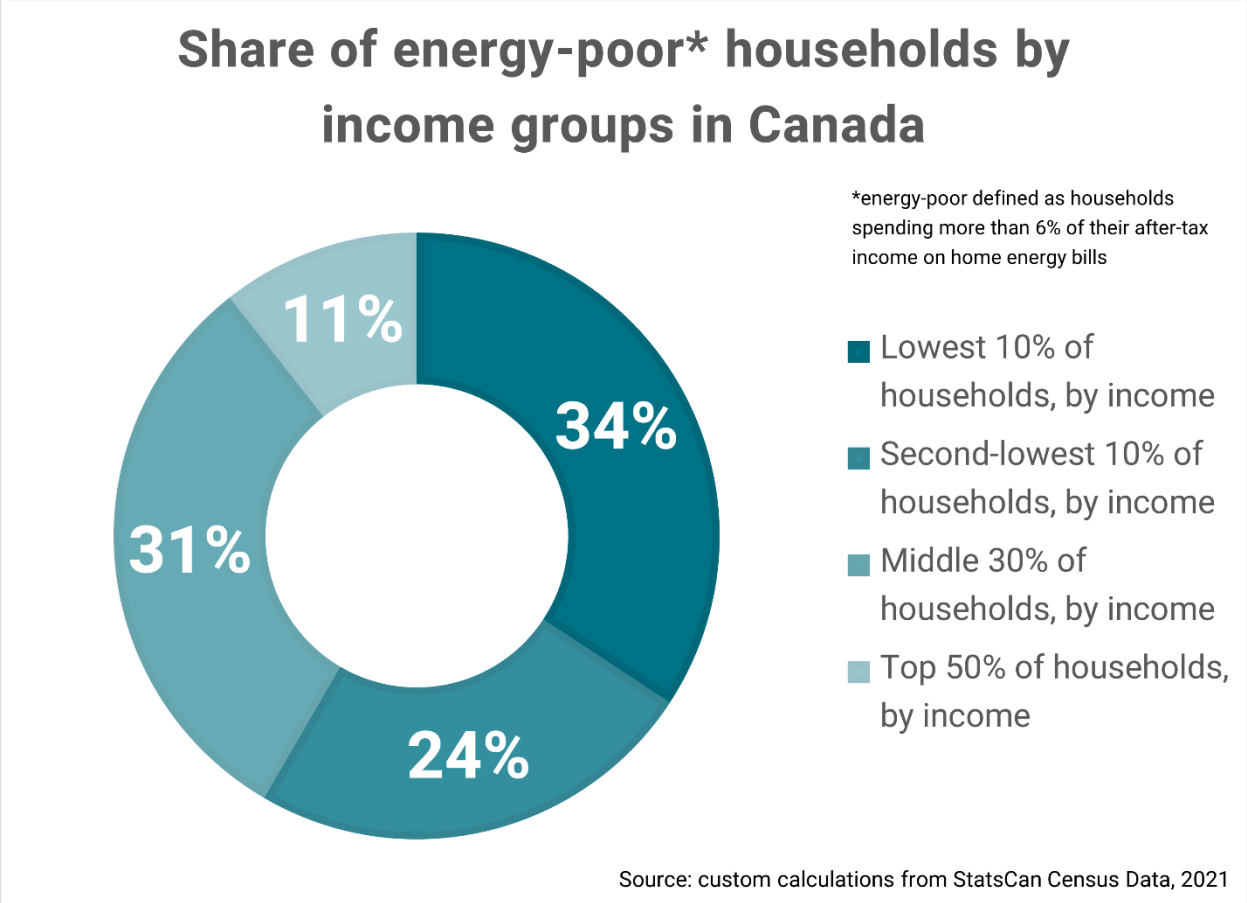

Figure 2. Share of energy-poor households by income groups in Canada, 2021

Key takeaways:

- Household income and energy poverty are correlated.
- Lower-income households are more likely to experience energy poverty. Fifty-eight per cent of energy-poor households are in the bottom quintile of household incomes.
- Energy poverty is not exclusively a low-income issue. Middle-income households also experience energy poverty — accounting for 31 per cent of all energy-poor households.

Energy poverty in Canada, by household characteristics

Characteristic	Total number of households	Number of energy-poor households	Percentage of energy-poor households	More or less likely to experience energy poverty relative to all households
Living in an apartment	1,595,935	55,820	3%	Less likely
Newcomers	821,840	69,790	8%	Less likely
Renters	4,953,840	389,355	8%	Less likely
Language: neither French nor English	1,854,310	229,460	12%	Less likely
All households	14,978,940	1,911,310	13%	-
Living in older housing	9,181,400	1,350,110	15%	More likely
Single parents	1,296,760	208,430	16%	More likely
Seniors	4,731,510	834,585	18%	More likely
Needing major repairs	919,550	182,780	20%	More likely
Low-moderate income	7,463,755	1,663,375	22%	More likely
In core housing need	1,451,025	420,795	29%	More likely
Low-income (MBM)	1,264,335	445,100	35%	More likely

Table 1. Number and percentage of households experiencing energy poverty based on threshold of spending more than 6 per cent of after-tax household income on home energy needs, by household characteristics

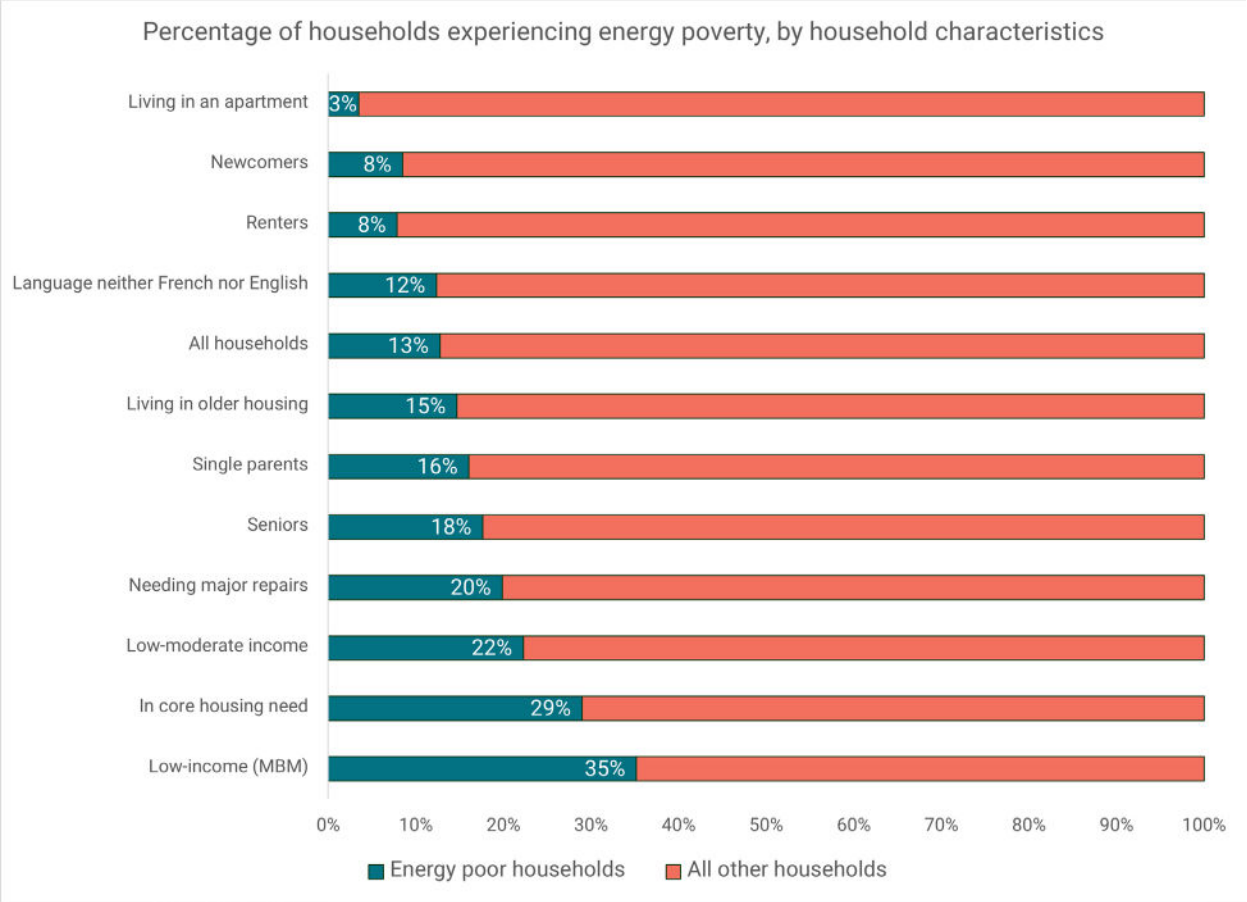

Figure 3. Number and percentage of households experiencing energy poverty based on threshold of spending more than 6 per cent of after-tax household income on home energy needs, by household characteristics

Key takeaways:

- There are nearly two million households experiencing energy poverty in Canada, as measured by the threshold of households spending more than 6 per cent of their after-tax household income on home energy needs.
- Income is the strongest predictor of energy poverty.
    - Households with low incomes (based on Market-Based Measure) experience the highest rates of energy poverty at 35 per cent — almost three times the national average (13 per cent).
    - Low-to-moderate income households (with household incomes less than national median household income) also face elevated energy poverty rates (22 per cent), reinforcing the economic nature of this issue.
- Housing conditions significantly impact energy poverty risk.
    - Households needing major repairs face 20 per cent energy poverty rates, much higher than the national average.

    - Canadians living in older housing (built before 1991) are also more likely to experience energy poverty (15 per cent), suggesting inefficient building stock contributes to affordability challenges.
- Some vulnerable groups, such as seniors and single parents, are disproportionately affected.
    - Seniors (18 per cent) and single parents (16 per cent) are more likely to experience energy poverty than the general population.
    - This may suggest that fixed incomes (for seniors) and single-income household constraints and chronic under-employment (for single parents) limit their ability to manage high energy costs.
- Core housing need is a major energy poverty risk factor.
    - Households in 'core housing need' face 29 per cent energy poverty rates, more than double the national average.
    - This suggests that affordability and poor housing conditions jointly contribute to high energy burdens.
- Renters and newcomers experience lower-than-average energy poverty rates, but these findings should be interpreted with caution.
    - While renters and newcomers experience lower energy poverty rates (8 per cent), this may be attributed to rental housing costs that include utilities, or newcomers living in multi-unit housing which may not be sub-metered and instead include utility costs in rents or condo fees.

In summary, energy poverty in Canada disproportionately affects low-income households, vulnerable communities, and those in poor-quality housing. Aligning net-zero retrofits with affordability measures can reduce energy costs and improve housing conditions for these groups.

However, relying solely on the energy cost burden metric provides an incomplete picture, as it overlooks access to essential energy services, self-reported hardship, and housing conditions. The recommendations in this report would enable Canada to better identify at-risk households and develop more effective, equity-focused net-zero policies.