

# Unlocking Retrofit Value in Social Housing

## A path to affordability through distributed energy resources

### Authors

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### Summary

Canada's social housing buildings are aging and becoming more expensive to operate and maintain. Current funding models cannot support the scale of required retrofits. Distributed energy resources (DERs), such as solar panels, batteries and electric vehicles, offer social housing providers and asset managers a practical way to create new revenue streams, improving the financial viability of retrofits.

When paired with full-building upgrades, DERs can help offset retrofit costs; lower operating costs; and create healthier, more comfortable homes for tenants. Examples from Europe and Canada show that this approach has helped housing providers manage deferred maintenance and protect long-term affordability.

# Social housing retrofits need a new approach

Canada's social housing sector is facing growing challenges with affordability and infrastructure. Aging buildings are more expensive to operate with each passing year. However, the capital needed to deliver deep retrofits that help to bring down operational energy costs, and serve to reduce operational emissions, is limited, fragmented, and often difficult to access.

Canada has over 600,000 units of social housing, most of which were built before 1994.<sup>1</sup> It is estimated that roughly 7,000 of these units need to be repaired and renovated every year to protect housing affordability.<sup>2</sup> In British Columbia, about 66 per cent of social housing units were built before 1996, meaning roughly 45,000 out of 68,000 units are now at least 30 years old.<sup>3</sup>

While the need to retrofit aging buildings for efficient operation has long been recognized, decades of delayed action have expanded the problem into a large-scale infrastructure challenge. In 2024, the estimated value of deferred maintenance for all social housing units under BC Housing exceeded \$2.6 billion.<sup>4</sup> (The amount is likely much greater when all the province's social housing providers are included.) This means that over 121,000 households who rely on social housing, most of whom are low income or otherwise vulnerable, are faced with high utility bills, uncomfortable indoor conditions and growing health risks.<sup>5</sup> At the same time, providers are absorbing rising energy costs driven by inefficient building systems, repair backlogs, and long-term asset devaluation.

The current model for delivering retrofits is poorly suited to tackling the scale of the problem. Retrofit activity remains heavily dependent on time-limited government programs, as costs cannot be recovered through rent increases without undermining affordability. In the past,

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<sup>1</sup> BC Housing defines social housing as “a housing development that government subsidizes and that either government or a non-profit housing partner owns and/or operates.” Government of British Columbia, “Social Housing,” December 8, 2022. <https://www2.gov.bc.ca/gov/content/housing-tenancy/affordable-and-social-housing/social-housing>

Ben Segel Brown, “The Evolution of Canada's Social Housing Stock,” *Office of the Parliamentary Budget Officer*, March 6, 2025. <https://www.pbo-dpb.ca/en/additional-analyses--analyses-complementaires/BLOG-2425-008--evolution-canada-social-housing-stock--evolution-parc-logements-sociaux-canada>

<sup>2</sup> Sasha Tsenkova, “The Design of Energy Efficiency Programs in Canada: A Social Housing Lens,” in *Energy Efficient Affordable Housing* (Springer, Cham, 2021), 23. [https://doi.org/10.1007/978-3-030-69563-7\\_2](https://doi.org/10.1007/978-3-030-69563-7_2)

<sup>3</sup> Canadian Mortgage and Housing Corporation, “Social and Affordable Housing Rental Survey – Rental Structure Data Tables (2024),” spreadsheet, July 22, 2025.

<sup>4</sup> Housing Central, *Build More, Protect More* (2024), 20. [https://housingcentral.ca/wp-content/uploads/2024/09/BC\\_AffordableHousing\\_Plan.pdf](https://housingcentral.ca/wp-content/uploads/2024/09/BC_AffordableHousing_Plan.pdf)

<sup>5</sup> BC Housing, *Climate Change Accountability Report* (2024), 5. BC Housing, *Climate Change Accountability Report* (2024), 5. <https://www.bchousing.org/sites/default/files/media/documents/BC-Housing-PSO-Climate-Change-Accountability-Report.pdf>

incentive programs have had mixed results. Such programs have generally faced several obstacles:

- lack of consistent requirements
- constrained funding
- shifting government priorities
- rigid, short-term timelines

These factors point to the need for approaches that create market demand for retrofits, generating revenue and reducing reliance on incentives.

## Distributed energy resources improve retrofit viability

Distributed energy resources offer a path to delivering comprehensive, long-term retrofits.

**Distributed energy resources (DERs)** are small-scale, local energy generation and storage technologies and include rooftop solar, batteries, and electric vehicles. They have traditionally not been considered as part of large retrofit projects and instead have been viewed as optional energy add-ons.

**Demand-side management (DSM)** optimizes how and when electricity is used through three key approaches: (1) energy efficiency, (2) DERs, and (3) demand response (e.g., smart controls). By controlling or decreasing energy consumption, DSM provides direct financial benefits to energy users.

DERs have the potential to create value by shifting how buildings interact with the energy grid. On-site generation can help offset purchased electricity, particularly for common-area loads. Alongside this, DSM strategies in general help manage operational affordability and have the potential to reduce and reshape demand in ways that benefit building owners, tenants, and utilities alike. Over time, these measures can stabilize or decrease operating costs, facilitate deeper retrofit upgrades,<sup>6</sup> and strengthen the market for retrofits by reducing perceived risks and improving project feasibility.

Social housing assets often experience structural and technical problems such as building envelope degradation, uncontrolled air infiltration, asbestos, and aging inefficient gas-based

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<sup>6</sup> Kari Hyde, Ceileigh McAllister, and Emma Caramazza, *Beyond the Meter: Harnessing demand-side management to power Alberta's energy future* (Pembina Institute, 2025), 5. <https://www.pembina.org/pub/beyond-meter>

heating systems. They also lack much needed cooling. Addressing these issues individually can increase costs and disruption while locking in suboptimal outcomes. Instead, a layered whole building retrofit approach that incorporates DERs in the early design phase can maximize savings and asset value.

## Integrating DERs and DSM strategies maximize value

The value of DERs emerges when they are deployed as an integrated package rather than as individual technologies. A typical example includes rooftop solar paired with behind-the-meter battery storage and smart controls. Solar generation reduces the amount of electricity that needs to be purchased, particularly for daytime common-area loads, while battery storage and smart controls enable load shifting, reduce peak demands, and provide backup power for critical systems.

This configuration also allows buildings to participate in utility-run DSM programs in many jurisdictions, which reduces exposure to costly, high-emissions peak electricity and, where permitted, enables the export of excess energy back to the grid. Additional value can be achieved by adding on-site electric vehicle charging.

Even without renewable energy and batteries, buildings can still participate in DSM through smart thermostats and demand flexibility and peak management initiatives. Participation in DSM programs has the potential to generate offset energy costs for operators and, if a building is sub-metred, tenants. DERs can be supported by different business models, including third-party leasing or outright ownership of integrated packages. Each approach varies in terms of complexity and financial return. Deeper integration and ownership typically deliver greater long-term value.

## Lessons from Europe and Canada highlight the role of DERs in scaling retrofits

Experience from other countries demonstrates that the affordable housing sector is uniquely placed to influence policy and direct public and private investment toward energy-efficient deep retrofits.<sup>7</sup> Retrofit providers in the Netherlands, Austria, Sweden, and Germany have been playing a leading role in scaling sustainable retrofits and using innovative and entrepreneurial delivery models.

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<sup>7</sup> Tsenkova, “Energy Efficiency Retrofits and Policy Design for Sustainable Affordable Housing,” in *Energy Efficient Affordable Housing*, 2. [https://doi.org/10.1007/978-3-030-69563-7\\_1](https://doi.org/10.1007/978-3-030-69563-7_1)

Through enabling policy, envelope upgrades are frequently combined with solar thermal systems, rooftop photovoltaic panels, district energy connections, and upgraded building-level energy systems. These are financed through relatively long-term, portfolio-scale blended models that include public loans, revolving capital reserves, market-based tools and performance-based incentives.<sup>8</sup>

Similar approaches have also emerged in enabling jurisdictions in Canada, where large social housing providers are testing portfolio-scale approaches to deploying DERs.

Toronto Community Housing assessed the financial potential of DERs through a portfolio-wide deployment of solar, geothermal, wind, and waste-to-energy systems to reduce greenhouse gas emissions by 18 per cent annually. A combination of utility savings, green incentives, and reinvestment lowered net project costs by 92 per cent, from \$242 million to \$19.5 million. Further savings and revenue potential were identified through leasing around 150,000 square metres of rooftop space to solar power companies.<sup>9</sup>

The opportunity to capture operational savings by addressing energy use is particularly significant in British Columbia, where non-profit housing has historically exhibited much higher energy intensity than the provincial average. Non-profit apartment buildings have an average energy intensity of 1.36 GJ/m<sup>2</sup> (377 kWh/m<sup>2</sup>), which is about 58 per cent higher than the provincial average of 0.86 GJ/m<sup>2</sup> (239 kWh/m<sup>2</sup>) for apartment buildings.<sup>10</sup> It is estimated that each 1 per cent reduction in energy use in the non-profit housing sector unlocks \$500,000 in annual energy savings.<sup>11</sup>

While Toronto and B.C. highlight the potential for significant savings, realizing these savings in practice would require approaches that work within the existing financial, technical, and social constraints of the social housing sector. The Pembina Institute, in partnership with BC Housing, has brought together industry experts in the [Reframed Initiative](#) to explore how this could be done. Working with six low-rise, multi-unit residential buildings owned and operated by social housing providers, a team of designers showed that deep retrofits are possible when supported by an integrated design process and sustained tenant engagement. However, discussions with building owners and tenants across all six buildings revealed similar challenges, including

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<sup>8</sup> Housing Europe, *The Financing of Renovation in the Social Housing Sector: A comparative study in 6 European countries* (2019). [https://www.housingeurope.eu/wp-content/uploads/2024/10/financement\\_renovation\\_EN\\_final.pdf](https://www.housingeurope.eu/wp-content/uploads/2024/10/financement_renovation_EN_final.pdf)

<sup>9</sup> Federation of Canadian Municipalities, “Case study: Renewable energy would lower housing costs, GHG emissions.” <https://fcm.ca/en/case-study/gmf/renewable-energy-would-lower-housing-costs-ghg-emissions>

<sup>10</sup> Tsenkova, “Beyond Energy Efficiency: Investing in Social and Affordable Housing in Vancouver,” in *Energy Efficient Affordable Housing*, 29. [https://doi.org/10.1007/978-3-030-69563-7\\_3](https://doi.org/10.1007/978-3-030-69563-7_3)

<sup>11</sup> Tsenkova, “Beyond Energy Efficiency: Investing in Social and Affordable Housing in Vancouver,” 30.

limited access to capital, deferred maintenance backlogs, split incentives, and high costs. DERs are well positioned to address these constraints by delivering value for both building owners and tenants

## DERs benefit building owners

Funding limitations are one of the biggest barriers to retrofitting social housing. With constrained capital, complex project requirements, and incentives often distributed across different programs and timelines, building owners are frequently pushed toward piecemeal upgrades or short-term fixes. To address this, building owners should plan for long-term asset renewal and adopt a bundled retrofit approach that includes DERs. Retrofit upgrades can also focus on making buildings DER-ready incrementally, for example by strengthening electrical capacity or enabling infrastructure that supports future integration.

Early integration of DERs can create new revenue streams for building owners. By hosting energy generation, storage, and mobility services that integrate seamlessly and cost effectively within broader retrofit projects, owners can shorten payback periods and improve long-term capital planning. In addition, lower operational costs free up resources for deferred maintenance, making buildings more affordable to operate over time.<sup>12</sup>

## DERs benefit tenants

Building conditions directly affect tenant health, for example moisture damage and mould combined with poor ventilation can have negative respiratory, cardiovascular and mental health impacts.<sup>13</sup> This creates greater inequities and long-term risks for low-income households and vulnerable populations who are more likely to live in buildings with such conditions.

A participatory, building-scale approach that aligns retrofit DSM programs with complementary DER deployment can help address these issues.<sup>14</sup> Utility incentives for efficient heating, ventilation, and air-conditioning systems, along with improved insulation, help reduce energy demand by improving building performance, which in turn enhances indoor conditions, increases occupant comfort, and supports energy equity. Where suitable, DERs can enhance these upgrades by reducing exposure to electricity cost volatility and improving resilience during

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<sup>12</sup> Tsenkova, “Energy Efficiency Retrofits and Policy Design for Sustainable Affordable Housing,” 2.

<sup>13</sup> Raidin Blue, Ceileigh McAllister, and Rachel Sutton, *Valuing Deep Retrofits* (Pembina Institute, 2024), 2. <https://www.pembina.org/pub/valuing-deep-retrofits>

<sup>14</sup> Kari Hyde, “Putting Power Back in Communities: The Case for Distributed Energy Resources,” op-ed, *Canada’s National Observer*, May 29, 2025. <https://www.nationalobserver.com/2025/05/29/opinion/power-back-communities-distributed-energy-resources>

power outages and extreme weather events.<sup>15</sup> Together, improved indoor conditions, thermal comfort, and system reliability contribute to better health outcomes and greater housing stability for tenants. For households, these benefits can mean more money available for essentials like education through avoided health-related and other costs over the long term.

## Building a DER-integrated future

High upfront costs, operational risks, and uncertainty associated with new technologies have hampered innovation in the retrofit sector.<sup>16</sup> The solution is not to avoid these risks, but to manage them strategically. Models such as third-party ownership, leasing of renewable energy assets, shared or neighbourhood-scale DER systems, and bundled portfolio-based retrofit planning can lower capital exposure for building owners. This approach enables retrofits to deliver greater impact for social housing providers and tenants, while laying the groundwork for future value under supportive utility frameworks.

Instead of playing catch up, social housing providers are uniquely positioned to lead this retrofit transition. Long-term ownership assets with stable occupancies and a mandate to deliver public value provide them with a solid foundation to tackle this challenge.

Future research must address not only scaling DERs, but also the advance enabling conditions for utilities to integrate DERs into their long-term planning and operations. This includes addressing procurement and operational barriers specific to social housing, while improving utility readiness to recognize, plan for, and eventually make use of DER-enabled flexibility and load reductions.

Education and training is a critical, and often overlooked, enabler of shifting to a broader retrofit approach. Design professionals, asset managers, operators, maintenance staff, procurement teams, and even tenants need practical knowledge on how these integrated systems function, how to properly operate and maintain them effectively, and how to realize their full value. Strengthening this internal capacity will be crucial in improving operational performance. Building sector-wide literacy around DERs will enable more confident decision-making and encourage broader adoption. Utilities and regulators will also require new capabilities and greater confidence to revise planning and operational practices as DER penetration grows.

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<sup>15</sup> International Energy Agency, *Unlocking the Potential of Distributed Energy Resources* (2022). <https://www.iea.org/reports/unlocking-the-potential-of-distributed-energy-resources/>

<sup>16</sup> J.A. Ortega, O.S. Asfour, and I.Y. Wuni, “A systematic review of renewable energy integration in social housing and its impacts on affordability and community sustainability,” *Discover Sustainability* 7, no. 108 (2026), 9. <https://doi.org/10.1007/s43621-025-02448-3>

Renewal is inevitable for aging buildings. In the near term, DERs can cut costs and improve resilience for owners and tenants. Over the long term, as utilities and regulators become more prepared, DERs can also support broader system value for utilities and customers, while enabling new service-based revenue and cost-recovery opportunities for building owners.