ecotrust canada

# MOVING TOWARD ENERGY SECURITY IN BRITISH COLUMBIA'S RURAL, REMOTE AND INDIGENOUS COMMUNITIES

## Policy Options and Research Areas

March 2020

# Acknowledgements

Ecotrust Canada and its members of the Community Energy team would like to acknowledge the traditional, unceded territories this work was conducted on.

Special recognition is owed to our community partners and contributors: Heiltsuk Nation, Lower Similkameen Indian Band, Quatsino First Nation and Kwakiutl First Nation, and the Regional District of Mount Waddington. We would also like to acknowledge the generous support from Mitacs, the Vancouver Foundation, and the Koerner Foundation.

Additionally, Ecotrust Canada recognizes its Vancouver presence on Musqueam, Squamish and Tsleil-Waututh Nation lands, and its Prince Rupert presence on Coast Tsimshian lands.

# Summary

This report explores a number of drivers of energy poverty in British Columbia's rural, remote, and Indigenous communities. Since its inception in 2017, Ecotrust Canada's Community Energy initiative has worked with communities that are facing significant economic barriers due to high energy costs, and has been collaborating to build more resilient and affordable energy systems. This report includes summaries of three real-world case studies completed with our community partners throughout 2019 based on experiential household surveys and collected energy use data.

These case studies highlight the experiences of households in the province that are facing disproportionately high household energy bills as a result of factors including remoteness, housing quality, and access to energy sources. Based on this research and our ongoing policy work, we have identified several key areas where policies and programs can be improved to better serve the needs of those who currently lack equitable access to basic energy services.

In this report, we examine five factors that contribute to energy poverty in B.C. and we propose five areas of focus for future policy research and engagement. These are summarized below.

| TACKLING ENERGY POVERTY IN BC | | |
|---|---|---|
| # | ISSUES | RECOMMENDATIONS |
| 1 | Tiered electricity rates may impact rural and Indigenous communities disproportionately | Investigate the potential for electricity rate redesign |
| 2 | Programs exist to support those unable to pay their energy bills, but are inadequate and/or not being fully accessed | Increase emergency and ongoing bill support for those most in need |
| 3 | Cleaner, more efficient heating technologies could help relieve energy poverty in many areas, but are not being deployed quickly enough | Increase capital and program support for low-carbon heating system retrofits |
| 4 | Programs designed to relieve energy poverty through energy efficiency have not achieved significant savings compared to rising electricity costs | Create low-risk, accessible market opportunities for deeper energy efficiency and heating system retrofits |
| 5 | Indigenous communities in B.C. are disproportionately impacted by energy poverty and have limited access to supporting programs | Make eliminating energy poverty among B.C.'s on-reserve Indigenous communities a top priority, supporting wider goals of reconciliation and self-determination |

# Content

# Context

## What is energy poverty and energy security?

Energy poverty can be broadly defined as a lack of affordable access to the energy services that contribute to quality of life. Essential energy services include thermal comfort, lighting, water heating, cooking, and transportation. Although there is no standardized definition or condition for energy poverty, it occurs at the nexus of low incomes and high energy bills, where households must spend a disproportionate amount of their income on meeting basic energy needs.

Energy security can be thought of as the opposite of energy poverty – a condition where energy services can be accessed affordably, equitably and safely. Energy security is one component of energy justice – a broader term that encompasses the equity impacts of the entire energy system – including climate change impacts, and the impacts of energy extraction and development.[1]

## Who experiences energy poverty?

Although energy poverty is sometimes perceived as a developing world issue, it is surprisingly prevalent in Canada and other developed nations. In defining a threshold for energy poverty, a metric is sometimes used wherein a household can be considered to be experiencing energy poverty when their household energy spending is twice the median household spending on energy. [2] For example, since the median household in British Columbia spends about 3% of their income on energy, this 'energy poverty line' is around 6% for the province.

Based on this metric, research indicates that at least one million low- and middle-income Canadian households experience energy poverty. In British Columbia, around 272,000 or 15% of households experience energy poverty.[3] Over 17,000 of these households are Indigenous, with an approximate 50/50 split between urban and rural areas.

## Energy poverty disproportionately impacts non-urban communities

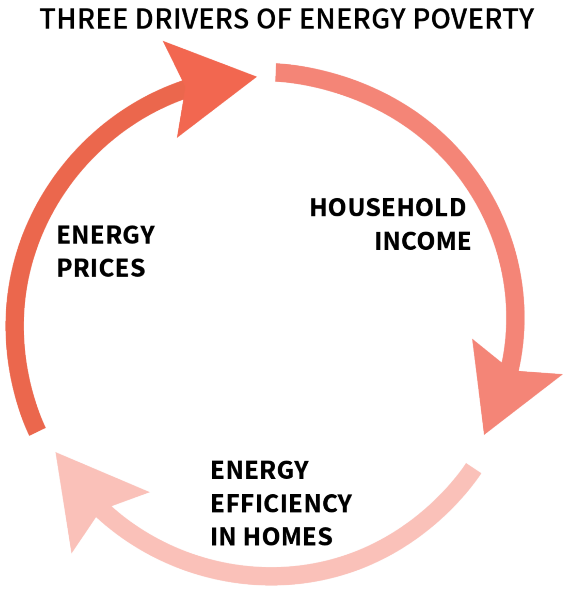
Energy poverty affects both urban and rural populations in British Columbia, but rural, remote and on-reserve Indigenous communities are all more likely to experience energy poverty than urban communities.[4] For example, rural areas tend to have a higher proportion of detached, single-family dwellings (SFDs) and larger homes overall, leading to higher energy demands.

1 Jenkins, K. et. al. (2017). Energy justice: A policy approach. Energy Policy. https://www.researchgate.net/publication/313254633_Energy_justice_A_policy_approach
2 Canadian Urban Sustainability Practitioners (2019). Energy Poverty and Equity Explorer Tool. http://www.energypoverty.ca/
3 Canadian Urban Sustainability Practitioners (2019). Energy Poverty in Canada: a CUSP Backgrounder. http://www.energypoverty.ca/
4 Energy Poverty in Canada: a CUSP Backgrounder

In many non-urban communities, poor quality housing, lower incomes, limited access to cheaper fuels like natural gas, high electricity costs, and in some cases no access to grid electricity all contribute to a higher incidence of energy poverty. The typical policy responses to energy poverty and high utility costs do not translate well to the rural context, where energy demand is greater overall and tends to be inelastic (does not vary greatly in response to price signals).

There are three broad categories of non-urban communities, each with a unique context:

- *Rural* communities are defined here as those without access to the natural gas distribution network. This category of communities tends to experience higher energy costs overall due to the lack of access to this affordable (but polluting) fuel source.
- *Remote* communities are those without access to natural gas or the North American electricity grid. These communities rely instead on local electricity micro-grids, typically powered by expensive and polluting diesel fuel.[5]
- *On-reserve Indigenous* communities can be rural, remote, or neither. Regardless of their proximity to energy sources, these communities often experience a relative lack of access to energy services and are addressing a legacy of low-quality housing. As an example, 7.8% of income is spent on energy in an average Musqueam household versus 2.4% across British Columbia, despite Musqueam's urban location and access to both natural gas and grid electricity.[6]




5 Heerema, D. and Lovekin, D. (2019). Diesel, renewables, and the future of Canada's remote communities. Pembina Institute. https://www.pembina.org/blog/remote-microgrids-intro

6 Maryam Rezaei. (2017). Power to the people: thinking (and rethinking) energy poverty in British Columbia, Canada. University of British Columbia. https://open.library.ubc.ca/cIRcle/collections/ubctheses/24/items/1.0351974

## Health impacts of energy poverty

A lack of access to basic energy services can have profound impacts on human health and well-being. High energy costs exacerbate the social distress and impact of poverty in low-income communities, while inadequate heating systems lead to negative health and social impacts from lower air quality and mould.[7] Indeed, some residents do not heat their homes at all because they cannot afford heating fuel, and many families experience higher instances of asthma and mould-related illnesses as a result of vastly inadequate heating and ventilation systems.[8] Households that experience energy poverty consistently report poorer overall health, both physical and mental.[9]

Families adapt to the high cost of energy through a range of compromises and inconveniences, including the collection of wood for heat, the boiling of water on a wood stove, and the use of cold water for washing - all due to a lack of access to affordable heating fuels. Meanwhile, some families in communities we have worked with have reported being forced to choose between paying their utility bills and feeding their families, which can be a source of anxiety and shame.[10]

# Policy Drivers of Energy Poverty in B.C.

In a developed nation such as Canada, energy poverty is, at its heart, a policy issue rather than one of inadequate resources. There are structural issues inherent in the way that energy is produced, delivered and sold in B.C., resulting in disproportionate impacts to some households. In addition, the majority of energy consumers in the province are reliant on technologies and fuels that are increasingly outdated, resulting in higher costs and emissions.

In order for governments, utilities, and communities to meet their objectives of providing affordable, safe and equitable access to energy, deeper collaboration and increased ambition will be necessary in addressing the drivers of energy poverty. We discuss some of these issues in more detail in this section.

7 Grey, C., Schmieder-Gaite, T., Jiang, S., Nascimento, C., & Poortinga, W. (2017). Cold homes, fuel poverty and energy efficiency improvements: A longitudinal focus group approach. Indoor + built environment : the journal of the International Society of the Built Environment, 26(7), 902–913. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5571750/

8 *Power to the people.*

9 Thomson, H., Snell, C., & Bouzarovski, S. (2017). Health, Well-Being and Energy Poverty in Europe: A Comparative Study of 32 European Countries. International journal of environmental research and public health, 14(6), 584. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5486270/

10 *Power to the people.*

## *Issue #1:* Tiered electricity rates may not be the ideal design for rural and Indigenous communities

Since 2008, most electricity in B.C. has been sold under a tiered rate structure called a residential inclining block (RIB).[11] The concept of the RIB is that an initial amount (or 'block') of electricity consumed each month is charged at a lower rate. For any electricity consumed beyond this initial threshold, a higher rate applies. Tiered pricing is designed to encourage conservation, but experience has shown that not all households are able to use less energy and keep their usage within the lower-priced block. This is particularly evident in larger homes that are heated with electric furnaces or baseboard radiators. For example, our work with the Regional District of Mount Waddington indicates that while apartment residents in the District pay less due to the tiered rate structure, those in single family dwellings pay more when compared to a flat rate (see Case Study #1 below).

The prevalence of larger, detached homes in rural areas typically corresponds to higher household energy usage in these regions. This does not in itself indicate the prevalence of energy poverty, and many rural residents do not have affordability issues heating their homes. However, where homes that are inefficient, due to poor repair or construction, coincide with low or moderate household incomes energy poverty can easily be the result.

B.C.'s tiered rate structure has been the subject of controversy since its introduction and was the subject of a BC Utilities Commission investigation in 2016-2017. A number of parties submitted evidence at that time, some of whom asserted that rural customers heating their homes using electricity were worse off under the RIB rate.[12] The Commission found, however, that low-income customers in the province as a whole (including urban customers) were better off overall under the tiered rate, and that rising electricity costs, rather than rate design, was the primary driver of unaffordability.[13] Despite these findings, FortisBC applied in 2017 to revert to a flat rate for their residential customers;[14] BC Hydro continues to use the RIB rate.

What has been largely missing from conversations around electricity rate design in the province to date is the existence of alternatives to the RIB or a simple flat rate, and the effectiveness of the tiered rate in reducing consumption. Alternatives to these rate structures exist, such as time-of-use pricing or redesigning the existing RIB to better reflect the inelasticity of demand for low-income customers.

Reconsidering electricity rates in B.C. is also a necessary response to province-wide policy direction introduced under 2018's CleanBC climate plan, which encourages electrification of most energy end-uses, including space heating and transportation.[15] The current rate structure does not incentivize widespread fuel switching to non-polluting energy sources, a shift which is necessary for the province to meet its legislated climate targets. Rate support and redesign is necessary to encourage adoption of technologies that will increase electricity consumption, for example, switching from fossil fuel space heating to electric heat pumps, and from gasoline cars to electric vehicles.

11 BC Hydro (2008, Sep 4). BC Hydro's two-step rate designed to drive conservation. https://www.bchydro.com/news/conservation/2008/bc_hydro_s_two-step.html

12 British Columbia Utilities Commission (2017). Report to the Government of British Columbia on the Impact of BC Hydro and FortisBC's Residential Inclining Block, p.13

13 BCUC *Report to the Government of British Columbia*, p.14

14 Potenteau, D. (2019, Mar 1). FortisBC to eliminate two-tiered electrical billing rate. Global News. https://globalnews.ca/news/5014093/fortisbc-to-eliminate-two-tiered-electrical-billing-rate/

15 Government of BC (2018). CleanBC: our nature, our power, our future. https://cleanbc.gov.bc.ca/app/uploads/sites/436/2018/12/CleanBC_Full_Report.pdf

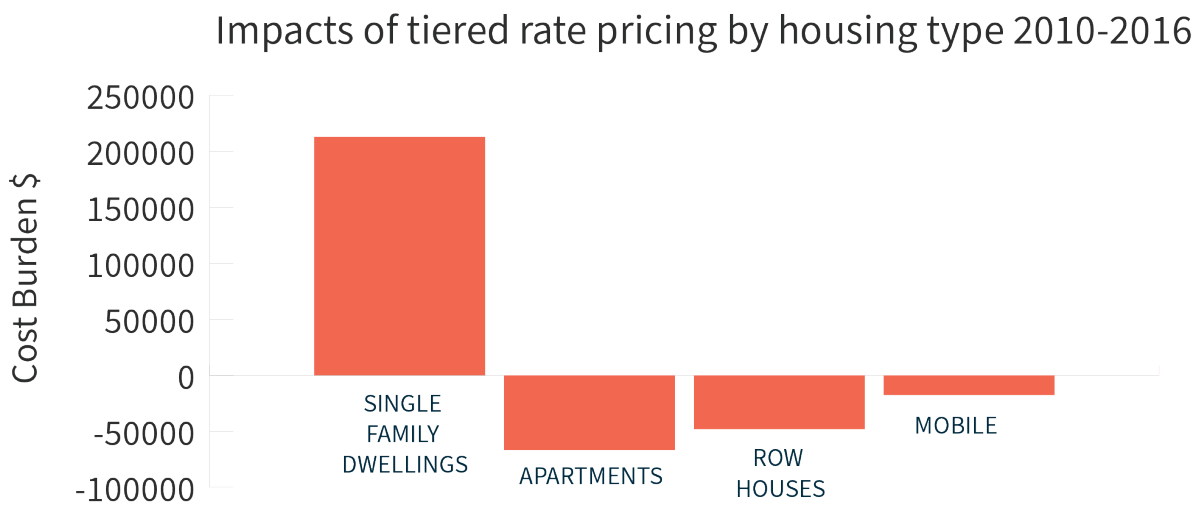
## Case Study #1: Regional District of Mount Waddington

The Regional District of Mount Waddington (RDMW) encompasses the northern end of Vancouver Island, the adjacent islands of the Broughton Archipelago, and a significant area of the southern Central Coast. Within the RDMW are four municipalities, six non-incorporated settler communities, and numerous First Nations living in at least 11 communities.

In partnership with RDMW, we completed a scientific poll with Mustel Group and an energy bill analysis for the region. Our findings demonstrate the prevalence of larger single-family homes with low energy efficiency throughout the region, which are extremely expensive to heat with incumbent electric baseboard radiators and electric furnaces.

Survey participants felt that BC Hydro's two-tiered rate structure disproportionately affects the region due to the prevalence of larger and less efficient homes, contributing to economic distress. We found that:

- **62%** of the region's housing stock and **98%** of the stock in Indigenous on-reserve housing is in detached single-family homes, compared to a provincial average of 44%
- Average household spending on heating in the RDMW is **47% greater** than the provincial average
- In one on-reserve community, electricity costs are **nearly 3 times** the B.C. average
- **33%** of residents reported that they were challenged to pay their household energy bills
- Of RDMW residents who are aware of BC Hydro's two-tiered pricing structure, **63%** said **they did not think it was fair**




The figure above shows the accumulated difference between electricity bills due to the current tier rate and a flat rate in Port McNeill, RDMW. While apartments, row houses and mobile houses have benefited slightly from the BC Hydro tiered rate, residents in single-family dwellings paid a total of more than $200,000 extra due to the tiered rate during the period from 2010-2016. The accumulated extra costs from these households are much higher than the accumulated savings experienced by those living in other housing types.

## *Issue #2:* Programs exist to support those unable to pay their energy bills, but are inadequate and/or not being fully accessed

Compared to some other jurisdictions across Canada, British Columbia has relatively few programs to support utility ratepayers that are facing energy poverty as a result of high energy bills. This is despite the fact that the prevalence of low-income households in B.C. is slightly higher than the national average (14.4% as compared to 12.8%)[16]

In terms of the breadth of programs designed to relieve bill pressure on low-income, rural and in-crisis customers, B.C. lags behind other jurisdictions in Canada. In contrast, our research indicates that the most comprehensive suite of support programs targeting energy poverty exists in Ontario. In addition to demand-side management (DSM) and emergency financing programs, policies in that province provide direct financial relief for high energy bills in the form of bill subsidies and limits. The table below illustrates the relative lack of programs designed to relieve energy poverty in British Columbia, as compared to those in Ontario.

| TARGET CUSTOMERS | TYPE | BRITISH COLUMBIA | ONTARIO |
|---|---|---|---|
| Low income | On-bill credit | X | ✓ |
| Payments behind/in arrears | One-time credit | ✓ | ✓ |
| Rural/remote | Rate subsidy | ✓ | ✓ |
| Rural/remote | Tax credit | X | ✓ |
| Remote/on-reserve | Delivery cost limits | X | ✓ |
| All | Efficiency upgrades | ✓ | ✓ |

In addition to the limited scope of support programs in B.C., our work with communities suggests that existing programs are also not being utilized effectively. For example, BC Hydro's Customer Crisis Fund is a three-year pilot project that started in 2018 to offer financial assistance to residential customers facing a temporary crisis which prevents them from paying their utility bills, putting them at risk of disconnection[17]. However, this program has proved difficult to access for many customers.

Province-wide, BC Hydro rejected 64% of applications made to the Customer Crisis Fund during its first year.[18] These rejections were largely due to the customer not yet facing an imminent disconnection, or due to BC Hydro determining that their financial circumstances did not warrant a grant. Some communities may be facing even higher rejection rates. During a meeting

16 Statistics Canada (2016). Census of Population. Statistics Canada Catalogue no. 98-400-X2016124
17 British Columbia Utilities Commission (2018, June). BC Hydro's Customer Crisis Fund Pilot Program: Frequently Asked Questions. https://www.bcuc.com/consumers/BCUC-FAQ-CustomerCrisisFund-June-2018.pdf
18 BC Hydro (2019). Customer Crisis Fund (CCF) Pilot Program Evaluation Report for Year One). https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/regulatory-filings/reports/2019-07-31-bchydro-customer-crisis-fund-evaluation-report-year-1.pdf

in late 2019, residents from the 'Namgis First Nation in Alert Bay, B.C. told us that approximately 90% of applications that community members have made to the BC Hydro Customer Crisis Fund have been rejected, even in circumstances where they believe they are eligible for the program.

Ironically, in the first year of the program BC Hydro only spent $1.7 million of the $4.5 million that it collected through a $0.25/month rate rider on customer bills. This amounts to less than 40% of the program's planned budget. Due to the low usage, the utility intends to cut the rate rider that funds the program to $0.13/month. The utility claims to have received 6,416 applications requesting assistance from the fund as opposed to their anticipated 15,000 in the first year.[19]

This raises questions as to the extent to which the Customer Crisis Fund has been advertised, the appropriateness of the qualifying criteria, as well as the ease of applying to the fund. It is possible that application requirements (tax return information, asset/liability details, disconnection notice) present barriers significant enough to deter submissions. In addition, FortisBC does not offer an equivalent program to BC Hydro's, leaving a gap in coverage.

A provincial supplementary crisis support program also exists (and does not require a disconnection notice prior to eligibility), but in our experience this program is not as well known.[20] Low-income households need to be made aware of these programs in order to be able to reach out in times of crisis and avoid disconnection. When such programs are not known or able to be are difficult to access, the alternatives can include disconnection or further pressures to reduce energy use, leading to inadequate provision of energy services and a worsening energy poverty situation in some communities.

## *Issue #3:* Cleaner, more efficient heating technologies could help relieve energy poverty in many areas, but are not being deployed quickly enough

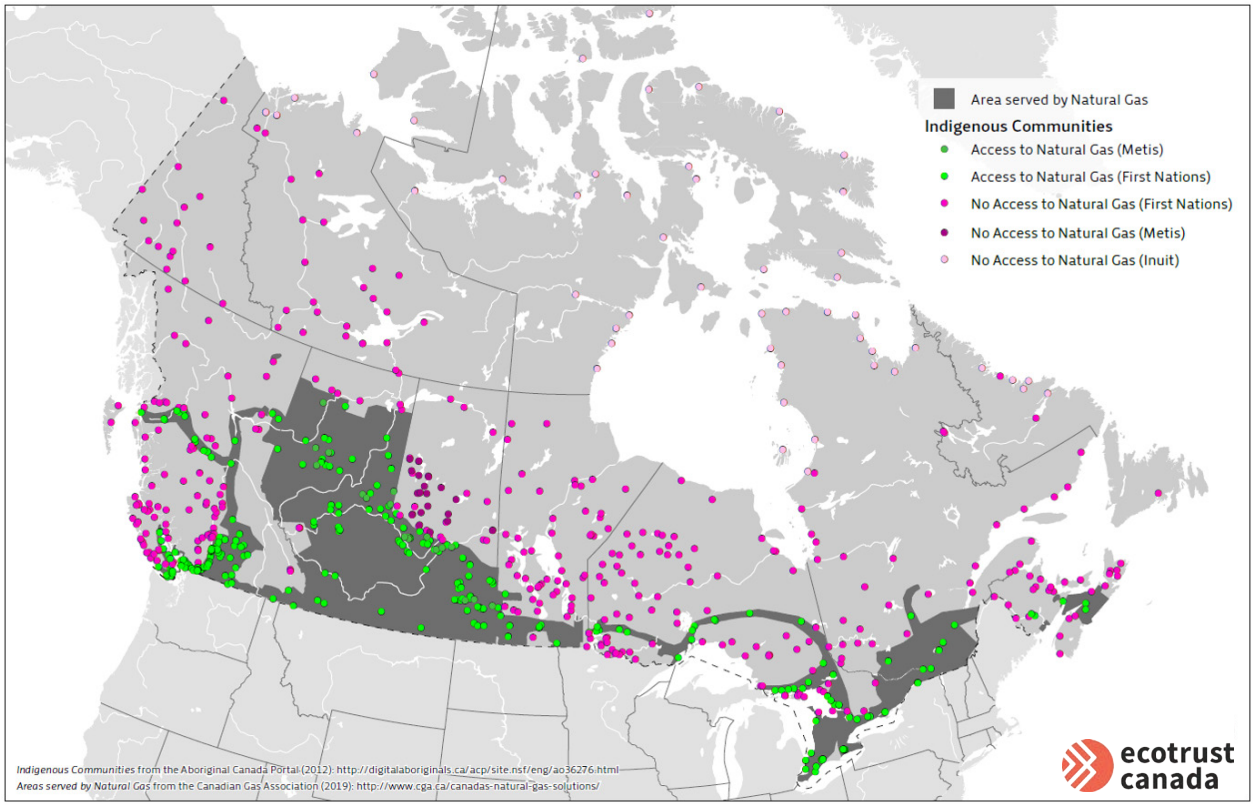
Like many other provinces and states in North America, British Columbia experiences a relatively wide cost differential between electricity and natural gas, with electricity typically costing between 3-4 times more per unit of energy. For several decades, the dominant heating technologies in B.C. have been either electric baseboard heaters or natural gas furnaces, creating a clear cost benefit for natural gas heating and disadvantaging those that heat their homes with electricity. Compounding the problem, many low-income and rental customers in the province live in buildings that are electrically heated but have little agency over their heating fuel supply, even if other options are available.

Not all communities in B.C. have access to the natural gas network, particularly on-reserve Indigenous communities (see figure below). For those communities where connecting to the natural gas network is an option it is not necessarily the most cost-effective way to reduce heating costs. In our initial analysis of a community that is adjacent to the natural gas distribution

19 Penner, D. (2019, August 8). B.C. Hydro crisis fund costs less than half its estimate, utility says. Vancouver Sun. https://vancouversun.com/news/local-news/b-c-hydro-crisis-fund-costs-less-than-half-its-estimate-utility-says

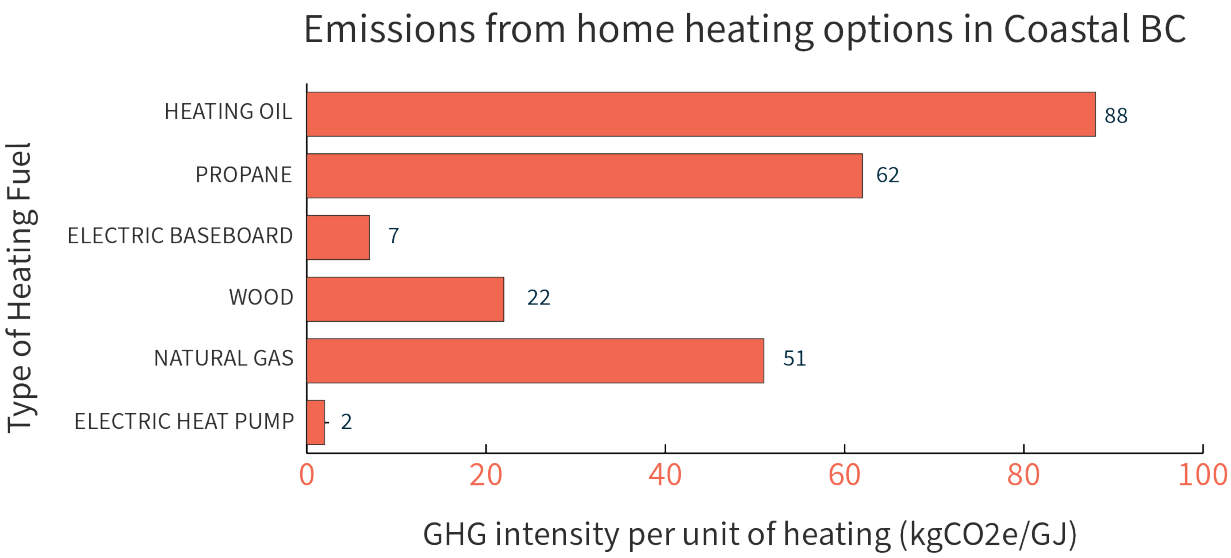
20 Government of BC. Crisis Supplement. https://www2.gov.bc.ca/gov/content/governments/policies-for-government/bcea-policy-and-procedure-manual/general-supplements-and-programs/crisis-supplement

network building envelope retrofits offered the strongest business case of all the measures considered. Installation of a natural gas furnace or ductless heat pump were also found to offer a positive business case, though heat pump retrofits can be installed with considerably lower project complexity (see Case Study #3).




In addition, natural gas is a polluting fuel, and a new connection to the pipeline network is the only common retrofit measure which would increase a community's carbon emissions. Such a strategy would risk conflicting with planned municipal, provincial or federal climate regulations. While efforts are being made to expand the availability of low-carbon renewable natural gas (RNG) as an alternative fuel, supply is constrained at present and costs are significantly higher than fossil natural gas.

The relative GHG emissions produced by different home heating options in B.C., given current industry standard equipment efficiencies, are summarized in the figure below.




Our project experience, particularly with the Heiltsuk First Nation, suggests that heat pump retrofits are one of the most effective and least complex pathways to lowering heating bills for rural and remote customers facing high energy costs in British Columbia. This is largely due to the ability of heat pump technology to provide lower operating costs as compared to electric resistance heating, heating oil, propane or wood heating, while remaining in line with government and community direction at all levels to reduce GHG emissions. The experience of other communities such as Skidegate, which installed heat pumps in nearly all of their 350 homes in 2016, supports this conclusion.[21]

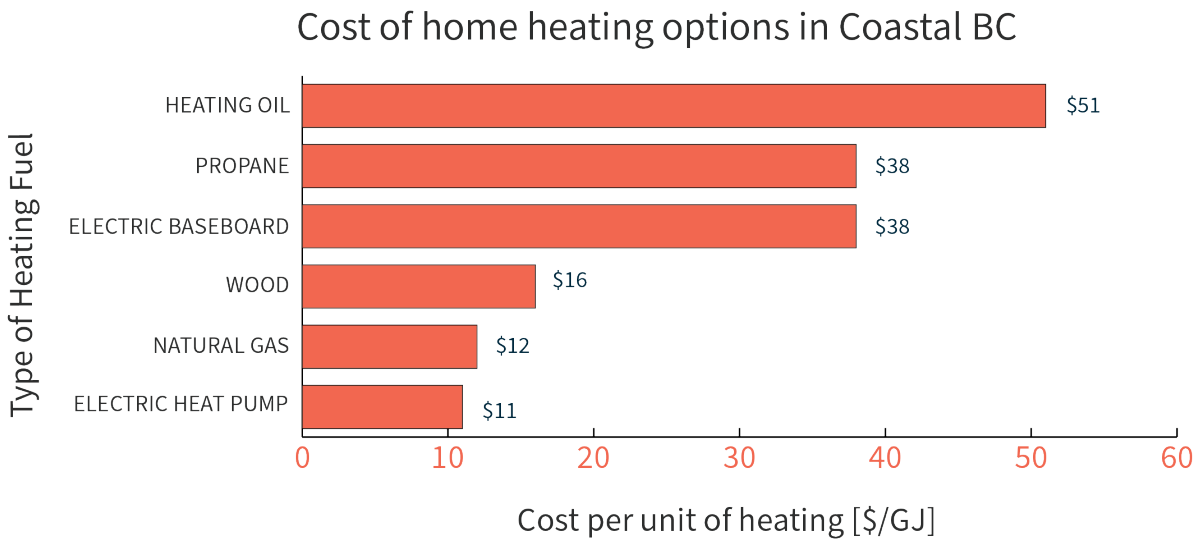
B.C. is unique among Canadian jurisdictions in that most of its population experiences a relatively mild coastal climate year-round. This makes the province an ideal region for deployment of electric air-source heat pump technology, which uses around one third as much energy for space heating as other electric or natural gas appliances, provided it is operated in a relatively warm climate (above -5°C). For colder regions of the province, heat pumps can still be effective, but operating costs may be higher as cold climate heat pump technology is still in active development and efficiencies remain somewhat lower, though the technology is improving rapidly.[22]

21 Smilie, S (2018). Evaluation of the Impact of Heat Pumps in Skidegate, Haida Gwaii. https://sustain.ubc.ca/sites/sustain.ubc.ca/files/Sustainability%20Scholars/2018_Sustainability_Scholars/Reports/2018-23%20Evaluation%20of%20the%20Impact%20of%20Heat%20Pumps%20in%20Skidegate%2C%20Haida%20Gwaii_Smillie.pdf

22 Gerdes, J. (2019, Apr 5).
Electrification Myth-Busting: Heat Pumps Are Ready for Cold Climates Today. *Greentech Media*. https://www.greentechmedia.com/articles/read/electrification-myth-busting-heat-pumps-are-ready-for-cold-climates-today

Heat pumps are also unique among heating system options in that they have the potential to provide summer cooling as well as heating, thus contributing to thermal comfort and future climate resiliency for community members and reducing the need for supplemental air conditioning equipment. When heat pumps replace radiant heat sources such as electric baseboard heaters, they can also increase ventilation levels in homes and potentially reduce issues of poor air quality and high moisture levels that can lead to adverse health impacts.

The relative cost of space heating with different fuels is presented in the figure below. Note that the below analysis reflects the cost to heat an average home in a coastal B.C. climate, based on 2019 utility rates and industry standard equipment efficiencies.




Using newer electric air-source heat pump technology has the potential to bring operating costs in line with the cost of heating with natural gas. However, the initial cost of a heat pump remains higher than that of a gas furnace. In response, heat pumps are being increasingly supported by policies at the provincial and municipal levels. The province's 2018 CleanBC plan and subsequent announcements introduced rebates of up to $10,000 for customers switching from fossil fuel heating to electric heat pumps, acknowledging that this technology provides a cost-effective pathway for reducing GHG emissions from buildings and supports the province's overall direction toward electrifying its economy. In addition to provincial rebates, several municipalities in the province have introduced policies supporting heat pump adoption, including top-up incentives ranging from $350 to $6000.[23] Unfortunately, a remaining capital cost differential persists as a barrier for many, and not all customers are not aware of these incentives.

As a result of these persistent barriers and the long turnover time for replacement of heating appliances, adoption of heat pump technology is still progressing slowly in B.C. More needs to be done to make heat pump technology affordable and accessible to all, particularly in homes that are still heating with high-cost oil, propane or electric baseboard heaters, where these older technologies can be one of the key drivers of energy poverty.

23 Government of BC (2019). CleanBC: Better Homes. https://betterhomesbc.ca/

## Case Study #2: Heiltsuk Nation

Bella Bella is the main community of the Heiltsuk people, whose unceded territory encompasses over 35,000 square kilometers along the Central Coast of British Columbia. The remote reserve has around 1,200 residents and 410 homes. The majority of homes in Bella Bella are reliant on hybrid wood and diesel furnaces, some of which are more than 25 years old. Low-efficiency electric systems such as baseboards or plug-in heaters provide additional heating options. Fuel shipments travel hundreds of kilometers to reach the community and are stored in large storage tanks along the shoreline. In 2017 and 2018, Heiltsuk Nation and Ecotrust Canada engaged in a project that replaced diesel furnaces with air-source heat pumps in 37 homes.

In 2019, a review of the project was initiated. The two main purposes of the review were to understand the perspectives of community members and to assess the effects on household comfort and heating costs. Ultimately, the goal was to assess the viability of heat pumps as a solution to improve the residential heating experience in Bella Bella. Since the pilot, residents have reported significant energy cost savings and high satisfaction with their heat pump systems, and the community is now working with Ecotrust Canada to explore the potential for retrofitting all of the remaining homes in the community.

Based on this and our other community partners' experience, we believe that heat pump technology, if deployed at scale and supported by capital cost incentives and financing instruments, has the potential to dramatically transform the landscape of energy poverty in coastal British Columbia. Our survey found that:

- **93%** of residents are 'happy' or 'very happy' with their heat pump system
- **87%** of residents would recommend a heat pump to other members in the community
- **75%** of residents **feel better** knowing they are heating their home without fossil fuels
- Based on a limited sample of 5 households, the total annual energy cost savings after switching from a diesel furnace to a heat pump averaged **$1,650 per home**
- Cultural activities are also better supported by the new heating system, with one resident taking advantage of improved airflow from the heat pump to dry seaweed.

## *Issue #4:* Programs designed to relieve energy poverty through energy efficiency have not achieved significant savings compared to rising electricity costs

Reducing the cost burden of high energy bills often means spending money upfront. Upgrades to insulation, air sealing, ventilation and heating equipment typically involve high capital costs and can have long payback periods. This can be a barrier for many low-income households. B.C. has seen several different programs designed to encourage these DSM and retrofit activities, from general rebate and incentive programs, to assistance programs specifically targeted at low-income households.

B.C.'s Energy Conservation Assistance Program (ECAP) is an energy conservation program designed and run through B.C.'s main utility providers: BC Hydro, FortisBC and Pacific Northern Gas Ltd. ECAP was introduced in 2008 to improve comfort and efficiency in low-income households. It provides free home energy assessments and presents retrofit options to eligible households that fall below a low-income threshold. ECAP is intended to help lower-income households reduce their energy bills through retrofits. However, it has encountered several challenges that have limited its effectiveness to date.

Low uptake has been one of the biggest issues for the ECAP program. Overall, BC Hydro estimates that 17,000 households have participated in ECAP since 2008,[24] out of over 350,000 eligible households.[25] This cumulative figure represents just over 6% of the approximately 272,000 households in B.C. that are experiencing energy cost burdens high enough to meet the above definition of energy poverty.[26] Our 2019 survey of the Regional District of Mount Waddington revealed that only 4% of respondents had participated in ECAP in the past 10 years, while at least 41% of respondents fall below BC Hydro's low-income qualification.

Another issue is that energy savings options offered through the program are relatively prescriptive and tend to favour lower-impact measures, such as replacement of lighting, showerheads, and basic draft-proofing. Homes in need of major improvements, such as insulation upgrades, may be eligible for an "advanced weatherization" stream of the program, but this stream has also seen a low uptake. Only 9% of the 1,500 households expected by BC Hydro to participate in advanced ECAP upgrades by 2011 actually did so.[27] A more recent review in 2018 indicated that "participation in Advanced Weatherization was too low to enable statistical analysis";[28] however, during 2018-2019 this figure appeared to be between 10-20% of ECAP participants province-wide.[29]

As a result of these program design and implementation issues, relatively few homes in

24 Including BC Hydro and FortisBC natural gas customers but excluding FortisBC electric customers. Personal Communication: Brenda Willington (BC Hydro), 2020.

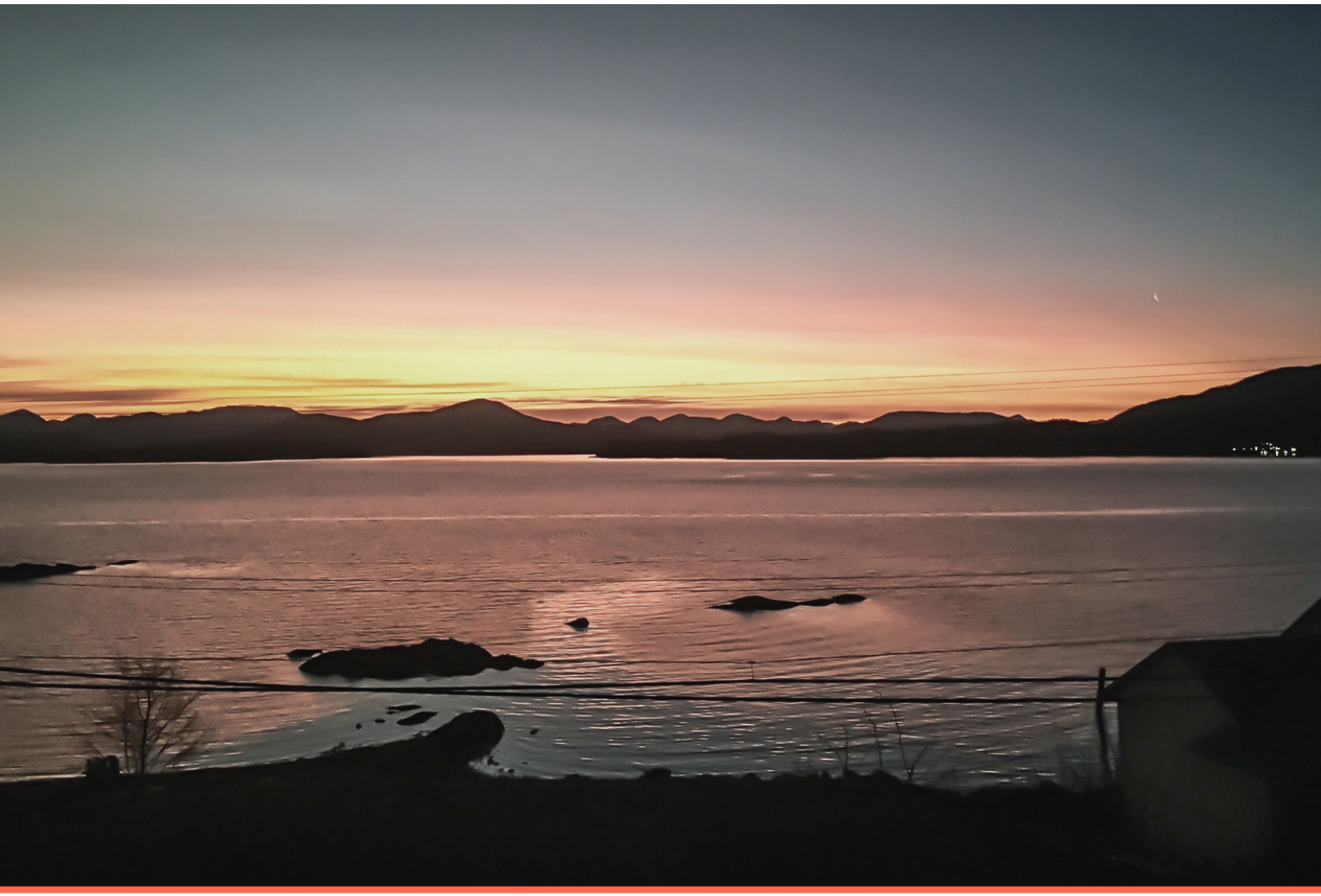
25 BC Hydro uses a threshold of 1.3 times Statistics Canada's low income cut-off (LICO) threshold to determine ECAP program eligibility. It estimates that 21% of its 1.7 million residential customers, or around 357,000 households, are eligible based on this criterion. This figure does not include eligible FortisBC electric customers.
Sources: BC Hydro (2018). Demand Side Management Milestone Evaluation Summary Report F2018 and BC Hydro (2015). Rate Design Application.

26 *Energy Poverty in Canada: a CUSP Backgrounder*

27 *Power to the people.*

28 BC Hydro (2018, Dec). Demand Side Management Milestone Evaluation Summary Report F2018. https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/regulatory-filings/rra/2019-01-15-bch-d66-f2018.pdf p.11

29 Personal Communication: Brenda Willington (BC Hydro), 2019 and Carol Suhan (FortisBC), 2019.



B.C. have been upgraded under ECAP, and those households that have participated generally only realize modest efficiency improvements. In most cases, the resulting savings have not meaningfully offset increases in the cost of electricity overall (see Case Study #3 below). Energy savings per household during the early years of the ECAP program were estimated at 6%[30], and had not risen significantly as of 2016.[31] This figure is largely insignificant when compared to the steady rise in electricity rates in B.C., which have increased by almost 50% in the last decade[32] and are set to further rise 6-8% over the next five years. [33]

30 BC Hydro (2012). Power Smart for Low-Income Housing: the Energy Conservation Assistance Program (ECAP) Program Evaluation F2010 and F2011. https://www.bcuc.com/Documents/Proceedings/2016/DOC_47646_B-5_BCH-DSM-IR-Responses.pdf p.53

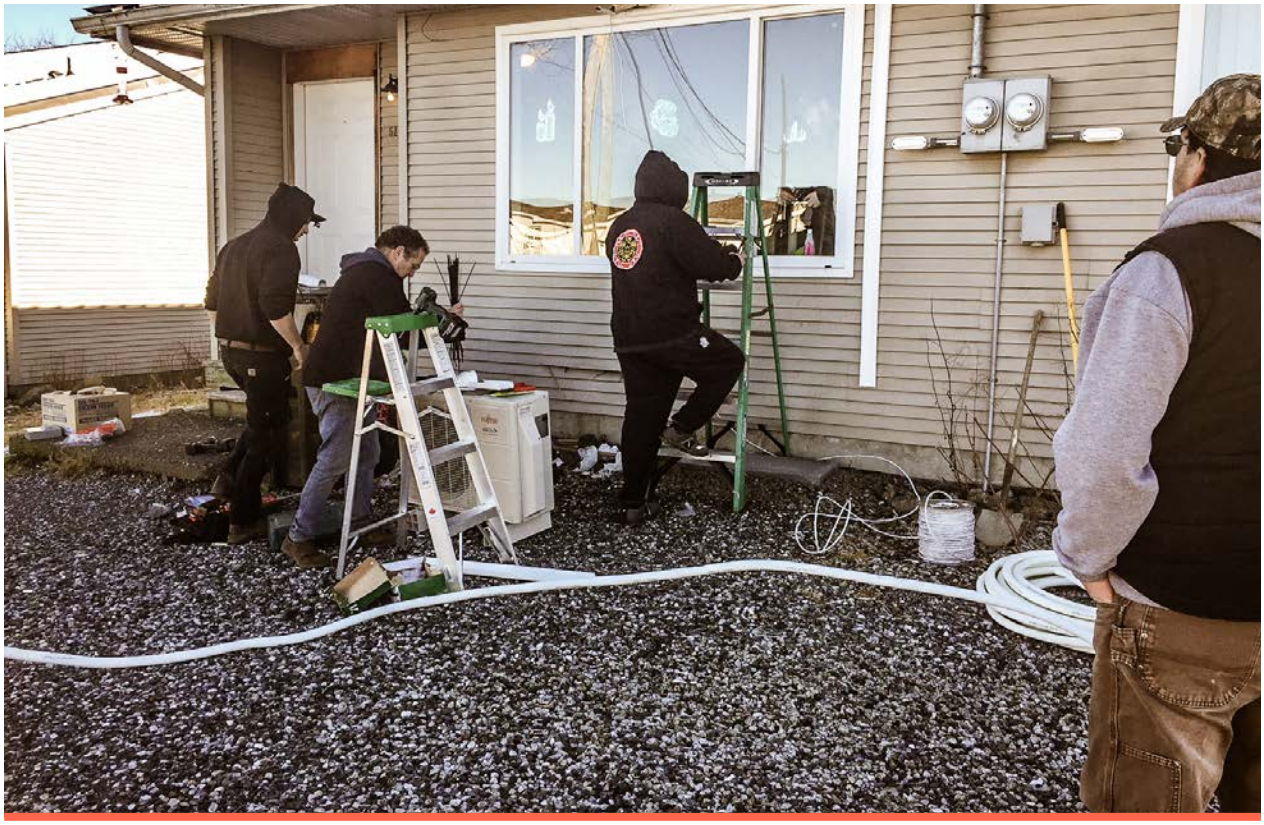
31 BC Hydro (2018). Demand Side Management Milestone Evaluation Summary Report F2018, Table 6.

32 Foster, A. (2016, Mar 19). BC Hydro's 4% rate increase is 2.6% above inflation and compounding to a 55% increase for businesses. Kambo Energy Group. https://www.kambo.com/bc-hydros-4-rate-increase-is-2-6-above-inflation-and-compounding-to-a-74-increase-for-businesses/

33 CBC News (2019, Aug 23). BC Hydro applies to lower electricity rates next year, but rates still going up long-term. https://www.cbc.ca/news/canada/british-columbia/bc-hydro-rates-decrease-application-1.5258128

The systemic issues of low participation and overall energy savings facing the ECAP program to date are summarized in the table below.

| ECAP PROGRAM ISSUES | |
|---|---|
| B.C. households experiencing energy poverty | 272,000 |
| Estimated households that are eligible for ECAP | 350,000 |
| Estimated households that have participated in ECAP since 2008 | 17,000 |
| Estimated households that have received advanced upgrades under ECAP | 1,700 - 3,400 |
| Overall energy savings per participating ECAP household | 6% |
| Projected electricity rate increase over the next 5 years | 6-8% |



## Case Study #3: Lower Similkameen Indian Band

The Lower Similkameen Indian Band (LSIB) is a First Nation located in the Southern Interior of British Columbia, with about 100 homes and 250 residents living on-reserve. We partnered with LSIB on a study to better understand the current realities of residential heating for members. LSIB housing staff identified heating quality and cost as potentially significant contributors to distress for band members.

FortisBC provides electricity to the reserve, which mostly utilizes a combination of wood stoves (62%) and electric systems (36%) for home heating. Aging homes, limited wood access, chimney fires, and a wide variation in seasonal temperatures were all identified as issues exacerbating the community's inadequate access to energy services. We found that:

- The average cost of energy for households heating with electric radiators or furnaces was over **$3600 per year**
- **61%** of residents felt that heating costs are very unaffordable or unaffordable
- From 2010 to 2018, annual household electricity consumption declined by 17% on average, yet the average cost of electricity increased 44%. During the same time period, overall annual household electricity **spending went up by 19%**
- This trend and comments from residents indicate that energy conservation efforts are not enough to make up for the rise in energy prices. Some residents may be **heating their homes inadequately** in an attempt to reduce costs.
- **61%** of residents were interested in installing a more efficient heating system

We analyzed a number of potential retrofit options for the community, and found that basic insulation improvement had the highest potential financial return, followed by the installation of a natural gas furnace or ductless electric heat pump. Both improvements to the home structure and installation of more efficient heating systems were supported by the majority of households we surveyed. Other retrofit options included installing wood or pellet stoves, and replacing doors and windows, but each of these had lower estimated financial returns and/or greater complexity.

Our experience with LSIB demonstrated that in some communities, efforts to conserve energy are not enough to keep up with rising electricity costs, leaving residents with the choice of very high energy bills, or reliance on a labour-intensive form of heating such as wood stoves. It also shows that measures that have been installed in some homes to date, such as heat pumps, have been effective at providing heat at lower cost than the electric furnaces they replaced.

## *Issue #5:* Indigenous communities in B.C. are disproportionately impacted by energy poverty and have limited access to supporting programs

Energy poverty is experienced across Indigenous communities of all types in Canada, driven in large part by a legacy of low-quality housing. On-reserve Indigenous communities experience significant issues related to inadequate housing and overcrowding, compounded by a tendency for reserve housing to be built from poor quality building materials and a lack of funds for building maintenance and upgrades.[34] The result is that on-reserve homes typically have inadequate ventilation that leads to poor air quality as well as mould and moisture issues, and leaky building envelopes that result in significantly higher energy use.[35]

Virtually all on-reserve Indigenous communities are challenged by this issue, resulting in energy poverty regardless of what fuel they are using or whether they are on or off-grid. Since poor quality housing and lack of access to affordable heating fuels are the primary factors contributing to energy poverty, solutions must be developed to address this challenge across all Indigenous communities, regardless of their location or primary heating energy source.

The rural location of many Indigenous communities also means that more affordable energy sources, such as natural gas, are often unavailable. Data from British Columbia shows that just 40% of Indigenous communities have access to natural gas, compared to 95% across all communities in the province. Alternatives to natural gas include diesel fuel, propane, and electricity, each of which can cost three to five times as much per unit of energy provided. This issue makes the adoption of energy efficient technologies, such as heat pumps, more critical to these communities.

Any discussion of policy pertaining to Indigenous communities must also be based in an understanding of colonialism and contextualized within the Indian Act of 1876. For example, Section 18 of the Indian Act dictates that reserve lands are "held by Her Majesty for the use and benefit of the respective bands for which they were set apart", setting out the reality that homeownership is dramatically different on-reserve than in other places where simple ownership is the norm.

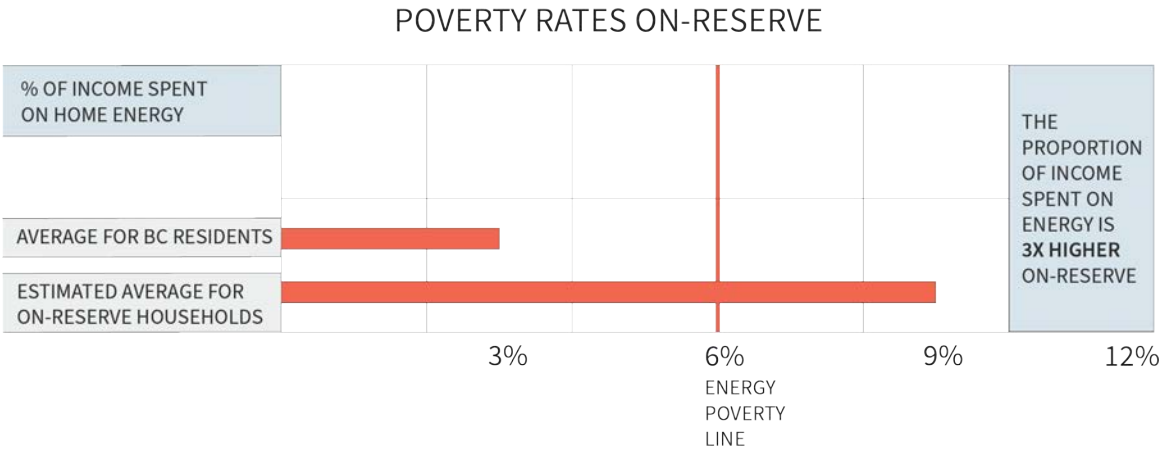
While it is possible for a band member to obtain a "Certificate of Possession" for their home on-reserve, Section 89 of the Act restricts the seizure of property on-reserve. This means that band members cannot use their homes as collateral to securitize a loan, thereby limiting the potential for private lending for housing upgrades and retrofits. While banks may lend to a band that can in turn administer funds on behalf of band members, the implication overall is that the main source of funding for efficiency projects on-reserve is government-administered grants.

As a result of the above and other factors, we estimate that energy poverty rates are up to three times higher on Indigenous reserves than the provincial average.[36]

34 Standing Senate Committee on Aboriginal Peoples (2015). Housing on First Nation Reserves: Challenges and Successes. Canada: Parliament, Senate. https://sencanada.ca/content/sen/Committee/412/appa/rep/rep08feb15b-e.pdf

35 Lawrence, R., & Martin, D. (2001). Moulds, moisture and microbial contamination of First Nations housing in British Columbia, Canada. International Journal of Circumpolar Health, 60(2), 150–156. https://www.ncbi.nlm.nih.gov/pubmed/11507964

36 Based on our energy analysis work with community partners, and estimates completed in 2017. See http://ecotrust.ca/clean-affordable-heating-solutions-for-rural-and-indigenous-communities-in-b-c/




Further, building effective program engagement within Indigenous communities can be challenging. For example, in addition to low overall participation rates, the ECAP program has faced challenges within Indigenous communities throughout its history, partly due to a lack of trust between residents and program delivery contractors.[37] According to FortisBC, as of 2019 only about half of Indigenous communities in their natural gas service area had participated in ECAP, and within these communities, less than a quarter of the eligible homes applied.[38] Similarly, just 15% of BC Hydro ECAP participants overall were from Indigenous communities in 2018-2019.[39] FortisBC reports that since hiring a new program contractor in 2018, participation has improved by 300%. Participation in ECAP is much higher in FortisBC's electric service territory, with all Indigenous communities reported to have participated.[40] This highlights the importance of effective relationship-building with communities and the need to better understand why programs have been successful in some communities but not others.

A new BC Hydro and FortisBC initiative, the Indigenous Communities Conservation Program (ICCP), aims to improve on some of the shortcomings of ECAP by engaging and training Indigenous community members to lead energy savings efforts in their communities. After initially being available only in BC Hydro's service area, the program will be launched in FortisBC's service area as well in early 2020. The energy efficiency rebates offered as part of this program are significant and are outlined in Appendix II. However, BC Hydro recommends the program for communities that have already participated in ECAP, but this is not mandatory. It remains to be seen whether the program will increase Indigenous community participation in DSM programs overall. [41]

A new Indigenous Energy Coach program, announced by the provincial government as this report was being finalized, has the potential to fill some of the gaps left by ICCP and includes a significant new heat pump incentive for Indigenous communities. While this program incorporated some key elements necessary for success in remote Indigenous communities — such as allowing the retention of wood stoves for backup — it is unfortunately only available to households that are switching from fossil fuel heating to electric heat pumps, limiting eligibility for many communities that rely on expensive and inefficient forms of electric heating.[42]

37 *Power to the people*
38 Personal communication: Carol Suhan, FortisBC (2019, August 6). *Follow Up- Data Request Re: ECAP Participation.*
39 Personal communication: Brenda Wellington, BC Hydro (2019, August 14) *RE: RDMW data and program info*
40 Personal communication: Robert Stupka, FortisBC (2020, March 5). *Re: ICCP and other info for report*
41 Personal Communication: Carol Suhan, FortisBC (2020, February 20). ICCP and other info for report and BC Hydro (2019). Indigenous Communities Conservation Program. https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/power-smart/residential/programs/indigenous-communities-conservation-program-info.pdf
42 BC Government (2020). CleanBC Indigenous Community Heat Pump Incentive. https://betterhomesbc.ca/rebates/icec-offer/

More needs to be done to make energy bill reductions programs accessible to all Indigenous communities in the province, regardless of their current heating system or previous program engagement.

# Policy Solutions and Recommendations

Ecotrust Canada has worked closely with communities experiencing high energy costs since 2017, and with 25 years of working with rural, remote, and Indigenous communities we have experienced firsthand the impact that innovative projects and approaches can have on health and well-being. Based on this experience and our research to date, we have identified several priority areas for policy development and engagement going forward. These priorities represent our intention of moving B.C. away from being a jurisdiction known for higher levels of energy poverty and inequitable energy access, toward a vision of fair and inclusive energy access for all – a vision for energy security.

## *Recommendation #1:* Investigate the potential for electricity rate redesign

Every public utility in B.C. is required to submit regular rate applications to the BC Utilities Commission, the quasi-judicial entity which approves or disapproves their design and amount. Historically, utilities in B.C. (and in much of the world) have tended towards either flat rates or inclining block rates for residential customers.[43] For large commercial and industrial customers, other rate structures (including demand charges) are also common.

BC Hydro has utilized a tiered, inclining block rate structure since 2008. B.C.'s second-largest electric utility, FortisBC, also adopted a tiered rate structure starting in 2012. The tiered structure was imposed by the BCUC with the intention of encouraging energy conservation. However, it is noteworthy that in 2017 FortisBC requested that the rate structure for their residential customers be returned to a flat rate, and in 2019 the tiered rate started to be phased out.[44]

While a flat rate may not necessarily be the best solution in terms of striking a balance between encouraging conservation and ensuring affordability of basic energy services, FortisBC's experience demonstrates that the inclining block rate structure has been met with resistance from both utilities and their ratepayers, and its successful overturning may set a precedent for a similar change to BC Hydro's rates in the coming months or years.

43 Lazar, J. (2013, May). Global Best Practices in Residential Electric Rate Design. The Regulatory Assistance Project. https://www.raponline.org/wp-content/uploads/2016/05/rap-lazar-globalratedesign-camunicipalratesgroup-2013-may.pdf

44 *FortisBC to eliminate two-tiered electrical billing rate.*

When considering future rate applications, both BC Hydro and FortisBC should consider the basic objectives of a rate structure (as popularized by James Bonbright in 1961); these are to:

a) Distribute costs fairly among customers

b) Optimize efficiency

c) Recover costs and realize allowable profits (revenue requirement)[45]

It is an oft-quoted principle of utility ratemaking (and in B.C., a legislated requirement[46]) that rates should not be "unduly preferential" to certain categories of customers. However, the concept of not discriminating unduly against certain groups is a critical extension of this principle. In an effort to avoid the perception of preferential treatment, utilities and regulators in B.C. have perhaps overlooked the extent to which rural, remote, and Indigenous communities are impacted by their geographic location, housing stock, and access to energy sources.

In justifying the negative bill impacts of the tiered rate structure to certain customers, BC Hydro in 2015 argued that these impacts were an 'incidental result from a pricing scheme that otherwise functions appropriately for the rest of the province'.[47] However, we found that these customers include some of the households most at-risk for energy poverty in the province, suggesting that the rate structure requires more attention in order to avoid discriminatory outcomes.

Furthermore, changes in the utility industry, such as the increased prevalence of network-connected metering infrastructure, means that alternative rate designs for residential customers are now increasingly feasible. Perhaps the most discussed among these rate structures is time-of-use (TOU) pricing, which ties the cost of energy to when it is produced and consumed.[48] Such a rate structure encourages conservation during times of peak demand, reducing costs to the utility.

TOU pricing is not entirely unfamiliar to British Columbia, as FortisBC has previously allowed this pricing structure as an option to consumers as an opt-in measure. However, participation in this rate structure has been limited and the option was closed to new residential customers in 2012, coinciding with the implementation of the inclining block structure as default. In 2019, the BCUC rejected FortisBC's application to reinstate the TOU rate, citing a lack of customer engagement, unknown financial impacts and unclear compatibility with the new CleanBC's mandate of electrification.[49]

TOU pricing, while a promising option enabled by advanced metering infrastructure, is not without its issues and in its current form would continue to penalize those relying on electricity to heat their homes, as this demand cannot be easily shifted to other times of the day. A rate structure that includes TOU pricing must also ensure that basic needs can be affordably met for all, with attention to differences in building stock, climate, and access to energy across the province.

For example, TOU pricing could be combined with an essential services usage block that is

45 Rauch, J. (2014, Mar 27). Cost of Service Study & Rate Design. Maine Public Utilities Commission. https://pubs.naruc.org/pub.cfm?id=5388D962-2354-D714-51A8-F5FD79C756F5

46 Government of BC (2019). Utilities Commission Act. http://www.bclaws.ca/civix/document/id/complete/statreg/96473_01

47 British Columbia Utilities Commission (2017, Jan 20). British Columbia Hydro and Power Authority 2015 Rate Design Application: Decision. https://www.bcuc.com/Documents/Proceedings/2017/DOC_48618_01-20-2017_G-5-17_BCH-2015-RDA-Decision-WEB.pdf

48 Trabish, H. (2019, Jan 28). An emerging push for time-of-use rates sparks new debates about customer and grid impacts. Utility Dive. https://www.utilitydive.com/news/an-emerging-push-for-time-of-use-rates-sparks-new-debates-about-customer-an/545009/

49 British Columbia Utilities Commission (2019, Feb 25). 2017 Cost of Service Analysis and Rate Design Application: Decision. https://www.bcuc.com/Documents/Proceedings/2019/DOC_53486_2019-02-25-Decision-FBC-2017-CoS-RDA.pdf

not time-dependent. This block could be larger (and the price lower) for homes that are heated with electricity, encouraging fuel switching away from fossil fuels. There are also opportunities to adjust pricing models to explicitly reduce impacts on low-income and/or Indigenous communities (for example, by eliminating basic monthly charges).

In the near future, the regulatory and business objectives of utilities will need to evolve in B.C., as the reality of a highly distributed and low-carbon electricity grid begins to emerge, and as climate emergency response policies demand the rapid decarbonization of energy services. The traditional, centralized method of energy delivery that places no monetary value on environmental or social objectives will not last forever, and a new set of "Bonbright" principles will be needed in order to redefine the role of the public utility in this new reality.

## *Recommendation #2:* Increase emergency and ongoing bill support for those most in need

There are a number of programs active in other provinces that are specifically designed to alleviate high energy bills and reduce the prevalence of energy poverty for low-income customers. Within Canada, Ontario is perhaps the jurisdiction with the most comprehensive suite of programs, several of which could potentially be adapted for use in B.C. The table and descriptions below compare the programs available in B.C. and Ontario in more detail:

| TARGET CUSTOMERS | TYPE | BRITISH COLUMBIA | ONTARIO |
|---|---|---|---|
| Low income | On-bill credit | X | OESP |
| Payments behind/in arrears | One-time credit | Customer Crisis Fund | LEAP |
| Rural/remote | Rate subsidy | Zone II subsidy | RRRP |
| Rural/remote | Tax credit | x | NOEC |
| Remote/on-reserve | Delivery cost limits | x | DRP/FNDC |
| All | Efficiency upgrades | ECAP/ICCP/CleanBC | HAP/AAF |

### Ontario Electricity Support Program (OESP)

OESP provides bill relief to all eligible lower-income electricity customers. Under OESP, a monthly credit of between $35-113 is directly applied to electricity bills, with the amount determined by the number of people in the home and the combined household income.[50] No comparable program exists in B.C., though the concept of a

50 Ontario Energy Board (2015). Ontario Electricity Support. https://ontarioelectricitysupport.ca/

"lifeline rate" for low-income customers has been identified as a priority by the current B.C. Government.[51]

### Low-Income Energy Assistance Program (LEAP)

LEAP provides emergency financial aid to customers behind on their natural gas or electricity bills or in arrears. Again, the size of credit is determined by the number of people in the home and the combined household income. Customers facing disconnection can receive up to $600 in support, similar to BC Hydro's Customer Crisis Fund. In contrast to BC Hydro's program however, LEAP is available to homes heated with natural gas as well as electrically heated homes.[52]

### Rural or Remote Electricity Rate Protection (RRRP) and Northern Ontario Energy Credit (NOEC)

RRRP and NOEC both provide financial assistance to customers in rural or remote areas of Ontario. The programs support areas of the province where the cost of providing electricity is dramatically higher than in towns and cities. RRRP is funded through charges on all electricity ratepayer bills and provides a monthly credit of around $30,[53][54] whereas NOEC is available as an income tax credit.[55] BC Hydro operates under a scheme similar to RRRP wherein electricity rates in remote communities (Zone II) are subsidized by ratepayers in the rest of the province.[56]

### Distribution Rate Protection (DRP) and First Nations On-reserve Delivery Credit (FNDC)

DRP ensures a maximum monthly distribution charge is set for customers in rural or remote areas. Until recently, this program applied to many low-income customers throughout the province, but rate protections are being rolled back by the current government.[57] Subsidies are dependent on customer locations and the utilities that service their region.[58]

On-reserve First Nations are exempt from the DRP program due to their eligibility for the First Nations On-reserve Delivery Credit. FNDC provides a credit for 100% of delivery costs to on-reserve homes that are serviced by licensed utility providers. Customers must be members of the respective bands.[59]

In B.C., delivery charge limits do not exist in the same way but are part of rates that must be approved by the BCUC. Both BC Hydro and FortisBC's basic charges and delivery charges vary depending on the service area.[60,61]

51 https://news.gov.bc.ca/releases/2018EMPR0004-000311
52 Government of BC (2018, Mar 1). Government will help low-income families manage electricity costs. https://www.oeb.ca/rates-and-your-bill/help-low-income-consumers/low-income-energy-assistance-program
53 Hydro One (2019). Rural Customers FAQ. https://www.hydroone.com/supportcentre_/Pages/FAQs/ruralcustomersfaq.aspx
54 BC Hydro (2015). Rate Design Application (RDA)Residential Rate Workshop - May 21, 2015 https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/corporate/regulatory-planning-documents/regulatory-matters/2015-05-21-bch-2015-rda-wksp-9b-disc-gd.pdf
55 Government of Canada (2019). Northern Ontario Energy Credit Questions and Answers. https://www.canada.ca/en/revenue-agency/services/child-family-benefits/provincial-territorial-programs/northern-ontario-energy-credit-questions-answers.html
56 *Rate Design Application (RDA)Residential Rate Workshop - May 21, 2015*
57 Hill, B. and Mauracher, J. (2019, Jan 22). Doug Ford scrapping rate protection for more than 325,000 Ontario hydro customers. *Global News*. https://globalnews.ca/news/4871939/changes-by-doug-ford-could-mean-ontarians-paying-more-for-electricity/
58 Government of Ontario (2019). O. Reg. 442/01: RURAL OR REMOTE ELECTRICITY RATE PROTECTION. https://www.ontario.ca/laws/regulation/010442
59 Government of Ontario (2019). O. Reg. 197/17: FIRST NATIONS DELIVERY CREDIT (ON-RESERVE CONSUMERS UNDER SECTION 79.4 OF THE ACT. https://www.ontario.ca/laws/regulation/170197
60 FortisBC (2019). Residential natural gas rates. https://www.fortisbc.com/accounts-billing/billing-rates/natural-gas-rates/residential-rates
61 BC Hydro (2019). Zone II Rates. https://app.bchydro.com/accounts-billing/rates-energy-use/electricity-rates/zone-2-rates.html

**Home Assistance Program (HAP) and AffordAbility Fund (AAF)**

Ontario's Home Assistance Program is similar to B.C.'s low-income ECAP program, and includes offers such as LED lighting, ENERGY STAR® appliances, insulation, and weatherizing.[62] In addition, AAF is an independent program funded by the Government of Ontario designed to support residents who do not quality for low-income programs such as OESP or LEAP, but who wish to reduce their electricity costs and usage rates.[63] B.C. also offers rebate programs for households that do not qualify for ECAP as part of CleanBC's Better Homes program.

While there are many differences between the two jurisdictions (including a lower cost of energy overall in B.C.), Ontario's suite of energy poverty policies and programs remains more comprehensive. Other provinces such as Manitoba and Quebec, as well as the U.S. federal government, also offer low-income bill support programs.[64] Given the continued prevalence of energy poverty throughout B.C., there is a duty for the provincial government, the BCUC, and all utility providers to acknowledge customers that are disproportionately affected and offer targeted relief programs.

Such programming should consider that demand-side management (though very important) is only one part of the equation. Programs that provide direct financial support, including credit programs, bill subsidies and cost limits are all relevant to B.C.'s energy landscape and could be adapted for use in that province.

## *Recommendation #3:* Increase support for affordable, low-carbon heating system and energy efficiency retrofits

Completing energy retrofits of homes and buildings in rural, remote, and Indigenous communities across B.C. would deliver dramatic reductions in energy use, energy costs, and greenhouse gas emissions while improving health outcomes for residents and creating new business and employment opportunities. There are two major types of retrofits that can work together or separately to achieve better outcomes and reduced heating costs for households:

- *Heating system retrofits* replace the existing heating system with a new system that offers higher efficiencies or uses a more affordable fuel. Since fuel costs are such an important factor in heating costs, addressing the heating source itself can have a large impact. Leading cost-reducing and low-carbon technology options include air-source heat pumps, ground-source heat pumps, and biomass heating.
- *Building envelope retrofits* reduce air leakage and improve insulation to reduce energy demand for space heating. This can include upgrades to doors and windows, installation of high R-value insulation, and thorough air sealing in high heat loss areas, such as the attic. These retrofits can be combined with ventilation improvements to simultaneously improve air quality.

62 Independent Electricity System Operator (2019). Home Assistance Program. Save on Energy. https://saveonenergy.ca/en/For-Your-Home/Home-Assistance-Program
63 PUC Inc. (2019). The AffordAbility Fund. https://ssmpuc.com/electricity/the-affordability-fund/
64 US Department of Homeland Security (2019). Low Income Home Energy Assistance Program. https://www.disasterassistance.gov/get-assistance/forms-of-assistance/4468

Heating system retrofits may present the most promising cost-saving opportunity for many households in B.C., especially in rural, remote, and Indigenous communities that lack access to a natural gas connection and thus need to rely on electricity to heat their homes. Dependence on electricity for space heating, combined with sometimes poor-quality housing and low energy efficiency, can translate to extremely high electricity bills. In some cases, this results in households relying on, or turning to, other fossil fuels for heating.

While this outcome might reduce costs, it contributes to greenhouse gas emissions and does not capture the opportunity presented by newer and more efficient heating equipment, such as electric heat pumps. These appliances are three to four times more efficient than other heating equipment including electric baseboards and gas furnaces and they can also help improve ventilation and air quality issues in some homes.

The financial benefits and business case for energy retrofits varies depending on housing size and quality, cost of fuel, and climate. As an example, a recent retrofit project with twenty homes in Bella Bella that replaced diesel furnaces with high-efficiency heat pumps has achieved household energy cost savings of 40-50% in the first few months of operation (see Case Study #2 above).

Incentives and subsidies for heating system retrofits exist in B.C. and have recently been expanded to include fuel switching incentives when installing an electric heat pump. However, these incentives still are usually not enough to cover the entire cost of an energy-saving measure. Some B.C. municipalities now offer top-up incentives in addition to provincial rebates, which in some cases is sufficient to address the capital cost barrier of technologies, such as air-source heat pumps, which have a higher upfront cost than other heating equipment (but potentially lower operating costs).

For example, the City of Vancouver now offers a top-up of $6,000 in addition to an existing $3,000 provincial rebate when switching from fossil fuel heating to an electric air-source heat pump.[65]

This supports the City's climate emergency goal of making all new and replacement heating systems zero-emissions by 2025, and is sufficient to cover the upfront costs of a heat pump system in most cases, creating a strong policy signal for fuel switching.

Increasing heat pump incentives for rural, remote, and on-reserve Indigenous communities, particularly in coastal climate zones where there is a strong operating cost benefit, could similarly catalyze widespread adoption of the technology in those areas. Importantly, it would incentivize fuel switching activity without imposing high capital costs, so that provincial decarbonization and electrification goals could be met without unduly impacting affordability to communities or contributing to energy poverty.

At the time this report was being finalized, an Indigenous Energy Coach Program was being launched by the Province, which includes a new incentive for customers in Indigenous communities that install electric heat pumps. This incentive, which covers up to $10,000 or 80% of the capital, installation and associated costs of a heat pump, is a welcome development and has the potential to significantly reduce barriers to access for these types of retrofits. It also leaves customers with the option of retaining a wood stove as a source of backup heat, an important consideration for isolated communities that would be severely impacted by

65 Government of BC (2019). Vancouver Heat Pump Top-Up. CleanBC: Better Homes. https://betterhomesbc.ca/rebates/vancouver-municipal-heat-pump-top-up/

a power outage caused by a storm or equipment failure. Unfortunately, it is not available to all Indigenous communities as it does not cover customers heating their homes with electric furnaces or baseboard heaters.[66]

Incentives for energy efficiency retrofits could also be expanded, though the capital cost barriers for deeper envelope retrofits are often significantly larger than for heating system retrofits, particularly for low-income households. In such cases, where payback periods are long and upfront costs high, low-risk financing may be a better alternative to direct subsidies (see Section 4 below).

## *Recommendation #4:* Create low-risk, accessible market opportunities for deeper energy efficiency and heating system retrofits

A rapid and complete transition to low-carbon and affordable energy systems for all residents in British Columbia will require a deeper and more sustained effort than basic subsidies and supporting programs alone can provide. Market transformation for residential energy efficiency and heating in the province will require a sustainable business model, capacity building and training, supply chain development, as well as the effective deployment of financial instruments.

This report will not explore all of these issues, as they are highly emergent and will be the focus of further research and engagement. A significant amount of work has already been done to encourage business model innovation in the province, for example through the Pembina Institute's work on aggregation of deep retrofit projects for social housing,[67] the Community Energy Association's work on heat pump business model innovation,[68] municipal policies like the City of Vancouver's Zero Emissions Buildings Plan,[69] and the formation of an interdisciplinary Heat Pump Coalition (of which Ecotrust Canada is stakeholder).

However, much of this effort to date has focused on the urban context, and learnings from this setting will need to be reexamined and adapted to the context of non-urban communities. For example, increasing code requirements for home energy assessments and inspections (such as blower door tests) are already impacting rural and remote communities, as qualified professionals often need to travel significant distances to reach these areas. This significantly increases the cost of these inspections for homeowners.

Ecotrust Canada has completed initial research specifically on the applicability of retrofit financing solutions to rural, remote and Indigenous communities. We found that in addition to funding programs, governments and utilities have an opportunity to advance financing solutions that specifically address the gaps in the current system, particularly the lack of credit and collateral, lack of capital, and limited capacity experienced by many homeowners and communities in Our assessment of a number of financing program design options is summarized below:

66 CleanBC Indigenous Community Heat Pump Incentive.
67 Frappe-Seneclauze, T., Heerema, D. and Bobyn, D. (2017) Aggregation of energy retrofits in affordable housing. Pembina Institute. https://www.pembina.org/pub/energiesprong-bc
68 Nelson, A. (2019). Business Model Innovation to Support Heat Pump Retrofits in Metro Vancouver. https://sustain.ubc.ca/sites/default/files/2019-13_Business%20Model%20Innovation%20to%20Support%20Heat%20Pump%20Retrofits_Nelson_0.pdf
69 City of Vancouver (2016). Zero Emissions Building Plan. https://council.vancouver.ca/20160712/documents/rr2.pdf

### On-bill financing (OBF) and Property Assessed Clean Energy (PACE)

OBF is a utility-led financing program where an energy efficiency upgrade loan is repaid on the utility bill, typically resulting in bill neutrality overall. Eligibility is determined by account status and bill payment history, and repayment enforced by a possibility of service disruption. A successful OBF program has been operated by Manitoba Hydro since 2001 under the PAYS (Pay As You Save) banner, and has seen almost 100,000 participants since its inception.[70,71] Multiple PAYS-branded programs exist in the U.S., where program evaluations demonstrate that between 70-90% of customers accept the offer of energy efficiency upgrades financed by bill savings, as long as the utility pays for the upfront retrofit work.[72]

An OBF pilot was operated by both BC Hydro and FortisBC during 2012-2013 but failed partly due to a lack of public awareness, limited contractor involvement, stringent underwriting criteria, and the requirement of both pre- and post-retrofit energy audits.[73] On-bill financing has also been implemented in the B.C. cities of Penticton and Nelson, where municipalities operate their own electric utilities.[74,75]

PACE is similar in concept, but applies to property taxes rather than utility bills and is therefore most often administered by municipalities. PACE has been successfully deployed in the U.S. for many years, and was recently launched in Alberta as the Clean Energy Improvement Program, though it is unclear if the program will survive ongoing cuts to Alberta's energy efficiency agency being made by the current government.[76]

While financing programs such as OBF and PACE have a proven track record of success in other jurisdictions, they have sometimes proven difficult and politically charged to implement. Nevertheless, interest in both programs remains high in B.C. and should be reexamined by the provincial government.

### Investment banks

A purpose-driven publicly capitalized financial institution able to increase the efficiency of public monies by attracting private investment. Preferential loans can offer greater accessibility, for example to First Nations bands that apply and administer funds for their members. Investment banks engage in a variety of activities (interest rate buy-downs, warehousing, co-management) to reduce the cost of capital.

### Performance contracting

A private sector approach wherein an energy services company (ESCO) is hired by a community to achieve a certain level of agreed-upon cost and energy savings. The ESCO is paid a percentage of the cost savings for the duration of the contract and is

70 Manitoba Hydro (2019). PAYS Financing. https://www.hydro.mb.ca/your_home/pays/
71 Brownlee, M. (2013, Dec). Financing Residential Energy Savings. *Sustainable Prosperity.* https://institute.smartprosperity.ca/sites/default/files/publications/files/Financing%20Residential%20Energy%20Savings.pdf
72 Building Decarbonization Coalition (2019). Accessible Financing Workshop. https://drive.google.com/drive/folders/1s2M7HDHGSh5Ep5x-hfPvD_ITx2whrKmM
73 Efe, S. et. al. (2015, Sep). Cheaper Power Bills, More Jobs, Less CO2:How On-Bill Financing Done Right can be a Quick Win for British Columbia. Pacific Institute for Climate Solutions. https://pics.uvic.ca/sites/default/files/uploads/publications/On-Bill%20Financing%20FINAL.pdf
74 City of Penticton (2019). Home Energy Loan Program. https://www.penticton.ca/EN/main/departments/electricity/energy-retrofits.html
75 City of Nelson (2019). Energy Retrofits Programs. https://www.nelson.ca/742/Energy-Retrofits-Programs
76 Energy Efficiency Alberta (2019). Clean Energy Improvement Program. https://efficiencyalberta.ca/financing/clean-energy-improvement-program

responsible for all aspects of planning, financing, and installation of upgrades. Capital may come from the ESCO itself or from a third party.

**Loan guarantees**

A government credit enhancement tool which enables Indigenous bands to circumvent the collateral barrier they typically face when applying for loans. Government determines eligibility based on risk of default, and if approved, bands can borrow using the government's credit rating. Loan guarantees are often partnered with approved lenders to finance retrofits on-reserve.

We believe that on-bill financing is the most attractive of these potential financing options, despite a largely unsuccessful previous pilot of this mechanism by BC Hydro and FortisBC. On-bill financing has the most flexible eligibility criteria (utility bill payment history), a strong enforcement mechanism (service disconnection), and a simplified process for the customer (on-bill repayment, bill neutrality). These key program design elements overcome some of the fundamental barriers to energy efficiency financing and present a viable opportunity to achieve utility bill cost savings and co-benefits at scale. The success story of Manitoba Hydro's PAYS further illustrates the great potential for this type of program in British Columbia, if some of the issues with the previous pilot program were addressed.

It should also be noted that the financing options presented above are not mutually exclusive and may be combined to satisfy multiple objectives – for instance, use of a loan guarantee to help secure financing and lower the interest rate, or the warehousing and sale of loans by the utility to a private investor to increase available capital.

Ultimately, financing for project implementation should be viewed as a part of a comprehensive approach that seeks to holistically address capital cost barriers, job creation and skills development opportunities for communities, and improvements to the housing stock. Capacity development and training support will be necessary to ensure that communities have the resources to identify, develop, and coordinate retrofit projects. Training local people to install and maintain systems allows communities to confidently adopt new technologies with better long-term outcomes. Parallel efforts are needed to transform the market for both deeper energy efficiency retrofits as well as the adoption of heat pump technology throughout the province.

## *Recommendation #5:* Make eliminating energy poverty among B.C.'s on-reserve Indigenous communities a top priority, supporting wider goals of reconciliation and self-determination

Poor housing quality, limited access to energy sources and a history of mixed success for supporting programs makes it critical to take renewed action to address energy poverty in B.C.'s on-reserve communities. In late 2019, the B.C. Legislature adopted Bill 41 – which will require the government to ensure that the laws of the province are consistent with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), and to report annually on implementation progress.[77]

As the first province in Canada to pass such legislation into law, B.C. has a clear obligation to act as a national leader in addressing the socioeconomic gaps and legacies of colonialism

77 Legislative Assembly of British Columbia (2019). Bill 41 – 2019: Declaration on the Rights of Indigenous Peoples Act. https://www.leg.bc.ca/parliamentary-business/legislation-debates-proceedings/41st-parliament/4th-session/bills/first-reading/gov41-1

that still hinder Indigenous communities from thriving. Implementing UNDRIP fully in B.C. will require addressing many difficult issues including Indigenous Rights and Title, economic reconciliation, and goals of self-determination. It will also require the elimination of conditions that contribute to energy poverty in on-reserve Indigenous communities.

There are also many issues specifically impacting energy access and costs that B.C. will need to examine as part of fully implementing UNDRIP. The current system of funding Indigenous community energy projects and addressing energy poverty in British Columbia has been historically ineffective in achieving results at scale, and investments to meet the need for energy retrofits on-reserve remain insufficient.

Funding available for First Nations in B.C. to develop energy projects has increased dramatically in the last two years due to an influx of funding through initiatives like the provincial Renewable Energy in Remote Communities (RERC)[78] and federal Clean Energy for Rural and Remote Communities (CERRC)[79] programs. However, most of this new funding is intended to support clean energy generation projects, and support targeted at energy efficiency and fuel switching activities has only very recently received similar levels of attention.

The current model of funding for energy projects in Indigenous communities has resulted in a number of negative consequences, including:

- Communities waste valuable time and resources in completing applications with little chance of success
- Only a very small portion of potential projects are realized, despite the strong business case and co-benefits for deep retrofit and fuel switching projects in particular
- Limited application windows and decision waiting periods extend project timelines unnecessarily
- Fund matching requirements can exclude communities that lack capital or own-source revenue to match
- A piecemeal funding approach means that communities often need to be successful with multiple funding applications in order to proceed with their project
- Communities with the highest capacity and the most resources are often most able to develop successful applications, leaving those with fewer resources falling further behind

An improved system would deploy resources at scale to meet the investment needs of communities, create more accessible application and reporting processes, and provide ensure user friendliness and simplicity throughout the entire process. In addition to new or improved funding programs, the government could advance financing solutions that specifically address the gaps in the current system, particularly the lack of credit and collateral, lack of capital, and limited capacity experienced by Indigenous communities in B.C.

Designing programs in a way that supports Indigenous communities to create local economies, skills, and jobs is also critical. Some of the learnings from programs like ECAP are now being applied to the design of new programs, such as BC Hydro's Indigenous Community Conservation Program (ICCP). ICCP is designed to provide support to Indigenous communities

78 Government of BC (2019). Renewable Energy for Remote Communities (RERC) Program. https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/community-energy-solutions/renewable-energy-remote-communities

79 Natural Resources Canada (2019). Clean Energy for Rural and Remote Communities: BioHeat, Demonstration & Deployment Program Streams. https://www.nrcan.gc.ca/reducingdiesel

that have previously participated in ECAP but are planning to conduct additional upgrades. It also promotes trades training or job readiness programs that provide local skilled labor. The program facilitates training for project lead, contractor, installer and energy assessor positions for members of participating communities. This local capacity-building approach could result in better outcomes, and if successful might provide a model for other programs.

While programs like ICCP are a promising start in improving energy programming for Indigenous communities, a step change in funding and support mechanisms will be required to fully eliminate energy poverty on-reserve in B.C. and fulfil the province's direction and obligations under UNDRIP. The B.C. government's introduction of a new Indigenous Energy Coach program and associated incentives is a new and promising addition to Indigenous-specific funding that specifically targets heat pump retrofits in homes, acknowledging the gap in existing programming and the potential for this technology to significantly reduce energy costs.

# Conclusion and Next Steps

Energy poverty, far from being a problem of the developing world, impacts a large number of households in British Columbia. Low-income households, particularly those in rural, remote, and Indigenous communities, face disproportionate cost burdens and impacts to their health and quality of life as a result of inequitable access to energy.

The drivers of energy poverty are many and complex, and contributing factors like low household income cannot be addressed through energy policy alone. However, our research and experience working with communities demonstrates that some of the burden of energy poverty can be relieved with new policy approaches and programs that are designed specifically with energy security in mind. In this respect, B.C. lags behind some other jurisdictions that have developed innovative policies – these include progressive rate structures, emergency and ongoing bill support, and programs that enable energy efficiency and heating system retrofits at scale and with low cost barriers.

As a region with relatively abundant access to low-carbon electricity and the development of highly efficient technologies like heat pumps that can take advantage of it, we believe that B.C. is well-positioned to be a leader in reducing energy poverty while still meeting the wider societal goal of transitioning to a low-carbon economy. However, a sustained effort and significant resources will be needed to ensure that low-income households are not left behind or disadvantaged in this transition. As the first province in Canada to pass legislation formalizing the adoption of UNDRIP, B.C. also has an obligation to take the lead in eliminating energy poverty in Indigenous communities, which are disproportionately affected by high energy costs and poor housing conditions.

The issues and recommendations presented in this report are a starting point – and will be the subject of future research by Ecotrust Canada as we continue to work with communities, utilities, governments and regulators to find new and innovative solutions to addressing energy poverty, and moving toward energy security for all in British Columbia.

# Appendix I: Assumptions and Limitations

- Full community case studies, including details on specific assumptions made in each study, can be found on our website at www.ecotrust.ca/
- Economic analysis and energy modeling is based on a snapshot in time using current prices, and focused on space heating exclusively. Any shared heating load from domestic hot water could impact project economics.
- Natural gas connection costs are based on general estimates provided by FortisBC staff. These figures have not been validated by a site visit.
- Natural gas retrofit scenarios focused on the installation of a new furnace, assuming homes with existing ducting. In homes without ducting, a wall furnace is likely a more practical solution, and consideration of this opportunity should be included in future related work.
- All project cost modeling assumes homes are serviced with sufficient electrical panel capacity. In our project experience to date, panel capacity has not been identified as a constraint. Any panel upgrades required would negatively impact project economics.
- Energy bills depend both on building condition and user behaviour, which may vary widely from home to home. This is an important factor that adds some variability to project results.

# Appendix II: Indigenous Community Conservation Program (ICCP) Rebate Details

Note: the following rebate amounts are specific to FortisBC customers. BC Hydro rebate amounts were not available at time of publication but are reported to be comparable.

| UPGRADE | DETAILS | REBATE AMOUNT (PER HOME) |
|---|---|---|
| HOME EVALUATION | | |
| EnerGuide Home Evaluation | To be eligible for the EnerGuide Home Evaluation Rebate, a pre- and post-Ugrade EnerGuide home evaluation must be completed on or after launch date, and the Energy Advisor Supported Rebates form must be submitted by the Energy Advisor. | $300 |
| HEALTH AND SAFTEY | | |
| Activities to eneable energy saving upgrades to occur in the home | Activities such as drywall repair, soffit repair, pest management, remediation of areas affected by mould/moisture, radon, asbestos, etc. | Maximum $1,000 |

| UPGRADE | DETAILS | REBATE AMOUNT (PER HOME) |
|---|---|---|
| BUILDING ENEVELOPE (AIR SEALING, INSULATION, WINDOWS AND DOORS) | | |
| Attic insulation and draft (Ave: sq. ft. = 808 and R-value = 34) | $0.05 per R-value added per square foot (Minimum R12 added) | Maximum $1,800 |
| Basement/ crawlspace insulation and draft proofing (Ave: sq. ft. = 475 and R-value = 18) | $0.20 per R-value added per square foot (Minimum R10 added) | Maximum $2,000 |
| Exterior wall cavity insulation (Ave: sq. ft. = 629 and R-value = 20) | $0.20 per R-value added per square foot (Minimum R12 added) | Maximum $2,000 |
| Exterior wall sheathing insulation (Avg: sq. ft. = 972 and R-value = 14.3) | $0.20 per R-value added per square foot (Minimum R3.8 added) | Maximum $2,000 |
| Other insulation (Avg: sq. ft. = 307 and R-value = 26) | $0.125 per R-value added per square foot (Minimum R20 added) | Maximum $1,500 |
| ENERGY STAR© Windows and Doors (Avg: sq. ft. = 475 and R-value = 18) | U-factor 1.40 - 1.23W/m2-K, Tier 1 | $100 per window/door; Max $2,000 |
| | U-factor 1.22 W/m2-K, Tier 2 | $200 per window/door; Max $4,000 |
| VENTILATION | | |
| Bathroom fan systems | Full fan system, including ducting to outside<br>$958 - Region 1/2<br>$1, 115 - Region 3/4 | Maximum $1,200 |
| EQUIPMENT AND APPLIANCES | | |
| Advanced Programmable Thermostats | $150 per programmable thermostat unit | Maximum $600 |
| | $25 per baseboard heater (if required) | Maximum $150 |
| PRIMARY SPACE HEATING | | |
| Furnace (Mid or Standard) | Tier 1 - 95-96.9% AFUE | $2,000 |
| Furnace (High Efficiency) | Tier 2 - 97-99% AFUE | $3,000 |
| Boiler | >94% AFUE | $2,000 |
| WATER HEATING | | |
| 0.67 EF Storage Tank | EF 0.67-0.70 | $500 |
| Condensing Tankless | EF 0.9-0.99 | $2,500 |
| Condensing Storage Tank | TE up to 98% | $2,500 |

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Ecotrust Canada is an enterprising charity that works with rural, remote, and Indigenous communities toward building an economy that provides for a healthy and resiliant natural environment; sustainable and abundant energy, food, and housing; prosperous and meaningful livelihoods; and vibrant and inclusive cultures. We call this approach, building an economy that provides for life. Our on-the-ground work and systems approach is entrepreneurial, partnership-based and relentlessly practical.
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