Introduction
The BC Non-Profit Housing Association (BCNPHA) is pleased to submit this response to the Economic Development Strategy, #BCTech Strategy and Emerging Economy Task Force on consultation of the Clean Growth Intentions Papers (Clean, Efficient Building Strategy). This response represents the view of BCNPHA based on the experiences and input from British Columbia’s social housing and non-profit housing sector. The focus on this submission is to provide feedback on the intentions paper: Clean, Efficient Buildings, 2018. The paper focuses on means to clean and efficient buildings through energy efficiency labelling, incentives for energy efficiency and building improvements, stronger codes and standards, support of low-carbon innovations, and building capacity. As such, this response focuses on providing feedback and making recommendations to meet these elements.

BC Non-Profit Housing Association
Formed 25 years ago, BC Non-Profit Housing Association is the provincial umbrella organization for the non-profit housing sector comprised of nearly 600 members, including non-profit housing societies, businesses, individuals, partners and stakeholders. Together non-profit housing societies manage more than 100,000 units of long-term, affordable housing in over 3000 buildings across the province. BCNPHA focuses on advocating and building capacity within the non-profits sector through research and advocacy, asset management, and education.

BCNPHA’s response for Clean, Efficient Buildings Strategy
In the view of BCNPHA, a Clean, Efficient Building Strategy needs to include the following five core principles to be outlined in this document.

1. Support impartial business case development for building owners & managers
2. Decrease inequality through more support for low income British Columbians
3. Streamline incentive applications and amounts across rate types
4. Decrease overall environmental impact by minimizing total building energy use
5. Support training for building owners, managers, and operators
Overview/Background

In 2010, BCNPHA conducted an asset analysis of the non-profit sector, which has enabled BCNPHA to identify building related needs for the sector. After the initial survey, BCNPHA has conducted bi-annual asset analysis surveys to maintain data relevancy. BCNPHA has also worked with BC Housing to conduct building condition assessments (BCA) on buildings within the non-profit housing portfolio. With this data, BCNPHA lobbies for and supports the sector to build and maintain buildings in a healthy, cost effective, and proactive manner.

The non-profit housing portfolio is aged (Figure 1) with several notable features including:

- Properties built from 1960-1980 are coming into a period in their lifecycle where significant capital repairs and upgrades are needed over the next ten years.
- Properties built from 1990-present are characterized by complex mechanical and controls systems which are largely which are often poorly maintained and inappropriately designed, creating significant opportunity for efficiency gains.

![Figure 1 Facility Age Profile (July 2011 snapshot of BCNPHA data)](image)

The BCNPHA data contains utility summaries for close to 50% of the building portfolio representing over 55% of the total tenant units in the province. Table 1 provides an order of magnitude understanding of utility consumption for roughly 50% of the building portfolio.
Table 1 Utility Consumption Summary for Available Utility Accounts (BCNPHA Data, Sept 08-Aug 09)

<table>
<thead>
<tr>
<th></th>
<th>Residential Elect. (GWh)</th>
<th>Commercial Elect. (GWh)</th>
<th>Total Elect. (GWh)</th>
<th>Residenti al Gas (1000 GJ)</th>
<th>Commercial Gas (1000 GJ)</th>
<th>Total Gas (1000 GJ)</th>
<th>Total Equivalent Energy (eGWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single detached</td>
<td>8.7</td>
<td>10.6</td>
<td>19.2</td>
<td>35.7</td>
<td>156.5</td>
<td>192.2</td>
<td>72.6</td>
</tr>
<tr>
<td>Duplex</td>
<td>0.9</td>
<td>0.0</td>
<td>1.0</td>
<td>3.4</td>
<td>4.9</td>
<td>8.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Apartment</td>
<td>58.9</td>
<td>86.9</td>
<td>145.8</td>
<td>73.9</td>
<td>1,730.7</td>
<td>1,804.6</td>
<td>647.1</td>
</tr>
<tr>
<td>Townhouses</td>
<td>45.7</td>
<td>4.4</td>
<td>50.1</td>
<td>121.2</td>
<td>114.4</td>
<td>235.7</td>
<td>115.5</td>
</tr>
<tr>
<td>Mixed building types</td>
<td>11.3</td>
<td>16.3</td>
<td>27.7</td>
<td>13.7</td>
<td>220.8</td>
<td>234.5</td>
<td>92.8</td>
</tr>
<tr>
<td>Total</td>
<td>125.5</td>
<td>118.2</td>
<td>243.7</td>
<td>248.0</td>
<td>2,227.3</td>
<td>2,475.3</td>
<td>931.3</td>
</tr>
</tbody>
</table>

The building energy performance indexes (BEPI) for the building stock vary significantly. The ranges of BEPIs are shown in Table 2 and Table 3. These figures are not weather normalized and do not represent a benchmark for the portfolio because of the low quality of utility data available to complete such an analysis.

Table 2 Mean BEPI and BECI for Gas-Heated Properties by Property Type

<table>
<thead>
<tr>
<th></th>
<th>Mean BEPI (kWh-el/m²/yr)</th>
<th>Mean BEPI (kWh-gas/m²/yr)</th>
<th>Mean Total BEPI (kWh/m²/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apartment</td>
<td>101.1</td>
<td>369.0</td>
<td>419.9</td>
</tr>
<tr>
<td>Duplex</td>
<td>86.0</td>
<td>143.6</td>
<td>209.8</td>
</tr>
<tr>
<td>Mixed building types</td>
<td>137.6</td>
<td>371.0</td>
<td>415.4</td>
</tr>
<tr>
<td>Single detached</td>
<td>138.1</td>
<td>274.3</td>
<td>325.2</td>
</tr>
<tr>
<td>Townhouses</td>
<td>95.4</td>
<td>278.1</td>
<td>325.0</td>
</tr>
<tr>
<td>Total</td>
<td>112.9</td>
<td>326.3</td>
<td>376.6</td>
</tr>
</tbody>
</table>

Table 3 Mean BEPI and BECI for Electrically-Heated Properties by Property Type

<table>
<thead>
<tr>
<th></th>
<th>Mean BEPI (kWh-el/m²/yr)</th>
<th>Mean BEPI (kWh-gas/m²/yr)</th>
<th>Mean Total BEPI (kWh/m²/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apartment</td>
<td>139.5</td>
<td>279.1</td>
<td>260.0</td>
</tr>
<tr>
<td>Duplex</td>
<td>143.9</td>
<td>N/A</td>
<td>143.9</td>
</tr>
<tr>
<td>Mixed building types</td>
<td>150.3</td>
<td>139.3</td>
<td>181.7</td>
</tr>
<tr>
<td>Single detached</td>
<td>206.0</td>
<td>130.0</td>
<td>224.0</td>
</tr>
<tr>
<td>Townhouses</td>
<td>140.6</td>
<td>179.0</td>
<td>170.8</td>
</tr>
<tr>
<td>Total</td>
<td>142.9</td>
<td>234.1</td>
<td>211.8</td>
</tr>
</tbody>
</table>
When compared to market rental and condo portfolios, BEPIs in the non-profit sector are significantly higher. The City of Vancouver studied market rent buildings and found an average BEPI of 214 kWh/m², compared to a low of 212 kWh/m² for electrically heated buildings and a high of 377 kWh/m² for gas-heated buildings in the non-profit sector.

The BCNPHA Asset Management Department has worked closely with BC Housing, BC Hydro and FortisBC to reduce energy consumption in the non-profit sector. With a limited budget, BCNPHA’s work has resulted in 8.5 GWh in electrical savings and 31,000 GJ in natural gas savings to date.

BCNPHA and BC Housing have also collaborated to conduct BCAs on all BC Housing-funded buildings in the non-profit sector. This work has identified deferred maintenance needs and opportunities in the non-profit sector. Currently, there is over $700 million dollars in deferred maintenance, with an increase of $100 million dollars per year over the next 30 years (Figure 2).

![Figure 2 Extrapolation of unfunded liability (deferred maintenance) in the non-profit for the next 30 years.](image)

BCNPHA and BC Housing have lobbied the Provincial and Federal Governments for investments to mitigate this unprecedented maintenance need. This year the BC Government committed $1 Billion over 10-years toward fixing deferred maintenance in the non-profit sector. This investment has started with $100 million this year, rising to 150 million per year in years 3 to 8, with an allocation of $7.5 million dollars per year specifically to mitigate energy efficiency issues.

1. **Support impartial business case development for building owners & managers**

   Energy labelling and benchmarking are essential parts of managing and controlling energy consumption. As Peter Drucker is quoted as say, “If you can’t measure it, you can’t improve it”. Energy labelling and benchmarking will allow owners, buyers, and renters to be more informed about the consumption of their units, suites and equipment.
Unfortunately, presenting people with this information without context, background, or business cases, will do little to help them control and reduce their energy consumption and emissions. If building users are to respond to the labelling and benchmarking information, they need information about the cost, potential savings, and best business cases for retrofits from accessible, trusted, and independent sources.

To ensure greater uptake and success, any incentive/funding programs should leverage partnerships with member organizations and non-profits to provide training, project support, and coaching on energy labelling and using data to build business cases.

The benchmarking process must be simple. Currently, utility companies segregate data by the meter. Many buildings in the non-profit sector have both commercial and residential meters under the same roof. It is currently cumbersome to access and combine this data. Integration of this data is essential to gain a whole picture of energy use in order to build business cases to pursue efficiency measures.

2 Decrease inequality through more support for low income British Columbians
Since all ratepayers contribute dollars to incentive programs, the BC Government needs to ensure that all ratepayers have equal access to programs designed to increase the efficiency of buildings. Current rebate/incentive programs are designed to incentivize new technology, which is expensive and unaffordable for low income households who cannot take advantage of the programs. The result is an unintended but direct subsidy to wealthier households.

We need to ensure that these programs are equitable and do not increase the inequality gap, which has been growing over the past 20 years. This has grown tremendously over the past 20 years. Please use the following link for more details:


As wealthy households gain more efficiencies and even leave the grid, low to middle income households are left holding the bill and paying higher rates to maintain infrastructure and programs. BC is looking at decreasing rates for low income households, which will result in higher rates for middle income ratepayers (and more high-income ratepayers leaving the grid). The BC Government needs to support affordability from the bottom up, build the market for energy efficient equipment, retrofits, and construction by directly subsidizing the most at risk British Columbians who are falling behind. Building the market in this way will trickle up to middle- and high-income ratepayers, build knowledge in the trades, and decrease costs for all ratepayers: truly a win-win.

California is superbly demonstrating this model through their Single-family Affordable Solar Homes (SASH) and Multi-family Affordable Solar Homes (MASH) programs.

https://www.lowincomesolar.org/best-practices/single-family-california/

3 Streamline incentive applications and amounts across rate types
The rebate/incentive process needs to be streamlined dramatically. Currently, separate programs exist for residential, commercial, combined buildings. Currently there are so many separate, patchwork programs for residential, multi-unit, townhouse and commercial buildings that projects can no longer
take equal advantage of incentives for energy savings. A holistic approach is the only way to scale up the much-needed retrofits in the sector.

The current incentive programs have left low-income households and buildings behind. The Energy Efficient Regulations’ Amendment 13 has removed incentives for older lighting technologies due to an assumption that buildings will be updated and retrofitted based on code requirements. However, low-income housing still holds a disproportionate amount of old technology whose replacement is now no longer incentivized. As a result, Amendment 13, and the upcoming Amendment 14, now disproportionately penalizes the low-income housing sector. If this sector is ever to catch up, specific incentives and/or exceptions to Amendment 13 must be made for the non-profit housing sector.

4 Decrease overall environmental impact by minimizing total building energy use

4.1 Health impacts from energy conservation
Most individuals associate energy efficiency with financial benefits such as reduced utility bill and environmental benefits such as reduced fossil fuel consumption. Energy efficiency also yields health benefits. The most obvious health benefit is reduced air pollutants from fossil fuels. These pollutants are linked to respiratory, circulatory and nervous system diseases.1

Energy efficiency in many cases also creates a healthier building that is more comfortable for its occupants. Typical “standard efficiency” buildings do not provide sufficient ventilation which leads to poor indoor air quality. A home can generate between 10 to 50 liters of moisture per day.2 Various items such as electronics, floor and wall finishes, furniture, cleaning products and many other household items can produce pollutants which leads to poor indoor air quality. In sufficient ventilation can cause mold growth which leads to indoor air quality problems and health issues. The various pollutants can cause irritation, allergies and other more serious health issues.

Energy efficiency retrofits can improve occupant comfort.2 For example, building envelope retrofits such as air sealing and thermal breaks can reduce drafts and hot/cold spots in the building. HVAC system retrofits can improve indoor air quality from improved ventilation. Mechanical system retrofits can improve thermal comfort through improved control systems and properly sized equipment.

4.2 Stronger codes and standards
BCNPHA supports the province’s Energy Step Code initiative around increasing energy efficiency, which has the benefit of streamlining the requirements across the province and setting out a timeline for increasing the minimum energy efficiency performance levels. This plan will allow builders, developers, and architects to plan and train so that their buildings meet future levels of the code.

The non-profit sector in British Columbia has struggled with the ongoing maintenance of the current high efficiency buildings developed and built over the past 10 years. These buildings used a prescriptive, rather than performance-based, design, resulting in overly complex mechanical systems, complex commissioning, high maintenance costs, and unfortunately no energy savings.

In the 10 years since occupancy permits were issued, many of these buildings have required re-commissioning, replacement of mechanical systems, noise mitigation measures, and major repairs to

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1 [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3869478/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3869478/)
2 [https://www.citygreen.ca/benefits-energy-efficiency](https://www.citygreen.ca/benefits-energy-efficiency)
ensure heat and hot water for tenants. This has resulted in substantial costs for the operators. Any new requirements must consider a full business case looking at maintenance costs, actual energy costs, staffing costs, and a life cycle assessment.

The focus should be on simple retrofits that have high impact over the long term. An envelope-first approach would help achieve this. An energy efficient building envelope requires less heating and cooling, which reduces the complexity and cost of the HVAC system. Various levels of government are keen on legislating net-zero buildings; therefore, building retrofits should prepare buildings to be net-zero ready.

With the current incentive model, codifying energy performance or retrofits eliminates incentive opportunities. Prior to codifying, the government must ensure that there is a positive business case for ratepayers. If there is not a positive business case, there needs to be an alternative means to subsidize the new step code level.

4.3 Low carbon building innovation program
While it is paramount to identify cost-effective, readily available high performance building retrofits, we need to recognize the profound impact inherent in energy generation

Electricity generated from hydroelectric dams has an enormous environmental impact with issues ranging from flooding of valleys, sediment reductions in streams, impeding migratory aquatic species, erosion of estuaries, salinization of estuaries, and geological problems surrounding the reservoir all of which reverberate with interconnected socio-economic and cultural impacts. The following link highlight issues directly cause by the construction of dams for electricity production in the Nile, Darya, Yangtze, and Mekong rivers;

- [http://www.ipsnews.net/2014/01/nile-delta-disappearing-beneath-sea/](http://www.ipsnews.net/2014/01/nile-delta-disappearing-beneath-sea/)

Fossil fuels impact the environment because GHG are emitted from the generation, transportation and consumption of fossil fuels. According to the U.S. Energy Information Administration, GHG emissions and atmospheric concentrations have increased over the past 150 years. According to the Intergovernmental Panel on Climate Change, GHG emissions are the dominate cause of global temperature rise. Most of these human-caused (anthropogenic) greenhouse gas emissions were carbon dioxide (CO2) from burning fossil fuels.

The following are three strategies to reduce GHG emissions: innovative building retrofits, dual fuel systems, and the adoption of biofuels.

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4.4 **Innovative building retrofits**

Energiesprong is an innovative building retrofit technique to quickly and efficiently retrofit homes to high efficiency. BCNPHA has been an active proponent of this approach, along with partners at BC Housing, Pembina Institute and Natural Resources Canada. Energiesprong process, which is Dutch for *energy jump*, targets retrofitting the building envelope and mechanical system resulting in the maximum energy savings. Although the projects are not net-zero, the current retrofits in the Netherlands are accomplishing a fossil fuel reduction of 87%, which is a significant reduction in GHG emissions and cost savings to owners, and tenants.

4.5 **Dual fuel systems**

Studies commissioned by the City of Vancouver and BC Hydro have demonstrated benefits of dual fuel system installations. Dual fuel systems, which primarily refers to using high efficiency electric heat pumps with a natural gas backup system, offer the best business case because they can overcome the cost limitations of dedicated standalone heat pump systems. Heat pump installation costs rise exponentially with size; therefore, when sized for peak load, they are uneconomical. Dual fuel systems can optimize heating costs based on outdoor air temperatures. As outdoor air temperatures drop, heat pump efficiency also drops resulting in higher heating costs. Dual fuel systems can minimize heating costs by modulating between electricity and fossil fuels. These systems also provide climate resiliency by providing cooling. These systems also provide climate resiliency by providing cooling, which is a growing need in the non-profit housing sector where overheating buildings are becoming unfortunately too common.

4.6 **Biofuels**

To achieve net-zero fossil fuel consumption and support local economies such as forestry, agriculture, waste facilities and potential innovative municipal revenue, the Climate Leadership Plan should support the investigation of biofuel generation from commercial and residential wastes and residues. Studies demonstrate the availability of energy biological waste to offset 50% of BC’s fossil fuel consumption; [http://cesarnet.ca/biocap-archive/images/pdfs/BC_Inventory_Final-06Nov15.pdf](http://cesarnet.ca/biocap-archive/images/pdfs/BC_Inventory_Final-06Nov15.pdf)

The Clean Growth Strategy can reduce our environmental impact, support the local economy and increase affordability for British Columbians. Focusing on opportunities to leverage and building business cases for innovative building retrofits, dual fuel systems and biofuels would launch BC’s Clean Efficient Buildings strategy into high yielding results.

5 **Support training for building owners, managers, and operators**

It is important that professionals are trained in how to design, construct, test, and inspect energy efficient new buildings and retrofits. BC Housing has actively been supporting implementation and training of the BC Energy Step Code for the past 2 years and is actively funding training programs at other institutions.

Universities and colleges are actively developing their programs to train a new generation of building professionals. For example, BCIT developed a Building Envelop Laboratory and training program ([https://www.bcit.ca/study/courses/bldc3060](https://www.bcit.ca/study/courses/bldc3060)). This new curriculum is fabulous and supports new and existing professionals.
A needs assessment completed by BCNPHA and BC Housing in 2013 found strong need for specialized training for the non-profit housing sector. The survey found more than 20% of the respondents believe their staff have insufficient training and experience. The survey also examined the barriers to further education, and it found that over 45% of the respondents did not have time to attend training programs, over 40% of the respondents found the training programs too expensive, and over 35% of the respondents did not have local access to courses.

Due to the lack of training, there is a significant knowledge gap around operating and maintaining buildings and an under-realized opportunity to save energy through better building operation and maintenance. It is estimated that there is the opportunity to save 5-30% through good O&M. The following sources speak to this:

- [https://www1.eere.energy.gov/femp/pdfs/OM_7.pdf](https://www1.eere.energy.gov/femp/pdfs/OM_7.pdf)

BCNPHA and BC Housing have developed training specifically for non-profit housing managers, operators, and administrators that demonstrates best practices for operations and maintenance and energy saving opportunities. This program benefits those just entering the non-profit operations and maintenance profession as well as non-profit sector employees who are interested in creating buildings that run more economically and efficiently.

The BC Government should work with universities, colleges, and local associations to streamline and support affordable training and partnerships between associations, institutions, and universities.

**Conclusion**

The impact of our buildings cannot be underestimated. They are long-term investments, which shape our communities and our daily lives in British Columbia. To reduce our environmental impact, GHG emissions, increase affordability and improve our quality of life, BCNPHA believes the addition of the following strategies will greatly improve the impact of the BC Clean Growth Strategy:

1. Support impartial business case development for building owners and managers
2. Streamline incentive programs applications and amounts across rate types
3. Decrease inequality through more support for low-income British Columbians
4. Decrease our overall environmental impact by minimizing total building energy use
5. Support training for building owners, managers, and operators