Examining the case for adopting the National Energy Code for Buildings

Consultation "What We Heard" Document

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Foreword

The Government of Newfoundland and Labrador would like to thank everyone who participated in this consultation process on the National Energy Code for Buildings.

This document represents the opinions of those who participated in the public consultation process.

It does not necessarily represent the opinions of the Government of Newfoundland and Labrador.

Introduction

In *Moving Forward: Energy Efficiency Action Plan 2011*, the Government of Newfoundland and Labrador committed to supporting a major shift in the uptake of energy efficiency in the province. Given that houses and buildings account for approximately 22 per cent of all energy consumed in the province, improving energy efficiency in new residential and commercial buildings represents a significant opportunity to achieve progress on this issue.

Through amendments to the National Building Code in 2012, new energy efficiency requirements are now in place for the construction of homes and small buildings (that is, commercial and institutional buildings that are up to either 600 m² or three stories tall). In Newfoundland and Labrador, these energy efficiency requirements are implemented through the *Municipalities Act, 1999* as well as the city *Acts* for St. John's, Corner Brook and Mount Pearl.

At this time, however, there are no regulated energy efficiency requirements with respect to the construction of commercial and institutional buildings greater than 600 m² or over three stories. Approximately 70 buildings, on average, are constructed in the province per year that fall within this category. The majority of these buildings, on average, are constructed in the St. John's, Conception Bay North, Gander, Grand Falls-Windsor and Corner Brook areas.

In this context, the Energy Efficiency Action Plan committed to "examine the case for adopting new national energy codes for buildings in Newfoundland and Labrador, in collaboration with key stakeholders including Municipalities Newfoundland and Labrador, the construction industry, and the design consulting and business communities."

This report provides an overview of research undertaken to date as well as the findings of consultations with stakeholders undertaken by the Office of Climate Change and Energy Efficiency.

National Energy Code for Buildings

The National Energy Code for Buildings (NECB) is one of five national construction codes published by the National Research Council, which is an entity of the Government of Canada. Published in 2011, the NECB outlines minimum energy efficiency requirements for the design and construction of large buildings, including new buildings and additions, but excluding farm buildings and renovations to existing buildings.

The NECB is a whole-of-building energy code, containing requirements related to the building envelope, interior and exterior lighting, heating, ventilating and air-conditioning (HVAC) systems, service water heating systems, and electrical power systems and motors. Unlike other energy codes and standards, the NECB applies increasingly stringent building envelope requirements by climate zone, that is, the further north a building is constructed, the more stringent the building envelope requirements. For example, the effective R-value for a wall assembly for a building that would be built in Labrador City is approximately 35 per cent more stringent than a comparable building in St. John's. Similarly, the effective R-values for roof assemblies would be approximately 30 per cent more stringent.

As of September 2015, the NECB has been adopted by Nova Scotia, Ontario, Manitoba, Alberta and British Columbia. These provinces account for approximately 70 per cent of the national population. Additionally, Prince Edward Island, Quebec, Saskatchewan, Yukon and Nunavut have indicated that they will adopt the NECB by 2016, and New Brunswick has indicated it will adopt the NECB but has not provided a target date. These 11 provinces and territories account for approximately 98 per cent of the national population.¹

In Newfoundland and Labrador, the Provincial Government strives to construct new public sector buildings in a manner consistent with Leadership in Energy and Environmental Design (LEED) Silver requirements. LEED is a voluntary North American building certification program that recognizes bestin-class building strategies and practices. It is not, however, an energy code or standard. Building to LEED requirements improves building sustainability, and results in less energy use as well as less water use and less waste. As will be outlined below, LEED-registered buildings in Newfoundland and Labrador exceed the NECB energy efficiency requirements and have stronger lifecycle costing outcomes. Similar LEED policies for public sector buildings have been adopted by most other provinces in Canada. In Newfoundland and Labrador, 46 provincial public sector buildings, including those owned by agencies, boards and commissions, are LEED-registered to date, and a further 21 private sector and federal government buildings are LEED-registered.

More information on the NECB and its status in other jurisdictions can be found at http://www.exec.gov.nl.ca/exec/ccee/publications/NECB_Discussion_Doc.pdf .

¹ The Northwest Territories have indicated that they will not adopt the NECB as they have their own energy efficiency requirements at an equivalent level of stringency.

Research Initiatives

Prior to engaging stakeholders on this policy commitment, the Provincial Government undertook two cost-benefit and lifecycle cost analyses to better understand the business case for adopting the NECB in Newfoundland and Labrador. This work was driven by four reasons:

- In a Canadian context, Newfoundland and Labrador is considered to be in a northerly climate zone. This means that more stringent building envelope requirements would be required in Newfoundland and Labrador relative to most of the Canadian population. However, existing analysis of the NECB focused on its implementation in large Canadian cities, many of which are in warmer climate zones than Newfoundland and Labrador.
- In a Canadian context, analysis is focused on larger buildings (greater than 3,000 m²) that is constructed in large cities, but not on buildings typical of those constructed in rural areas of Newfoundland and Labrador (generally up to 2,000 m²).
- Building owners in most large cities in most Canadian provinces have the ability to access natural gas for heating. However, Newfoundland and Labrador is relatively more reliant on electricity generation. Electricity generation, from a space heating perspective, is more efficient than natural gas.
- Within the province, there are four climate zones. This means that there are different building envelope requirements between locations such as St. John's, Corner Brook, St. Anthony and Labrador City. However, analysis of the NECB focused only on climate zone 6 which had the least stringent energy efficiency requirements of the four climate zones. This decision was taken because it was too costly to run models for all climate zones and the zone 6 analysis would help determine whether it would be cost effective to build to the more stringent energy efficiency requirements for zones 7a, 7b and 8.

The first study, completed in 2013 by Stantec, comprised a cost-benefit and lifecycle cost analysis for seven recently constructed LEED-registered buildings in Newfoundland and Labrador. The key features of the study were:

- It focused on LEED-registered buildings as these are the only large buildings in the province for which comprehensive energy models have been developed.
- The buildings included a new school in Torbay, the Corner Brook Long Term Health Care Centre, the new student residence at the St. John's campus of Memorial University, and the new College of the North Atlantic (CNA) campus in Labrador City². The study also included three private sector LEED-registered buildings, including two office buildings in St. John's and a warehouse in Mount Pearl.
- The smallest building in the study was about 3,800 m² and four of the buildings were over 10,000 m².

The study concluded that while it costs more to construct a building to LEED requirements than NECB energy code requirements, there are, in all cases expect the CNA campus, substantive energy savings

² The Corner Brook Long Term Care Home and Memorial University Student Residence have been awarded LEED Silver certification by the Canada Green Buildings Council.

realized.³ The study concluded that, from a lifecycle costing perspective, there are substantive net savings to be achieved by building to meet LEED requirements rather than NECB requirements. The study can be found at

http://www.exec.gov.nl.ca/exec/ccee/publications/Cost_Benefit_Analysis_Implementing_2011National EnergyCode_BuildingsNL.pdf

The second study, completed in 2015 by Caneta Research Inc., comprised a cost-benefit and lifecycle cost analysis for five building archetypes representative of building construction practices and functions located in rural areas of Newfoundland and Labrador. The key features of the study were:

- Building sizes considered ranged from 620 m² to 2,000 m².
- An archetype analysis was used i.e. representative energy models were developed for different types of buildings. This was because there are no recently constructed buildings in the province, other than LEED-registered buildings, that had an energy model that could be used in the analysis.
- The building archetypes included an office building, multi-unit residential building, box retail store, warehouse and restaurant.
- Three wall assembles (metal, wood and concrete) were analyzed.
- The analysis was completed for St. John's (representing the least stringent climate zone in the province from a building envelope perspective) and Labrador City and Nain (representing the most stringent climate zone in the province). This approach also allowed for a review of the impact of different electricity rates within the province.

The study concluded that, while substantive energy savings would be realized in all cases, any incremental up-front capital construction costs incurred would not be realized from a lifecycle cost perspective in all cases. The study can be found at

http://www.exec.gov.nl.ca/exec/ccee/publications/necb_archetype_analysis.pdf .

Consultation Process

The Provincial Government held targeted consultations from July to September 2015 to solicit stakeholders' views on adopting the NECB in the province. There were two components to the consultation process, namely, focused consultation sessions with stakeholder groups, and provision for stakeholders and the public to provide feedback in writing through an on-line portal. Invited stakeholders included business sector organizations, construction industry organizations, electric utilities, municipalities, aboriginal governments and training institutions.

To facilitate the consultation process, a discussion document, which can be found at http://www.exec.gov.nl.ca/exec/ccee/publications/necb_discussion_document.pdf, was made publicly

³ The College of the North Atlantic Campus is located in a northerly climate zone (meaning it has more stringent building envelope requirements), the region has higher construction costs, and the region has low electricity rates. This means that it is challenging to achieve positive lifecycle costing outcomes from incremental investments to improve energy efficiency as there is relatively less energy cost savings.

available. It was put on government's website and circulated to stakeholders. The document provided an introduction to the NECB, the status of its adoption across Canada, and an outline of three key issues that the consultations were to focus on, namely:

- the business case for adopting the NECB;
- potential approaches to implementation and administration of the NECB in the province; and
- potential skills and training requirements.

The discussion document included eight questions on these issue areas to guide stakeholder input and feedback. A summary of points raised during consultations is found in the next section below.

A total of 11 consultation sessions were held in total (eight were in-person and three via webinar). Inperson consultation sessions were held on July 27-28 and September 25, 2015 and webinar sessions on August 4 and September 28, 2015. Targeted in-person consultations were also held following requests from two stakeholder groups: the St. John's Board of Trade (August 25, 2015) and the Mount Pearl-Paradise Chamber of Commerce (September 15, 2015). In addition, an in-person session was held with the Urban Municipalities Caucus of Municipalities Newfoundland and Labrador (September 12, 2015). Written feedback was received from the St. John's Board of Trade and a private sector engineer. The consultation process closed on September 30, 2015.

In total, 77 individuals from stakeholder groups participated in the consultation sessions and two written submissions were received. Figures 1 and 2 provide a breakdown of participants by sector and by location of the participant. The consultations were led by the Office of Climate Change and Energy Efficiency with support from Natural Resources Canada and Caneta Research Inc.





*Figures include the 13 participants who attended the sessions requested by the St. John's Board of Trade and the Mount Pearl-Paradise Chamber of Commerce.

Key Findings from Consultations

As noted above, the discussion document included a discussion of three key issues to guide stakeholder input and feedback. These issues included the business case for adopting the NECB, potential approaches to implementation and administration of the NECB in the province, and potential skills and training requirements. Input from stakeholders on these issues is outlined below.⁴

The Business Case

The key findings of the cost-benefit building archetype analysis (described above) were provided to participants. Three questions were asked:

- 1. What are your views on the findings of the cost-benefit analysis?
 - All participants felt the technical study was broadly representative of the building types and wall assemblies commonly found in Newfoundland and Labrador.
 - All participants felt that additional analysis is required that would look at the impacts of building to NECB 2011 requirements in Labrador given more stringent building envelope requirements, transportation costs and different electricity rates in the region. (*This work has now been completed. The findings are included as an addendum to the cost-benefit analysis available on-line.*)
 - Business sector and construction industry participants noted that, in some cases, the findings of the lifecycle cost analysis indicate that business owners would not recoup any incremental up-front costs that would be incurred, and that accommodations should be considered for high-bay

⁴ Where possible, the summary of findings indicates which stakeholder group provided input on particular questions. However, for some stakeholder groups, such as the utilities and Aboriginal government, there were fewer participants. In these cases, input from these stakeholder groups is not specifically identified.

buildings, such as warehouses. They felt, in general, that payback periods should not exceed ten years.

- Business sector and construction industry participants noted that the cost-benefit analysis did not include any indirect costs that may be incurred by building owners, such as energy modelling and additional incremental permitting costs, and these costs would impact on the findings of the lifecycle cost analysis.
- Business sector and municipal participants also noted that the cost-benefit analysis should be considered parallel to other cost pressures, including increasing land purchase costs and increasing municipal water taxes.

2. What opportunities or barriers would you or your organization encounter if the NECB was adopted?

- Construction industry participants noted that there is capacity in the province to complete energy modeling, design and construct building to meet NECB requirements.
- Construction industry participants noted that the primary incremental capital cost driver was the building envelope, and felt that owners of larger commercial buildings may be better able to absorb any new capital costs as they have access to different forms of capital financing (relative to owners of smaller buildings) and have more opportunity to achieve energy savings in other building components, such as HVAC systems and lighting, which may mitigate against incremental costs for the envelope.
- Business sector and construction industry participants felt that the incremental upfront capital costs appear to be high relative to energy savings in some cases, and overall payback periods are too long in these circumstances for smaller building developers and for building developers constructing buildings with an expected lifespan of 25 years or less.
 - In particular, they noted that, unlike public sector buildings and larger buildings with an expected lifespan of 50-75 years, many warehouses, box retail stores and smaller office buildings have a lifespan of 25 years or less. In these situations, they felt that a payback period of 10 years or higher may be met with some degree of resistance from some financial lenders.
 - However, they also felt that there is flexibility in NECB requirements which could help offset costs and drive innovation, and that the introduction of energy efficiency requirements will result in increased use and demand for construction materials which may, over time, bring down upfront capital costs.
- Participants noted that improving the energy efficiency of buildings may increase the value of properties and, in turn, municipal property tax. Some, such as municipal participants, viewed this as a potential opportunity and others, such as business sector participants, as a potential barrier (i.e., increased property tax assessments may lengthen the projected payback period to recoup upfront investments made).
- Business sector and construction industry participants felt that most building owners are unaware of the complexity and energy consumption of mechanical and lighting systems in their buildings and their associated energy costs, and that this may result in unwillingness by building owners to invest in energy efficiency.
 - To address this, they felt that a phased-in approach should be considered and that a communications strategy be developed to facilitate a broader understanding of the relationship between energy efficiency and energy savings for business owners.

- Business sector and construction industry participants indicated that regulating energy
 efficiency requirements may help address split incentives⁵ and push the commercial rental
 market to be more uniform and consistent on energy efficiency. The introduction of energy
 efficiency requirements would mean that energy savings would be realized by tenants, but
 tenants may pay higher monthly lease fees to cover incremental costs incurred by building
 owners.
- Business sector participants also noted that regulating energy efficiency requirements may help
 address energy efficiency challenges in tight rental markets, that is, where market demand
 meets or exceeds market space. In these situations, building owners and tenants may not
 prioritize energy efficiency as the market for space is competitive, regardless of energy
 efficiency investments.

3. Based on what you have seen, should Newfoundland and Labrador move forward with adopting the NECB? Why or why not?

- Overall, participants supported the introduction of energy efficiency requirements in the province. In particular, participants noted that the province may be viewed as less environmentally progressive than other provinces and territories if it did not adopt energy efficiency requirements, and that that this may impact, in some cases, on the propensity of private sector investors to invest in the province. All participants felt, however, that the local context needs to be accommodated.
- Business sector and construction industry participants noted the introduction of the NECB would not present a burden for building designers or contractors as products and practices are already shifting towards energy efficiency. However, they felt that commercial financing institutions, in some cases, may be less willing to provide loans to some building owners given lifecycle costing projections in the cost-benefit analysis. To address this, they felt that accommodation should be made for more northerly climate zones and for some building types, such as high-bay garages, warehouses and fire halls.
- Business sector and construction industry participants indicated that a phased-in approach would provide time for the local market to better understand and adapt to energy code requirements. For example, participants identified that ASHRAE 90.1⁶ could be first introduced followed by a phase in to NECB.

Administration

Participants were provided with an overview of how current construction codes are implemented in Newfoundland and Labrador, as well as the various approaches used in other provinces and territories. Two questions were asked:

⁵ Split incentives refer to situations, such as in rental properties, where there is less incentive for building owners to invest in energy efficiency if building tenants pay for their own energy use. Split incentives do not occur when the building owner pays for the energy use by tenants.

⁶ ASHRAE stands for the American Society of Heating, Refrigerating, and Air-Conditioning Engineers. ASHRAE 90.1, first published in 1975, outlines minimum requirements for energy efficient designs for buildings. Within Canada, Ontario and British Columbia have adopted both the 2010 version of ASHRAE 90.1 and the 2011 version of NECB.

4. If the NECB is adopted in Newfoundland and Labrador, what do you think would be necessary to promote effective compliance with the code's requirements?

- Municipal participants felt that an integrated approach to implementing construction codes in the province, including the National Building Code (NBC), National Fire Code (NFC) and NECB should be pursued. More specifically, they noted that NBC provisions are implemented in different municipalities using different approaches and that the province provides oversight to NFC implementation.
- Municipal participants felt that implementation of the NECB should not be more onerous than the NFC which includes fire and life safety provisions, and that an integrated approach would ensure consistency in code implementation for all codes.
- All participants noted that, regardless of the approach taken for NECB implementation, a streamlined, responsive and timely approach should be pursued so that all code requirements can be implemented on a regional basis by a single regulator at least-cost to the private sector.

5. From your perspective, if the Provincial Government moves forward with adoption of the NECB, what would be the pros and cons of pursuing provincial-level administration of the code, municipal-level administration, and/or out-sourcing various aspects of administration to private companies?

Provincial-level administration

- Municipal participants felt that provincial-level administration, particularly if integrated with
 other regulatory requirements such as the NFC, would result in a consistent approach to NECB
 implementation across the province, and would support a "level playing field" across
 municipalities and regions of the province. As an example, they noted that municipal
 implementation may result in a situation where a warehouse developer could incur a 7.5 per
 cent cost increase if the building was constructed inside a municipal boundary rather than
 outside the municipality's boundary.⁷
- All participants noted that provincial administration will require additional resources within the Provincial Government in order to avoid, in some cases, any delay for permitting and inspection services in some rural areas. They indicated that any permitting and inspection costs that may be incurred by building developers should not exceed those that may otherwise be incurred through municipal-level administration of the NECB.
- Municipal participants felt that, if provincial-level administration is pursued, flexibility should be afforded to municipalities to take on some regulatory responsibilities if they so desired to do so in the future.

Municipal-level administration

 Municipal participants noted that, on an ongoing year-over-year basis, there are relatively few buildings constructed in most municipalities are large enough to fall within the scope of the NECB and that; therefore, it would not be cost-effective to develop capacity and expertise at a municipal level to implement the NECB.

⁷ The building archetype analysis showed that the incremental cost to construct the warehouse archetype (climate zone 6, metal wall construction, 2,000 m²) to NECB requirements is \$120,950 or 7.5 per cent higher than the estimated baseline construction cost of \$1.6 million. The payback period for this archetype exceeded 50 years. Actual costs incurred will differ based on specific building design features and location.

- Municipal participants felt that a regional approach may help alleviate this issue in some rural areas in the future, but that any regional model with municipal oversight would take an extended time to develop.
- Municipal participants noted that capacity constraints could potentially result, in some situations, in an uneven playing field in terms of NECB implementation across municipalities which could generate competitiveness distortions in the business sector.
- Municipal participants felt that municipalities would incur some costs to implement the NECB, but felt that there was insufficient information provided to estimate these costs. They indicated that they these costs would depend on the precise permitting and inspection requirements that may be outlined in legislation.

Out-sourcing to private companies

- Municipal and construction industry participants felt that this approach could help address capacity constraints at the provincial or municipal level. Construction industry participants noted that this would represent a new business opportunities for some engineering companies, and pointed out that some financial institutions request periodic third party inspections during construction periods as a condition of financing, however, inspections may not be required by all lenders or for all buildings, and these inspections may not necessarily include provision related to energy efficiency.
- Municipal and construction industry participants were uncertain as to whether out-sourcing would be more or less expensive to a building owner relative to provincial or municipal level administration. They felt that the cost should be no more expensive per building than municipal-level administration.
- Municipal and construction industry participants expressed differing views as to whether private sector companies that would be engaged in NECB implementation would need to be certified or accredited.⁸ They felt that while a certification process may increase the rigor of NECB implementation, it may also limit the propensity of some companies to pursue certification given that the local market for services is relatively small and that some service providers may not have a presence in rural areas, and noted that this may have the effect of increasing costs to building developers in cases where demand for services exceeds available supply.

Skills and Training

Participants were provided with an overview of how skills and training-related functions are undertaken in other provinces and territories and potential groups, such as building designers, contractors and officials that may require skills and training in Newfoundland and Labrador. Three questions were asked:

- 6. What knowledge, skills or training would you or your organization's staff need to acquire to build to the NECB?
 - Post-secondary training and construction industry participants noted that different skills are required for the different groups identified. For example, building designers require skills and expertise on matters such as interpretation of code requirements, techniques for meeting effective R-values requirements for wall assemblies, lighting design to meet lighting density

⁸ The term certification will be used inclusively in the document to refer to certification and accreditation.

requirements, and energy modeling. They felt that these skills could be attained, on a formal basis, through training offered by industry associations, college technical programs and university engineering faculties, conceptually similar to the LEED Accredited Professional designation. Construction industry participants also identified that some industry groups may prefer informal training to raise industry awareness, including presentations in lunch-and-learn and related formats.

- At a technical training level, post-secondary training participants noted that program offerings exist at the college level that provide guidance on interpreting building codes, guidance on how to meet technical specifications, and related matters. They noted that these courses are outside the purview of the Red Seal program and can be adapted to address regulatory amendments, as required.
- Post-secondary training participants noted that energy code requirements cover a range of trades programs, such as carpentry and electrical programs, and that many of these programs are designated trades that offer an Interprovincial or Red Seal endorsement. They noted that curriculum for these programs are updated periodically to reflect ongoing regulatory changes, and felt that there may be limited value in developing energy efficiency-specific curriculum content for these trades.
- Regarding building inspections, post-secondary training and municipal participants noted there are a range of technical complexities of the NECB which would require specific skills and training. They noted that formal training courses are offered by the Federal Government and that provinces such as Nova Scotia require certification of building inspection officials as a condition of employment. They noted that any similar certification process in Newfoundland and Labrador would have to be outlined in legislation or regulation, and suggested that, at least in the near term, any training to be provided should not be mandatory as a condition of employment.
- Municipal participants felt that informal or voluntary training for building inspection officials would present less cost pressures in rural areas, for example, than formal certification processes.

7. Which entities should be responsible for coordinating the delivery of training on this issue for building designers, building contractors, building officials and any other groups who would need to acquire the necessary knowledge and skills?

- All participants noted that the responsibility for delivering training would likely depend upon the audience receiving the training. With respect to training related to building design and inspection services, participants identified roles for the Federal Government, College of the North Atlantic, industry associations (for industry certification for designers and informal lunchand-learn opportunities) and, potentially, university engineering faculties.
- With respect to building trades, post-secondary training participants identified post-secondary training institutions, including College of the North Atlantic and other trades colleges, as playing a role, but noted that such training would occur within the structure of existing programs using curriculum developed at the interjurisdictional level to meet Red Seal certification processes.
- Post-secondary training, construction industry and municipal participants noted that any
 certification process established in legislation would require Provincial Government oversight,
 including the establishment of curriculum, testing procedures, registration lists, and related
 matters. They indicated that these oversight functions would result in costs that would, likely,
 have to be recouped from industry.

8. If Newfoundland and Labrador were to adopt the NECB, how long would your organization need to be ready for any new requirements?

- Post-secondary training participants felt that post-secondary institutions would require at least one year to develop any new curriculum, train their instructors and train students.
- Post-secondary training and construction industry participants felt that one year would also be sufficient for designers, builders and instructors and tradespersons to become familiar with NECB requirements.
- Post-secondary training, construction industry and municipal participants noted that any certification process that may be established would result in a longer timeline for a training institution to be registered to provide training related to the certification process, to implement training, particularly if implemented on a modular basis, and to accommodate for additional testing procedures.

Next Steps

Feedback received during this consultation process will be used to identify options and next steps in the coming months on an approach to enhancing energy efficiency requirements for new large buildings in the province.