

TO: CHAIR AND MEMBERS
ENVIRONMENT COMMITTEE

DATE: 2008 January 03

FROM: DIRECTOR PLANNING & BUILDING

FILE: 41500-20
Reference: Building Regulations

SUBJECT: GREENING THE BC BUILDING CODE - UPDATE

PURPOSE: To provide information on the current status of proposed amendments to the BC Building Code to promote green building objectives.

RECOMMENDATION:

1. **THAT** Council request the Minister Responsible for Housing to take into consideration the comments provided with respect to the proposed green amendments to the BC Building Code, as outlined in Sections 2.1 to 2.3 of this report.

REPORT**1.0 INTRODUCTION**

The “greening” of the BC Building Code is an initiative of the Building and Safety Policy Branch (BSPB) of the Ministry of Housing. This initiative stems from a 2007 February 13 throne speech by the Province announcing the development of a greener, unified BC Building Code by early 2008. The creation of regulated standards for buildings has been identified as one of several key actions for achieving the Province’s energy conservation and efficiency targets.

The BC Energy Plan, released by the Province on 2007 February 27, aims to acquire 50% of BC Hydro’s incremental resource needs through conservation efforts by the year 2020. Additionally, the Province has committed to a greenhouse gas (GHG) emission reduction target of 33% by the year 2020. To help meet these targets, the Province has indicated that it intends to implement ‘green’ or energy efficient building standards by 2010.

To advance energy efficiency in new building construction, the BSPB consulted with industry, local governments and provincial government ministries and agencies through two advisory groups. Their input has supported the development of proposals for changes to the BC Building Code (the Code) to improve:

- energy efficiency - reducing energy consumption and greenhouse gas emissions through higher standards in building construction; and

- water efficiency - reducing water use through low-consumption fixtures

To-date, the proposed changes to the Code advanced by the BSPB address the following:

- energy efficiency requirements for single family houses and smaller multi-family residential, commercial and industrial buildings;
- energy efficiency requirements for high-rise multi-family buildings and larger industrial, commercial and institutional buildings; and
- water efficiency requirements for all new buildings and additions

In Fall 2007, the BSPB invited all interested parties, including municipal governments, to review the proposed changes and submit their comments through an online consultation process, which closed 2007 December 21. Building and Planning staff have reviewed the green code proposals in terms of their feasibility and desirability for implementation, and have submitted feedback to the BSPB. This report summarizes the proposed changes, and recommends that Council request the Minister Responsible for Housing to take into consideration the comments outlined in Sections 2.1 to 2.3 of this report, as provided below.

2.0 REVIEW OF PROPOSED BC BUILDING CODE AMENDMENTS

The proposed amendments represent the first stage of “greening” the BC Building Code, and set the following requirements for new construction or additions to existing buildings, effective in Spring 2008:

- houses, low-rise residential buildings and small commercial and industrial buildings would be required to install increased insulation or, in the case of housing, meet an increased EnerGuide rating;
- high rise residential buildings and larger industrial, commercial and institutional buildings must meet the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)¹ 90.1 (2004) standard; and
- use of ultra low-flow toilets and other water saving plumbing fixtures in all new buildings and additions to existing buildings

The Province has suggested that future iterations of the BC Building Code may explore requirements for the reuse of existing buildings, the adoption of ‘smart metering’ to track energy use, the disposal of construction materials in a more environmentally-friendly manner, and improvements to indoor air quality. It is anticipated that future public consultations will be held as these initiatives develop further.

¹ ASHRAE is an internationally recognized standard for energy efficiency in buildings.

2.1 *Energy Efficiency Requirements for Single Family Homes and Smaller Multi-Family Residential, Commercial and Industrial Buildings*

Included in the proposed amendments are new requirements for single family houses, multi-family residential buildings four stories or less, and some smaller non-residential buildings. In BC, there are currently prescriptive requirements for smaller residential buildings; however commercial and industrial buildings have been exempted from any standard. Also being proposed is the option for new houses to meet a minimum Energuide for New Houses (EGNH) standard.²

Some of the key changes being proposed for smaller buildings include:

Houses and multi-family residential buildings four stories or less –

- prescriptive requirements that consist of higher standards for the insulation of natural gas heated homes, which would require a change from a 2 x 4 construction assembly to a 2 x 6, or, alternately³;
- the option of performance-based requirements that would require a new home to meet a minimum EGNH rating of 77 (rather than incorporating the prescriptive requirements above)⁴

Non-residential buildings –

- new prescriptive requirements for insulation between heated and unheated spaces, where currently no requirements exist

Staff Comments:

The proposed changes to small building construction, represent a good first step in advancing energy efficiency requirements Province-wide. Staff are generally in favour of the proposed requirements for small buildings, particularly with respect to the prescriptive requirements for residential and non-residential buildings. The following staff comments have been advanced to the BSPB:

EGNH Assessment Method: The option to use the EGNH rating system, while allowing greater flexibility in the design of buildings, may pose certain implementation and enforcement challenges. The EGNH system would rely upon the use of a trained Energy

² The EGNH system is a science-based approach coordinated by Natural Resources Canada and the Canadian Home Builders' Association of BC to rate the energy efficiency and emissions footprint of a house. British Columbia houses currently perform at between EGNH 69 and 78, depending on location and space heating fuel types.

³ The additional cost of constructing a single-family home (approx. 2,500 ft²) to meet the new prescriptive requirements is estimated to be \$1,000.

⁴ The cost of constructing a single-family, detached home to an EGNH 77 rating is estimated to vary between \$1,300 and \$3,900 – as calculated for the southern interior and northern interior climatic zones. These figures represent a simple payback on investment of four to nine years resulting from the energy savings. The payback period in the Lower Mainland's more temperate climate may be slightly longer, due to fewer temperature extremes and lower anticipated heating/cooling costs.

Advisor to conduct an energy assessment of a new house at the design stage to ensure that the building 'as a system' achieves the desired EGNH rating. Once the house has been constructed, an independent Energy Advisor (not affiliated with the builder) would be required to conduct a blower door test⁵ to verify achievement of the minimum rating. Once the energy-efficiency of a house has been verified, the house would be issued an EGNH rating and label for placement on the home's furnace or electrical box. This approach presents concerns in terms of the effectiveness of an EGNH assessment, and the ability of municipal officials to ensure adherence to the Code through the use of this tool. To address these, staff have suggested that the BSPB incorporate the following modifications into their proposal:

- The use of standardized software and/or reporting forms by Energy Advisors to communicate energy-saving recommendations to builders and regulators.
- A requirement for an independent Energy Advisor to conduct a third party field review during the construction period to ensure that the performance-based recommendations (e.g. insulation, window glazing) have been implemented, which would not otherwise be revealed by a blower door test.
- The use of a standardized form or checklist by Energy Advisors to conduct the necessary mid-construction assessments.
- The provision of copies of the initial and final EnerGuide assessment reports to municipalities to confirm the builders' preferred use of performance-based (e.g. EGNH) requirements.
- Clarification of the roles and responsibilities of municipalities dealing with homes that fail to meet EGNH requirements, and the minimization of municipal liability exposure in this regard.

EGNH Rating Requirement: The EGNH option would require that new home construction meets a minimum rating of 77. However, with new requirements for energy-efficient furnaces and windows coming into force on January 1, 2008 and 2009, respectively (as per the *Energy Efficiency Act*), it is expected that new homes would easily achieve a rating of between EGNH 74 and 79. As a result, staff recommend that future iterations of the BC Building Code strive to achieve a higher EGNH rating of 80 or more, with accompanying building material prescriptions to match.

Implementation Timeline: With respect to the proposed effective date for the new small building energy efficiency requirements, staff have proposed that there be a minimum three month implementation period preceding the effective date (currently set for April 2008).

Other: The Province should provide a timeline defining their future plans for the BC Building Code and in particular, indicating when future iterations may be considered. In addition to establishing a higher EGNH requirement, future iterations of the Code should

⁵ A blower door test measures the air-tightness of a house, and thus serves as an indicator of the energy-efficiency of the house. The cost of this verification step is approximately \$300 per house.

address other green building objectives such as those related to resource sustainability and health (e.g. non-reactive building materials etc). Lastly, on a regional or sub-regional basis, municipalities should be provided with regulatory tools to opt for higher standards in green building construction — without having to seek Ministerial approval as currently required under the Community Charter. While not intended to create a patchwork of requirements throughout the Province, the ability of regional governments to mandate certain aspects of green building construction (e.g. green roofs), may allow municipalities to take advantage of local expertise or technologies to meet the expectations and needs of their jurisdictions.

2.2 *Energy Efficiency Requirements for High-Rise Multi-Family Residential Buildings and Larger Industrial, Commercial and Institutional Buildings*

Included in the proposed amendments are new requirements for commercial, institutional, industrial and multi-unit residential buildings (over 600 square meters of floor space or more than four storeys above grade).

The key change being proposed for these buildings includes a requirement to adhere to the ASHRAE 2004 *Energy Standard for Buildings Except Low-Rise Residential Buildings*, number 90.1. This standard is based on the specific climate where the building is constructed, and includes requirements for the building envelope, HVAC systems, service water heating, power intensity, lighting, and other mechanical equipment. Adherence to ASHRAE 90.1 (2004) could be achieved through one of the following three routes of building design: prescriptive, performance, or simplified performance paths, as outlined below.

1. The prescriptive path is a simple approach and provides specific equipment and design components to meet the ASHRAE 90.1 (2004) standard.
2. The performance path uses energy performance simulation software to give the designer flexibility to trade-off energy use among various building components. For example, a high-rise, multi-family residential building could meet the ASHRAE standard by using a high-efficiency heating system, rather than by providing a superior building envelope.
3. Simplified performance paths are available for the building envelope, HVAC and lighting systems; offering a variety of prescriptive requirements combined with certain flexibility provisions.

Compliance with the proposed requirements would be demonstrated through a Letter of Assurance signed by a professional engineer or architect stating that a building conforms to the ASHRAE standard (either through the performance or prescriptive paths).

Staff Comment:

The proposed changes to large building construction, represent a good first step in advancing energy efficiency requirements Province-wide. However, as with the

To: Environment Committee
From: Director Planning & Building
Re: Greening the BC Building Code - Update
2008 January 03..... Page 6

requirements for smaller buildings, future iterations of the BC Building Code should strive to achieve progressively higher standards for large buildings, as experience with new building technologies continues to advance. Overall, staff are in favour of the proposed requirements for large buildings, but have suggested the following modifications to the BSPB to facilitate the implementation and enforcement of these requirements:

Letters of Assurance: Letters of Assurance and standardized province-wide reporting forms should be provided to municipal building officials to indicate the owners' intended method of meeting the energy efficiency requirements (e.g. prescriptive versus performance paths). Furthermore, the Letters of Assurance that are currently provided in the BC Building Code must be updated to include new article(s) for the proposed requirements.

Implementation Timeline: Staff proposed that the effective date for the new energy efficiency requirements be delayed to January 2009 to allow for the consulting and construction industries, as well as building officials, to become familiar with the new requirements. Sufficient time would also be required to allow the preparation of standardized province-wide reporting forms, which owners could use to indicate their intended method of achieving the energy efficiency requirements. As discussed previously, the Province should provide a timeline defining their future plans for the BC Building Code and in particular, indicating when future iterations may be considered.

Other: In addition to establishing higher standards, future iterations of the Code should address other green building objectives such as those related to resource sustainability and health. As recommended for small building construction, municipalities on a regional or sub-regional basis should be provided with the regulatory tools to opt for higher standards in green building construction, where it may be appropriate to do so.

2.3 Water Efficiency Requirements

Included in the proposed amendments to the BC Building Code, are new requirements for ultra low flow toilets and urinals as well as supply fittings for kitchen faucets, lavatory faucets and shower heads. While these new requirements are currently embodied in the *Water Conservation Plumbing Regulation* — already adopted by Metro Vancouver and other regional districts and municipalities, this proposed amendment would apply Province-wide.

The new water efficiency requirements would apply to all new buildings for which the BC Building Code applies, including new additions to existing buildings. Compliance with the new water efficiency requirements would be monitored by local governments — as is already the case in Burnaby under the regional *Water Conservation Plumbing Regulation*.

Staff Comments:

Staff are generally in favour of adding water conservation requirements to the BC Building Code, as it allows for a consistent application of water conservation standards throughout the Province. However, as the proposed amendments would not serve to advance water conservation goals in Metro Vancouver or other jurisdictions whose aim is to reduce the demand on potable water supplies, staff have advanced the following comments to the BSPB:

Maximum Flow Rate of Supply Fittings: Consider more stringent requirement for the flow rate of supply fittings (e.g. 7.6 L/min for shower heads, rather than the current 9.5 L/min), where those technologies are available and cost-effective – particularly in those jurisdictions where the *Water Conservation Plumbing Regulation* already applies. Also, consider a requirement to limit the *maximum* flow rate per shower stall, to address the installation of multiple fixtures (e.g. body shower systems) that greatly increase overall consumption.

Fixture Water Efficiency: Consider more stringent flush cycle requirements for fixtures (e.g. 3.8 L for urinals, rather than the current 5.7 L), where those technologies are available and cost-effective. Also, it would be desirable to establish requirements for dual-flush toilets, as per previous City of Burnaby recommendations.

Outdoor Irrigation Requirements: In addition to the need for more efficient indoor plumbing fixtures, the proposed amendment to the BC Building Code should also establish requirements for outdoor irrigation (in-ground or above-ground), which accounts for one of the largest residential uses of water in the summer months.

Implementation Timeline: If more stringent requirements are considered, such as the ones suggested above, a longer implementation period may be required to allow for the market-place (and the building industry) to adjust. However, if the proposed requirements are not made more stringent, than the proposed April 2008 implementation date may be adequate.

Other: As mentioned in previous sections, it is important that the Province provide a timeline defining their future plans for the BC Building Code, and in particular, indicating when future iterations of the Code may be considered.

3.0 CONCLUSION

The proposed amendments to the BC Building Code represent an important first step in incorporating energy and water efficiency requirements to new building construction in BC. Staff are generally supportive of the amendments that would result in higher energy and water conservation standards in buildings – namely higher insulation requirements in smaller buildings (residential and non-residential), the option to use the EGNH rating system for new houses, the application of the ASHRAE 90.1 (2004) standard for larger

To: Environment Committee
From: Director Planning & Building
Re: Greening the BC Building Code - Update
2008 January 03..... Page 8

buildings, and the implementation of minimum standards for the flow rate and flush cycle of plumbing fixtures.

Staff have recommended a number of modifications to the proposed amendments to facilitate the implementation and enforcement of these requirements. These modifications include the need for standardized reporting forms, mid-construction assessments of homes seeking EGNH rating, and updated Letters of Assurance for large building construction. Other recommendations include a delayed effective date for the implementation of energy efficiency requirements, and the provision of regulatory tools to allow regions or sub-regions of the Province to opt for higher standards in building efficiency, where appropriate.

In terms of water efficiency requirements, staff have recommended more stringent requirements for the flow rate and flush cycle of plumbing fixtures, and additionally have requested the establishment of requirements for dual flush toilets and outdoor irrigation systems.

The proposed amendments to the BC Building Code will begin the process of advancing energy efficiency and water conservation throughout the Province. However, a further, consistent and ongoing process of Code review and amendment will likely be required to advance the Province's goals of energy conservation and greenhouse gas emissions reductions in a significant manner.

This report recommends that Council request the Minister Responsible for Housing to take into consideration the comments provided with respect to the proposed green amendments to the BC Building Code, as outlined in Sections 2.1 to 2.3 of this report.



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