CITY OF VANCOUVER

CITY OF **VANCOUVER**

POLICY REPORT
DEVELOPMENT AND BUILDING

Report Date:	June 9, 2008
Author:	Tim Ryce / David Ramslie
Phone No.:	604.871.6751 / 604.873.7946
RTS No.:	7183
VanRIMS No.:	08-2000-31
Meeting Date:	June 26, 2008

TO: Standing Committee on Planning and Environment

FROM: Chief Building Official in consultation with the Office of Sustainability, Planning, Development Services and Engineering Services

SUBJECT: The Green Homes Program - Building By-law Amendments for New One Family Dwellings, One Family Dwellings with Secondary Suites, and Two Family Dwellings (in this report called "New Dwellings")

RECOMMENDATION

A. THAT Council approve the proposed amendments to the Building By-law, generally as set out in Appendix A, directed at reducing the environmental impacts of new dwellings, and

B. THAT Council authorize the Director of Legal Services to bring forward the By-law amendments generally as shown in Appendix A to this report.

GENERAL MANAGER'S COMMENTS

The General Manager of Community Services RECOMMENDS approval of A and B.

COUNCIL POLICY

Council may pass by-laws to regulate the construction of buildings and adopt any code relating to the construction of buildings, with any changes that Council consider appropriate.

In March 2005, Council approved the Community Climate Change Action Plan to reduce greenhouse gas (GHG) emissions in the community to 6% below 1990 levels by 2012.

In March 2007, Council passed a motion directing staff to begin planning for significant, long-range GHG reductions with the eventual goal of becoming a carbon-neutral city.

In May 2007, Council adopted the Building By-law which included environmental protection objectives. Although no new "green building" requirements were added to the by-law at that time, the environmental protection objectives were put into place to facilitate the future development of the City's Green Building Strategy.

In July 2007, Council adopted targets to reduce community GHG emissions to 33% below current levels by 2020 and 80% below current levels by 2050. In addition, Council adopted the target of having all new construction in Vancouver be GHG neutral by 2030.

PURPOSE

The purpose of this report is to propose a set of Building By-law amendments directed at reducing the environmental impacts of new dwellings (new one and two family dwellings, including secondary suites). The recommended by-law amendments address the following issues:

A. Building envelope performance in the areas of wall, basement, foundation, and window insulation,
B. Energy performance in the areas of lighting fixtures, energy monitoring systems, hot water heating, and fireplaces,
C. In-building water efficiency in the area of water closets,
D. Indoor air quality and ventilation, and
E. Infrastructure development in the areas of roof-mounted solar energy generation and electric vehicle charging.

BACKGROUND

In November 2005, Council approved the Green Building Strategy (GBS) to develop specific zoning guidelines and By-laws to enhance the environmental and human health performance of all Part 3 buildings (generally over 3 storeys or greater than 600 m^2 in building area). In May 2007, Council received an update report on the progress of the Green Building Strategy in which staff presented the refined Strategy and conveyed industry support for the program as it now stood. Council instructed staff to develop options and recommendations for future scope, approach, staffing and resourcing for broadening Vancouver's green building and infrastructure strategy, including expanding the GBS to include buildings that are not classified as Part 3 in the Building By-law.

Recently Council adopted a series of ambitious targets for greenhouse gas (GHG) reductions including targets to reduce community GHG emissions by 33% below current levels by 2020 and 80% below current levels by 2050 to reflect and support adopted provincial targets. In addition to these, Council adopted the target of having all new construction in Vancouver be GHG neutral by 2030.

Section 306(a) of the Vancouver Charter provides that Council may make by-law regulating the constructions of buildings in certain circumstances. Bill 10 recently amended s. 306(a) to add the following circumstances:

"(iv) where the provision of access to a building, or to part of a building, for a person with disabilities is concerned;

(v) where the conservation of energy or water is concerned;

(vi) where the reduction of greenhouse gas emissions is concerned;"

DISCUSSION

As directed by Council, staff have developed Building By-law amendments aimed specifically at new dwellings as a plan of action for broadening the scope and approach of the Green Building Strategy. These amendments are collectively known as the Green Homes Program.

The amendments proposed in this report are aimed at providing Vancouverites with environmentally responsible homes while helping to address the causes of climate change by reducing GHG emissions. The Green Homes Program provides substantial environmental impact reductions without significantly impacting the costs of new construction. According to building energy use data collected by the Natural Resources Canada (NRCan) EnerGuide™ for New Homes Program, staff believe the recommended amendments will reduce the energy consumption of new dwellings by approximately 33% when compared to current building practices. This program will also move Vancouver toward its targets for GHG emission reductions in the community and its eventual goal of carbon neutrality for all new construction.

54% of all GHG's generated in the City of Vancouver are produced by the construction and operation of buildings. Within City limits, 75% of the land zoned for residential development is occupied by these types of buildings. These statistics highlight the importance of addressing the construction and operation of one and two family dwellings as the City strives to meet our climate change mitigation objectives.

The Province of British Columbia has recently released a similar set of Building Code requirements directed at reducing the environmental impact of buildings throughout British Columbia. Staff from the Office of the Chief Building Official worked collaboratively with the Province in order to stay consistent with the Provincial initiatives, but at the same time is bringing forward additional requirements that will further improve the environmental performance of Vancouver's one and two family dwellings.

For both the Provincial initiatives and the by-law amendments proposed in this report, staff have developed projections for estimated GHG savings based on the NRCan data mentioned above. The analysis is based on the assumption of the construction of 700 new dwellings each year, which is what the City has experienced in the last few years. As seen in Figure 1 below, staff have projected that the Vancouver Green Homes Program will be 14% more effective in reducing GHG's in new dwellings than what has recently been introduced in the Provincial Building Code.

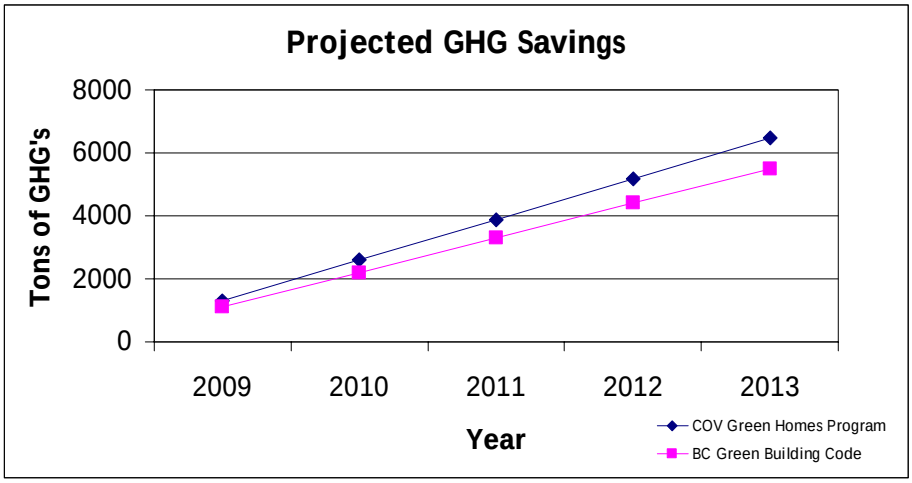

Figure 1: Projected GHG Savings from the proposed Green Homes Program

The projections presented in Figure 1 are based solely upon the adoption of the proposed By-law amendments outlined in this report. However, the recommendations in this report represent the requisite first step needed to achieve carbon neutrality targets by 2030.

The proposed amendments related to energy efficiency and future renewable energy generation are designed to move new dwellings as far as possible towards Vancouver's 2030 target without adversely impacting affordability. Staff estimate that if the proposed amendments are accepted by Council, all new dwellings will achieve a minimum rating of EnerGuide 80. Figure 2 below shows the projected level of performance the proposed Green Homes Program is expected to meet, correlated to the EnerGuide Rating Service measurement system.

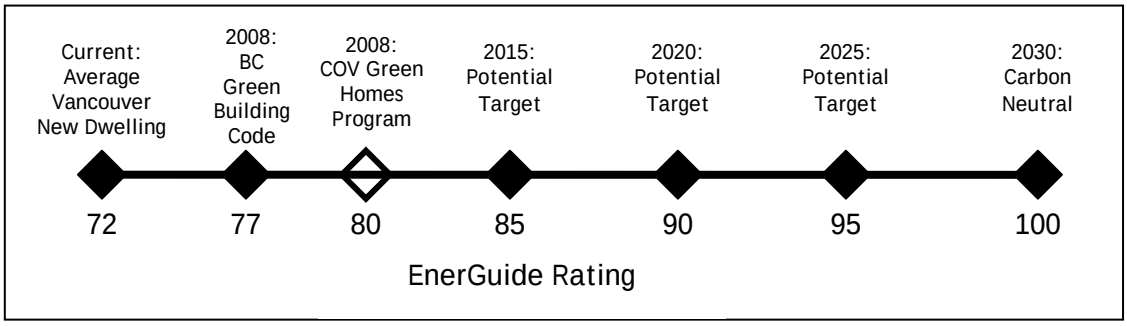

Figure 2: Estimated EnerGuide Rating for the proposed Green Homes Program

Consultation with industry has advised that a dwelling built to or above an EnerGuide 80 standard should be provided with a constant ventilation system, such as a heat recovery ventilator. To accommodate potential future updates of the Green Homes Program and to enable carbon neutral new dwelling construction by 2030, the recommendations in this report include reference to this component, detailed in the following section.

The proposed amendments to the Building By-law are as follows:

A. Building Envelope Performance

Increasing Insulation Requirements:
Currently, the Building By-law addresses heat loss from the interior of dwellings by mandating the installation of specific levels of insulation in wall and ceiling/roof assemblies. To reduce these heat losses in new dwellings, staff are recommending increasing these minimum insulation requirements and adding a new requirement for insulation under basement floors. The proposed amendments would increase both wall and basement insulation requirements, reducing heat losses through both above-ground and below-ground walls. Furthermore, the new requirement for insulation under basement floors would reduce the amount of heat loss to the ground through the foundation, and allow for a more comfortable basement indoor environment.

In addition to foundations, walls, and roof assemblies, windows permit a substantial amount of heat loss. In order to limit heat loss through windows, staff are recommending requiring a minimum performance specification that will apply to all windows in new dwellings. If Council accepts this recommendation, these new requirements would mandate better window performance and, when combined with the proposed insulation requirements mentioned above, would address and improve the thermal performance of the entire building envelope.

B. Energy Efficiency

Reducing Electricity Consumption:
A substantial portion of dwelling energy usage is electricity for lighting. Despite the fact that several alternatives to the standard incandescent light bulb are commonly available, consumer adoption of these energy-saving, long-lasting lighting elements is slow, largely due to the wide availability of standard bulbs. In order to promote consumer adoption and education, staff are recommending requiring that a minimum of 40% of light fixtures in a dwelling be hard-wired to not accept incandescent or halogen light bulbs. In doing so, homeowners will utilize energy-saving lighting technologies, such as compact fluorescent (CFL) or light-emitting diode (LED). This recommendation will provide City-wide electrical savings that will support BC Hydro and senior government efforts to "green" the provincial electricity supply.

Requiring In-home Energy Display Meters:
Research has shown that homeowners are more likely to augment their behaviour when they are provided with a near real-time indication of how their actions impact resource consumption. To that end, staff are recommending requiring in-home electrical energy usage display meters in all new dwellings. In-home energy usage display meters provide residents with up-to-the-minute statistics of energy consumption through easy-to-understand devices inside the house. Through this device, dwelling residents will be able to directly observe the positive effects of energy-conscious behaviour.

Reducing Hot Water Heating Energy Losses:
Another significant energy use in a dwelling is the generation and supply of hot water; heat losses in hot water piping networks, as well as at the hot water tank itself, can greatly increase the amount of energy required to provide residents with hot water. In order to limit these losses, staff are recommending requiring that insulation be provided around all electrically-powered hot water tanks, and around a portion of the hot water piping leading to and from the tank itself on both electrically and gas-

powered systems. In the case of constant recirculation hot water systems (i.e. - systems that continuously circulate hot water throughout the hot water piping system, regardless of whether hot water is being consumed), staff are recommending that all hot water piping in the systems be required to be insulated.

Increasing Natural Gas Fireplace Efficiency:
Natural gas fireplaces, while not commonly considered to be a component of a dwelling that would consume a large amount of energy, are in fact very detrimental to home energy efficiency. Heat losses through chimneys and typical gas fireplace vents, combined with an always-on pilot light consume a substantial amount of resources. Statistics from Terasen Gas indicate that pilot lights alone cost the average home owner $120 a year in natural gas. To limit these losses, staff are recommending requiring that all natural gas fireplaces be direct-vented and use electronic ignition. Direct venting, a process that eliminates the need for a chimney, ensures that the fireplace consumes only unheated outdoor air. Electronic ignition removes the need for a pilot light, effectively eliminating the standby energy consumption of the fireplace.

C: In-Building Water Efficiency

Reducing Potable Water Consumption:
Currently, the Building By-law addresses potable water consumption in dwellings by requiring the use of low-flow fixtures throughout the home, as well as mandating the installation of toilets that use a maximum of 6 litres of water for each flushing action. While effective, a substantial amount of potable water is still consumed with each toilet flush. Dual-flush toilets, toilets that allow the user to choose between a large or small flushing volume, can reduce this consumption by using appropriate water volumes. If Council accepts this recommendation, this requirement will allow residents to further reduce potable water consumption.

D: Indoor Air Quality and Ventilation:

Requiring a Heat Recovery Ventilator:
As industry adopts more energy efficient construction techniques, it is projected that air leakage through the dwelling's envelope (walls, ceiling, windows, etc.) will be notably reduced. While this is considered a positive change from an energy perspective, the continued assurance of a minimum standard of indoor air quality is required. To that effect, staff are recommending that all new dwellings be provided with a heat recovery ventilator (HRV). Capable of ensuring that adequate ventilation is provided to a home, an HRV continuously exchanges stale indoor air with fresh air while transferring the heat contained in the outgoing exhaust to the incoming ventilation. By minimizing heat loss while ensuring the delivery of fresh air, this recommendation will promote new dwellings that are both healthy and energy efficient.

E: Infrastructure and Data Collection for Future Green Homes

Data Collection for Future Green Homes Program Development:
Future development of the Green Homes Program would greatly benefit from an ongoing analysis of the effects of current Building By-law requirements and Green

Homes initiatives. To facilitate this, staff are recommending requiring that an EnerGuide Rating System Audit, as defined by NRCan's EnerGuide™ Rating Service, be carried out on all new dwellings. The audit involves a plan review, on-site inspection and Blower Door Test; the latter component is specifically designed to test the air-tightness of the dwelling, which directly relates to the dwelling's long-term energy efficiency. The audit also provides some analysis on general home efficiency related to large appliances, layout, and design of the home. This information will be critical for staff to track the performance of the Green Homes Program, and to help them identify where they can provide targeted development, training and incentives to the industry, and prioritize future directions for the Program.

The adoption of the EnerGuide™ Rating Service metric is advantageous on several fronts. While acting as a tool to help build capacity in energy efficient design and construction within the residential construction industry, EnerGuide™ audits promote public awareness on the topic of dwelling energy efficiency. Research has shown that this type of consumer-friendly rating tool can help to promote market transformation in the building sector.

Infrastructure Installation for Future Roof-Mounted Energy Generation:
As the typical dwelling can be in use for half a century or more, some allowances for the adoption of future technologies is prudent. One such technology that will be undergoing widespread adoption in the coming years is that of on-site solar energy generation, namely roof-mounted photovoltaic or solar thermal systems. In order to facilitate the simple addition of such systems to dwellings at a future date, staff are recommending requiring that a vertical service shaft be provided, extending from the dwelling's service room to the attic space. When desired, homeowners would be able to use this service shaft to easily install the piping and cabling required by the systems they chose. This recommendation recognizes that infrastructure must be put in place at the time of construction in order to mitigate future cost barriers and ease the adoption of emerging technologies by the homeowner at a later date.

Infrastructure Installation for Plug-in Electric Vehicles:
Over the past 5 years there has been a growing market for electric bicycles and scooters. It is also expected that plug-in electric hybrid vehicles will be available to the public in the near future, followed soon after by the widespread availability of fully electric vehicles. The adoption of this technology represents a significant opportunity to further reduce GHG's in our community. However, a primary challenge to their adoption is the fact that they require a charging station in the user's home. To that end, staff are recommending requiring the installation of a cable raceway from the building's electricity circuit panel to an enclosed outlet box in the home's garage or carport. In doing so, staff are ensuring that the home can be easily retrofitted at a later date to allow for the installation of electric vehicle charging facilities. This recommendation recognizes that infrastructure must be put in place at the time of construction in order to ease the adoption of emerging technologies by the homeowner at a later date.

Staff developed these recommendations with the goal of improving the overall environmental performance of Vancouver's housing stock while minimizing the impact on cost and affordability. Staff defined "minimizing costs" to mean that all recommendations could not add up to more than 2% of overall construction costs. The recommendations in this report

would add approximately 1.4% to the cost of constructing a new dwelling. According to statistics produced by the Greater Vancouver Real Estate Board, the impact of these recommendations on the list price of a new home will be less than 1%.

Recognizing that affordability is a concern to many residents in Vancouver, staff have designed the program to take advantage of incentives already present within the market to further mitigate the cost impact. The recommendations meet the criteria necessary to receive $600 from BC Hydro as part of their PowerSmart™ Homes Program. Furthermore, they will also allow all new dwellings to qualify for the Canadian Mortgage and Housing Corporation's (CMHC) Mortgage Loan Insurance Program, which offers a 10% refund on Mortgage Loan Insurance and extended amortization periods.

The proposed Green Homes Program also provides access to several green homebuilding marketing opportunities such as EnerGuide™ for Homes, PowerSmart™ for Homes, and the Energy Star™ rating system. The recommendations pre-qualify all new dwellings built in Vancouver to achieve the highest levels of energy efficiency certification for each of these rating systems.

CONSULTATION

These recommendations were circulated to members of industry, the general public, and City staff for review and comments. The Greater Vancouver Home Builders' Association (GVHBA) was presented with draft recommendations in January 2008, and shortly after provided written commentary. A concern was raised that the increased wall insulation requirements would reduce the saleable square footage of a new dwelling. To address this, staff are investigating modifying the methods used to calculate allowable floor space ratios such that varying wall thicknesses would have no effect on allowable square footage. The GVHBA questioned the necessity of requiring that 40% of lighting fixtures be non-incandescent and non-halogen, stating that the market is trending towards this already. Staff considered the pace of market adaptation in the development of this requirement, and determined the proposed amendment to have value in promoting consumer awareness.

The feedback from the GVHBA questioned the use of the EnerGuide Rating System audit, noting that the tool is site-dependant and based on "average" resource consumption data. Staff are aware of the audit's limitations; however, as the purpose of the proposed audit is to inform future research and development of the Green Homes Program, the EnerGuide tool is well-suited for the task. Furthermore, as a prominent green home rating system, the ability to promote consumer awareness and market transformation is unmatched in Canada. The final concern of the GVHBA related to the estimated cost of the HRV; it was their belief that the cost of that component is greater than that determined by staff. While the GVHBA's estimate represents a cost increase for the proposed Green Homes Program, the increment in minor; using the GVHBA's values, the overall cost of the Program would still be less than 2% of total construction costs.

GHVBA members were invited to attend a forum held by the City in February 2008. The majority of attendees expressed their support for the initiative and provided feedback throughout the development of the Green Homes Program.

Representatives from the Window and Door Manufacturers Association of BC also provided commentary on the recommendations, drawing attention to the ramifications in mandating 3rd party window performance classifications, as discussed in the following paragraph.

In order to receive feedback from industry as well as the general public, a website was developed to allow for public consultation and feedback on a wider scale. Responses were received from a range of respondents, including design professionals, manufacturers, interest groups, and the general public. Comments were positive, and the vast majority of respondents supported the proposed By-law amendments. Respondents appreciated the initiatives; in many cases the proposed amendments were considered a "good start", and that the Green Homes Program would "inspire other municipalities to follow suit". Some concerns were raised by the building industry and design professionals regarding the use of a 3rd party classification for window performance standards; this was resolved through the revision of the amendment to reference a specific level of performance, as determined by staff. Overall, respondents suggested that while these proposed amendments were a solid start, continued efforts to create, maintain, and develop future By-law amendments would be required for the Green Homes Program to be successful.

Consultation with the various City departments that would be affected by the recommendations has been carried out; direction has also been received from the Green Building Strategy Steering Committee and the Planning and Implementation Advisory Committee. Feedback from staff members has been incorporated into the Green Homes Program. It was observed that since the majority of the proposed by-law amendments in this report are modifications to existing By-law requirements, the impact on staff of the Green Homes Program thus far was deemed to be minimal.

Numerous organisations have also come forward to voice their support for the proposed Green Homes Program, including BC Hydro and the Ministry of Energy, Mines, and Petroleum Resources. Letters of support are on file at the City Clerks Office.

FINANCIAL IMPLICATIONS

There are no financial implications for the City of Vancouver.

PERSONNEL IMPLICATIONS

It is anticipated that there are no personnel implications with respect to City resources to administer the Green Homes Program requirements.

ENVIRONMENTAL IMPLICATIONS

The Green Homes Program will result in an annual reduction of 1300 tons of greenhouse gases. Based on staff projections, staff believe that over five years the program will cumulatively save over 25000 tons of greenhouse gases. The recommendations will provide residents with homes that conserve energy and potable water, create opportunities for on-site renewable energy generation, and allow for the future use of electric vehicles.

IMPLEMENTATION PLAN

Should Council adopt the by-law amendments proposed in this report, staff recommend that these amendments come into effect on September 5, 2008. This will give the Chief Building Official time to develop a training program for permit processing and inspection staff, as well as inform builders and homeowners about these new requirements. It should be noted that the majority of these proposed requirements relate to issues that staff currently regulate. Therefore, extensive training will not be required.

CONCLUSION

This report recommends amendments to the Building By-law directed at reducing the environmental impacts of new dwellings (new one and two family dwellings, including secondary suites). The proposed amendments include changes to promote energy efficiency and potable water consumption reduction, improve indoor air quality, and provide infrastructure for the adoption of future technologies. Staff estimations extrapolated from NRCan data state that these amendments will reduce the energy of consumption of new dwellings by approximately 33%, and will be 14% more effective in reducing GHG's than what was recently adopted as part of the BC Green Building Code.

Through public consultation with City staff, the Vancouver building community, industry, and the general public, there was general support for the recommended amendments. The comments received have been reviewed and some of the amendments have been revised based on their concerns. Support was also expressed for further initiatives to reduce environmental impacts of new dwellings; staff will continue to work with this feedback on future Green Homes Program components. In order to provide sufficient time for City staff and industry education, an adoption date of September 5, 2008 is recommended.

Should Council adopt these recommendations, the Green Homes Program will put Vancouver at the forefront of sustainable development home construction practices in North America. It would be, once implemented, the most progressive green buildings standard required for new dwellings in North America.

* * * * *

APPENDIX A

BY-LAW NO. _____

A By-law to amend Building By-law No. 9419 regarding green building strategy for one family homes, one family homes with secondary suites, and two family homes

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This By-law amends the indicated provisions of the Building By-law.

2. In Table 9.25.2.1 of Part 9 of Division B and the notes to that table, Council:

   (a) from the first column, strikes out "(insulation to 600 mm below grade)";

   (b) from the first sub-column of the second column, strikes out "Less than 4500 Celsius Degree Days(1)";

   (c) from the first sub-column of the second column, strikes out the "3.5" that is in the same row as "Frame Walls", and substitutes "3.85";

   (d) from the first sub-column of the second column, strikes out the "2.1" that is in the same row as "Foundation Walls", and substitutes "3.85";

   (e) from the first sub-column of the second column, strikes out the "1.8" that is in the same row as "Unheated Concrete Slabs on Ground at or above grade", and substitutes "2.1";

   (f) from the first column, strikes out "Unheated Concrete Slabs on Ground at or above grade", and substitutes "Concrete Slabs on Ground at, above, or below grade (insulation under all slab area and around edge of slab)";

   (g) from the first column, strikes out "Radiant Heating Slabs on Ground (insulation under all slab area and around edge of slab(4))";

   (h) from the first sub-column of the second column, strikes out the "2.1" that is in the same row as "Radiant Heating Slabs on Ground (insulation under all slab area and around edge of slab(4))";

   (i) strikes out the second sub-column of the second column entitled "4500 and Greater Celsius Degree Days(1)", and the contents of the second sub-column of the second column;

   (j) strikes out Notes 1) and 2); and

   (k) re-numbers Notes 3), 4), and 5) as Notes 1), 2), and 3).

3. After Part 11 of Division B, Council adds:

"**Part 12**
Environmental Protection

Section 12.1. General

12.1.1. Application

12.1.1.1. Scope

1) The scope of this Part shall be as described in Subsection 1.3.3. of Division A except that this Part shall apply only to one-family dwellings, two-family dwellings, and one-family dwellings with secondary suites.

12.1.2. Definitions

12.1.2.1. Defined Terms

1) Words that appear in italics are defined in Article 1.4.1.2. of Division A.

12.1.3. Conflicts

1) In case of a conflict between any provision of this Part 12 and any other provision of this By-law, the Part 12 provision shall prevail.

Section 12.2. Building Envelope Performance and Energy Efficiency

12.2.1. Building Envelope Performance

12.2.1.1. Windows

1) Windows shall have a maximum thermal conductance (U value) of 2.00 $W/(K \cdot m^2)$.

12.2.2. Energy Efficiency

12.2.2.1. Light Fixtures

1) At least 40% of hard wired, electrically powered light fixtures shall be hard wired so as not to accept incandescent or halogen light bulbs.

12.2.2.2. Energy Usage Display Meter

1) Electrical installations shall have an energy usage display meter in the dwelling unit capable of calculating and displaying electrical consumption on at least a monthly basis.

12.2.2.3. Hot Water Tanks

1) Electrically powered hot water tanks shall have insulation that provides a minimum RSI value of 1.76.

12.2.2.4. Hot Water Tank Piping

1) The first 3 m of non-recirculating hot water piping leading from both electrically powered and gas powered hot water tanks, and the last 1 m of piping prior to connecting to the hot water tank, shall have insulation that provides a minimum RSI value of 0.35.

2) Despite Sentence 12.2.2.4.(1), the entire hot water piping system, if it is of constant recirculation design, shall have insulation that provides a minimum RSI value of 0.35.

12.2.2.5. Gas-Fuelled Fireplaces

1) Gas-fuelled fireplaces shall use electronic ignitions.

2) Gas-fuelled fireplaces shall be direct vented so that all products for and of combustion circulate to and from the dwelling unit without the use of a chimney.

12.2.2.6. Toilets

1) Toilets shall be of dual flush design, with a maximum single flush consumption of 6 litres.

12.2.2.7. Heat recovery ventilators

1) Each dwelling unit, in the case of a one-family dwelling or two-family dwelling, and each one-family dwelling with secondary suite shall have one heat recovery ventilator.

2) Each heat recovery ventilator shall

a) be designed and tested to meet the CSA International Standard CAN/CSA-F326 M91 (“Residential Mechanical Ventilation Systems”),

b) be installed by persons trained by the Heating, Refrigeration and Air Conditioning Institute of Canada or equivalent,

c) supply outdoor air directly to the principal living area, each bedroom, and any floor without a bedroom,

d) be operated by centrally located manual controls or by automatic controls,

e) not exhaust supplemental exhausts in the kitchens and bathrooms which shall be controlled by a manual switch in the room being served,

f) if a solid-fuel-fired appliance is present, be installed to operate without depressurizing the house in any operating mode,

g) be located in an accessible location within the dwelling unit, having a minimum headroom clearance of 2 m,

h) have an air intake equipped with a damper or bird screen, and be a minimum of 450mm above finished grade,

i) have an air exhaust equipped with a damper or bird screen, and be a minimum of 100mm above finished grade,

j) have supply-air ducts carrying un-tempered air through heated spaces insulated to at least RSI 0.5 (R-2.9), and

k) have exhaust ducts in unheated spaces insulated to RSI 0.5 (R-2.8).

3) Door under-cuts or transfer grilles shall be installed in doors to rooms where both supply and return air ducts are not located.

12.2.2.8. Energuide Rating System Audit

1) Before issuance of an occupancy permit, the Chief Building Official shall be provided with an Energuide Rating System Audit, as defined by the EnerGuide ™ Rating Service of Natural Resources Canada.

12.2.2.9. Vertical Service Shaft

1) A vertical service shaft shall extend from the service room, which contains the service water heater, to the attic space, consisting of at least two 50 mm PVC pipes, capped at both ends, and having at least a 20°angle.

12.2.2.10. Cable Raceway

1) Each dwelling unit shall have a cable raceway leading from the electricity circuit panel to an enclosed outlet box in the garage or carport.

2) A raceway not smaller than size 21 shall be provided to accommodate future conductors of a separate branch circuit intended to supply a future receptacle for use with the electric vehicle charging system.

3) An outlet box for the receptacle referred to in Sentence (2) and approved for the purpose shall be provided in a parking space or a parking stall of a storage garage or carport intended for use with the electric vehicle charging system.

4) The raceway described in Sentence (2) shall be installed between the dwelling unit panel board and the outlet box referred to in Sentence (3).

12.3 Objective and Functional Statements

12.3.1. Objective and Functional Statements

1) For the purposes of compliance with this By-law as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Table 12.3.1.1. (See A-1.1.2.1.(1) in Appendix A.)

Table 12.3.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 12
Forming Part of Sentence 12.3.1.1.(1)

Acceptable Solutions		Objectives and Functional Statements
12.2.1.1. Windows		
(1)		[F51,F52,F53F54,F55,F61,F63,FEP01-OEP1]
12.2.2.1. Light Fixtures		
(1)		[FEP1-OEP1]
12.2.2.2. Energy Usage Display Meter		
(1)		[FEP1-OEP1]
12.2.2.3. Hot Water Tanks		
(1)		[FEP1-OEP1]
12.2.2.4. Hot Water Tanks		
(1)		[FEP1-OEP1]
(2)		[FEP1-OEP1]
12.2.2.5. Gas-Fuelled Fireplaces		
(1)		[F40,F41,F43,F44,FEP1-OEP1,OEP3]
(2)		[F40,F41,F43,F44,F54,F55,FEP1-OEP1,OEP3]
12.2.2.6. Toilets		
(1)		[F72,FEP1-OEP4]
12.2.2.7. Heat Recovery Ventilators		
(1)		[F40,F44,F50,F51,F52,F53,F54,F63,OEP1]
12.2.2.8. EnerGuide Rating System Audit		
(1)		[OEP1,OEP5]

4. A decision by a court that any part of this By-law is illegal, void, or unenforceable severs that part from this By-law, and is not to affect the balance of this By-law.

5. This By-law is to come into force and take effect on the date of its enactment.

ENACTED by Council this day of , 2008

_____
Mayor

_____
City Clerk

#112487v6