

 Office of the Chief Building Official and The Sustainability Group

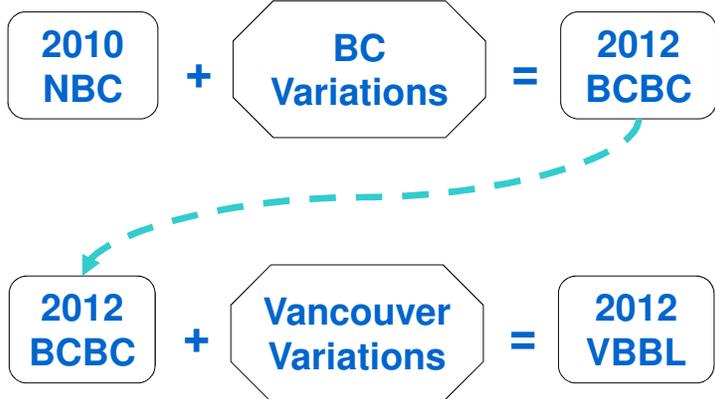
Proposed 2012 Vancouver Building By-law



 Vancouver Building By-law Building Code Development in Canada

2010 NBC + **BC Variations** = **2012 BCBC**

2012 BCBC + **Vancouver Variations** = **2012 VBBL**



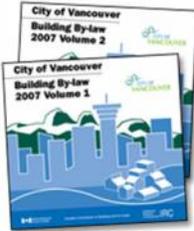
 2

Vancouver Building By-law Development Process

3 Components

1. Model Code Alignment
2. Vancouver Variations (Council mandates)
3. Administrative provisions

- **Development timeline**



```

    graph LR
      A[Model Code Review  
New Initiatives] --> B[Public Consultation  
(Jan-Apr 2012)]
      B --> C[Consultation Review & Amendment Revisions  
(May 2012)]
      C --> D[Council Adoption  
(Sep 2012)]
      D --> E[Effective Date  
(Mar 2013)]
    
```

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Vancouver Building By-law: Categories of Proposed Amendments

- Model Code Alignment Highlights
- Housekeeping Amendments to Vancouver Variations
- Removal of Barriers
- Council Directives
 - Industrial Flex Spaces
 - Adaptable Housing
 - Environmental Protection
 - Occupant Load Exit Capacity
 - (may go before May 2012)

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 Vancouver Building By-law:
Council Directives

Environmental Protection:

- 1 & 2 Family Dwellings “Part 9”
 - Green Homes Program
- Small Multi-Unit Residential “Part 9”
 - Subset of Green Homes Program
- Complex/Larger Buildings “Part 3”
 - ASHRAE 90.1 2010



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 Environmental Protection Summary:
All Building Types

Industry Considerations

- Bias to Marginal Incremental Cost
- Reviewed with Industry Green Building Steering Ctte
- Supported by Financial Tools and Training
- Further Public consultation needed on some specific items

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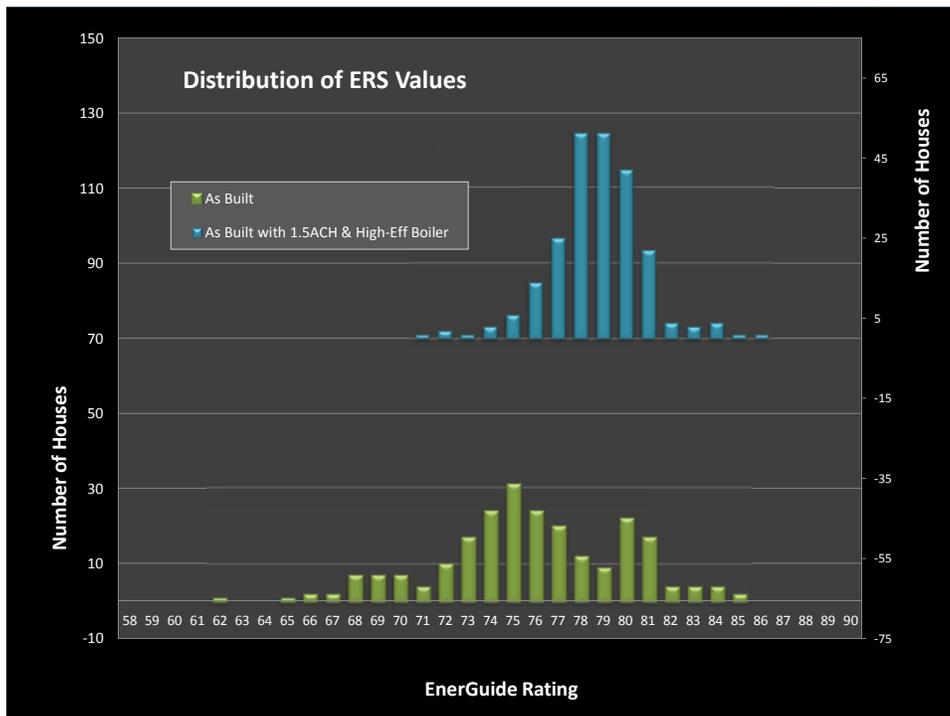
UPDATE 1: Green Homes Program - 1 & 2 Family

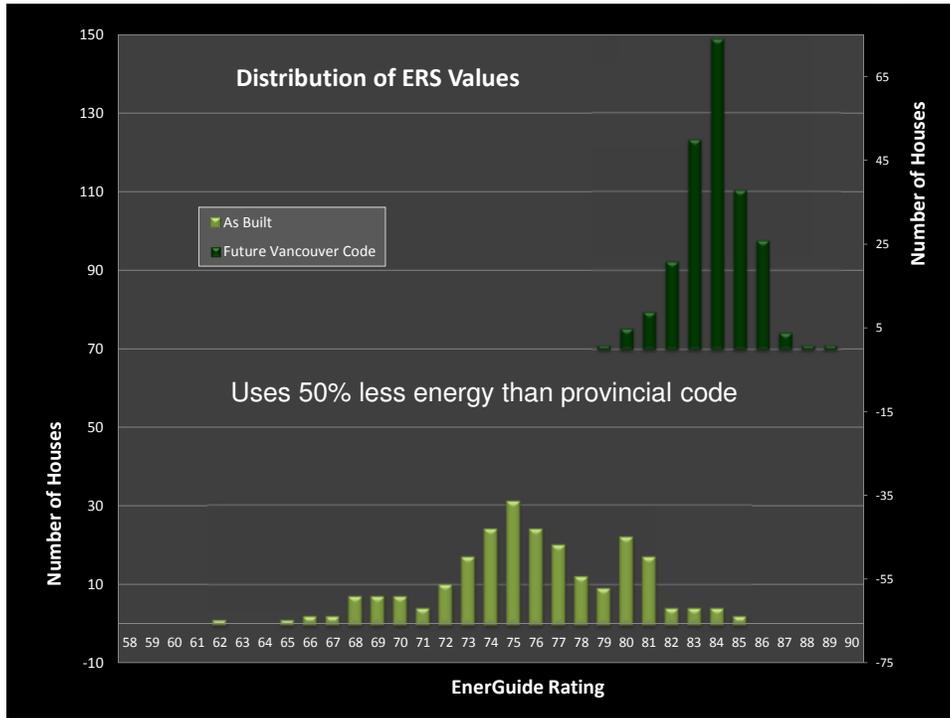
2009 GHP:

- 33% reduction in energy use
- Greenest code in North America
- ❖ Held off regulating air leakage (ACH)
- ❖ Assumed high efficiency furnaces



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Proposed Changes

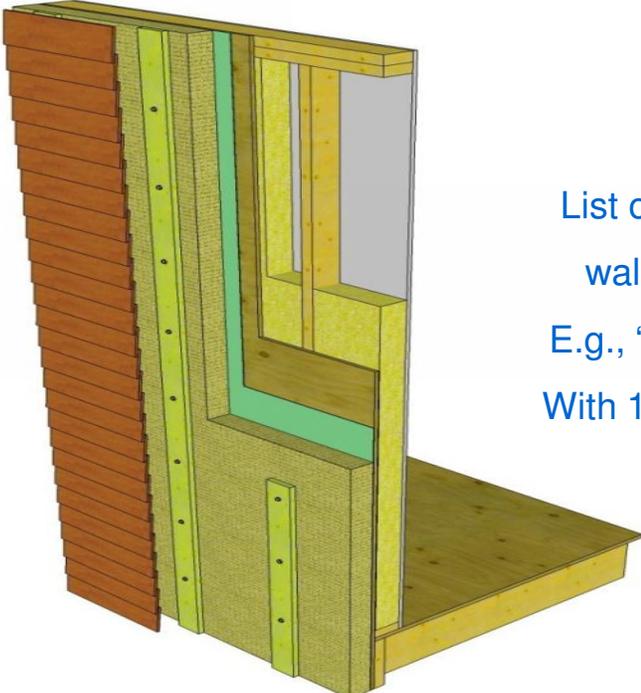


Key Updates:

- Maximum 3.5 ACH
- High Efficiency heating
- R22 Effective Walls
- Attic R50
- Energy Star Windows (R4)
- Water Heating > 82%
- Electric Vehicle Charging

Comfort & Durability



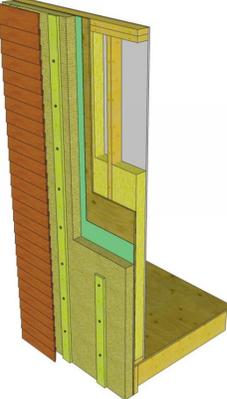


List of 5 acceptable wall assemblies:
E.g., “Split Insulation”
With 1.5” mineral wool

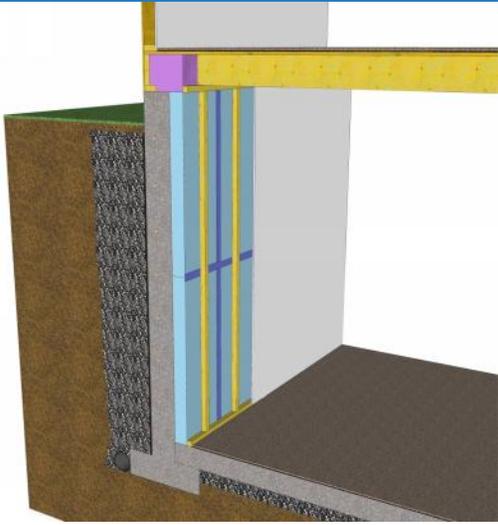


 Split Insulation R-values: Screws through Insulation

Exterior Insulation R-value added to exterior of sheathing	Effective Wall R-value Accounting for Thermal Bridging & Fasteners	
	2x4 stud wall @ 16” o.c. with R-14 batts	2x6 stud wall @ 16” o.c. with R-22 batts
1.5” Mineral Wool (R-6)	-	22.9
1.5” XPS (R-7.5)	-	24.3
3” Mineral Wool (R-12)	23.2	
2.5” XPS (R-12.5)	23.7	




Below Grade - Interior Insulation - XPS



R-20 foam insulation with framing and drywall (un-bridged) provides ~R-22

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This diagram illustrates a cross-section of a below-grade wall assembly. From left to right, it shows: a concrete foundation wall, a layer of XPS foam insulation, vertical wooden studs, a layer of drywall, and an interior floor slab. The text indicates that this combination provides an overall R-value of approximately 22.

Resources



Building Enclosure Design Guide
WOOD-FRAME MULTI-UNIT RESIDENTIAL BUILDINGS

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This section provides resources for building enclosure design. It includes a technical drawing of a wall section on the left, the cover of the 'Building Enclosure Design Guide' for wood-frame multi-unit residential buildings in the center, and another technical drawing of a window/wall junction on the right. The design guide cover features a construction worker on a wooden frame and logos for the City of Vancouver, BC Building Department, and other partners.



1.1% Incremental Cost (2500 Sq Ft Home)

No.	Description	Cost Premium
1	Increase attic insulation	\$200
2	Above-grade double stud	\$1,274
	Below-grade exterior insulated	\$1,212
3	Improved air tightness: 3.5 ACH	\$500
4	Increase window and skylight specification	\$757
5	Condensing boilers for space heat	\$1,000
6	Upgrade domestic hot water energy performance	\$300
TOTAL INCREMENTAL COST		\$5,243




PART 3 NEW CONSTRUCTION

- ASHRAE 90.1 2010 (~15% improvement)
- Master Meters and Sub-Meters protocol
- Electric Vehicle Charging 10% of stalls

Multi-Family only:

- HET/Dual Flush Toilets
- Green Switch for overhead lighting
- Stairwell Lighting Sensors
- Variable Parkade Lighting Levels





ASHRAE 90.1-2010 Incremental Cost

Table 14: Incremental Capital Cost (% of Construction Cost) over Baseline

Archetype	Incremental Capital Cost (% of Construction Cost) over Baseline	
	ASHRAE 90.1-2010	NECB 2011
High-Rise Residential	0.04%	0.46%
Mid-Rise Residential	0.02%	0.46%
Low-Rise Residential w/Retail Units	0.05%	0.28%
Stand Alone Retail	0.17%	1.50%
High-Rise Commercial	0.10%	0.78%
Mid-Rise Commercial	0.50%	0.61%
New Code Residential	0.04%	0.48%



VBBL PART 10 – Existing Buildings

Principles for Existing Building Policy Development

- Progressive upgrade requirements
 - Rapid paybacks (2-3 years)
- Gather data
 - Build database of Energy Utilization Intensities
- Align renovations to existing programs

 VBBL PART 10 - Existing Buildings
“The Green Renovation Program”

One and Two Family Dwellings

<u>Permit</u>	
<u>Value</u>	<u>Requirement</u>
\$5000+	EnerGuide Audit
\$25,000+	Air Sealing
\$50,000+	Attic Insulation



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 Strategic Approach

Supported by:

- Home Energy Loan Program (HELP)
- Provincial & Federal Incentives
- Education Materials
- Creation of Green Jobs



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VBBL PART 10 - Existing Buildings

All other Buildings:

- (a) Modest prescriptive approach
 - “menu of upgrades” supported by 90.1

OR

- (b-1) Energy Use Disclosure
 - 2 years of energy data

OR

- (b-2) Energy Retrofit Assessment (ERA)
 - Completed by authorized PEng



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Vancouver Building By-law: Cost Impacts of Proposed Amendments

1&2 Family Dwellings

- Building Cost: \$435,000
2500 sq.ft. at \$175/sq.ft.
= PowerSmart Home (\$2000)
= ENERGY STAR Home
- Primary Items:
 - Green Homes Program
 - Adaptable Housing



Construction Cost \$435,000	GHP \$4750 (1.1%)	AH \$1200 (0.3%)	Fire Safety \$200 (0.04%)
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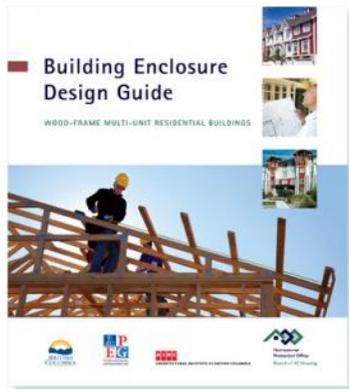


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Vancouver Building By-law: Cost Impacts of Proposed Amendments

Large Wood Frame Residential

- **Building Cost: \$3,000,000**
 - 20,000 sq.ft. @ \$150/sq.ft.
- **Primary Items:**
 - Environmental Protection
 - 100% better windows
 - 40% better walls
 - Adaptable Housing



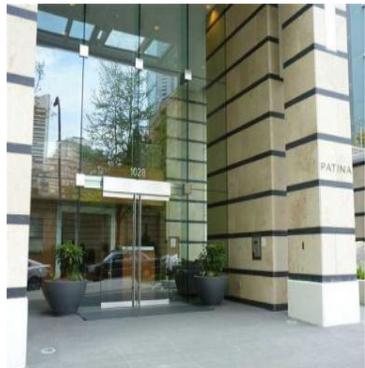
Construction Cost \$3,000,000	GHP \$25,000 (.8%)	AH \$9000 (0.3%)
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Vancouver Building By-law: Cost Impacts of Proposed Amendments

High Rise Condo

- **Building Cost: \$55,000,000**
 - 20 Story High-Rise (150 Units)
- **Primary Items:**
 - ASHRAE 90.1-2010 +\$140/unit
 - Adaptable Housing +\$300/unit



Construction Cost \$55,000,000	ASHRAE 2010 \$22,000 (.04%)	AH \$45,000 (0.08%)
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 Vancouver Building By-law:
Cost Impacts of Proposed Amendments

High Rise Commercial

- Building Cost: \$34,000,000
 - 17 Story Office Tower (170,000 sq.ft.)
 - High Performance Building?
- Primary Items:
 - ASHRAE 90.1-2010



Construction Cost \$55,000,000	ASHRAE 2010 \$34,000 (.10%)
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 Vancouver Building By-law:
Next Steps

- Fall Winter 2012
 - Complete Industry & Public Consultations
 - Finalize By-law language based on consultations
 - Internal staff training
 - Industry workshops (including CP Update Workshop)
- Spring 2013
 - Ongoing training/support to staff and industry during adoption period and beyond

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Conclusions

- Questions?