

ENERGY STEPCODE

BUILDING BEYOND THE STANDARD

BC-BEC Annual Conference: October 26, 2018

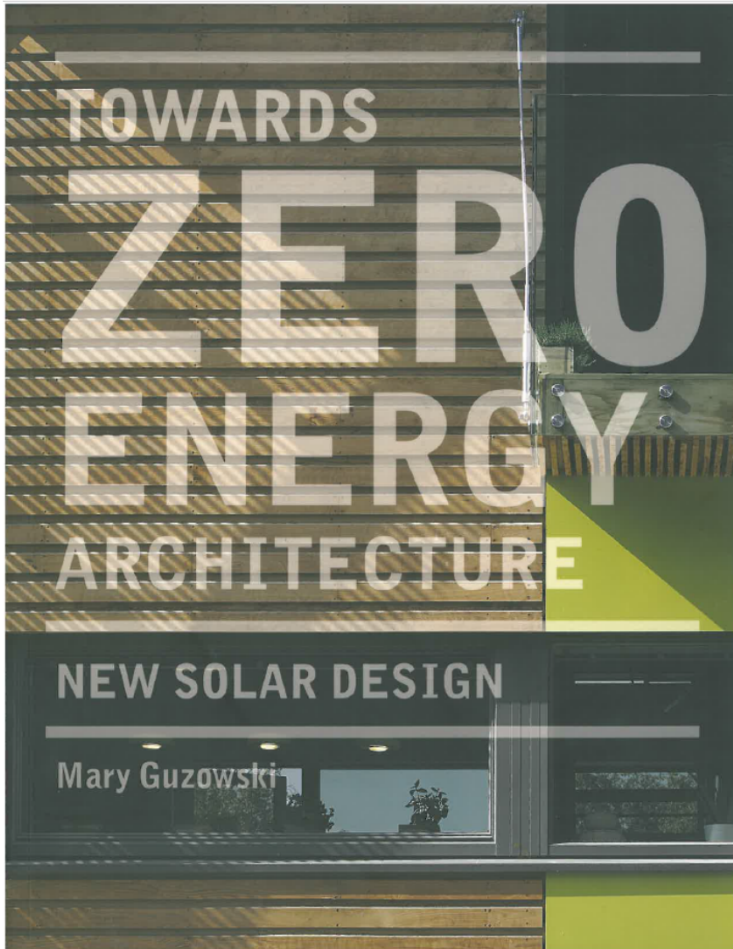
Local Government Implementation Issues and Opportunities

Norm Connolly

Community Energy Manager
City of New Westminster



National and Provincial Code Direction



Pan Canadian Framework on Clean Growth and Climate Change

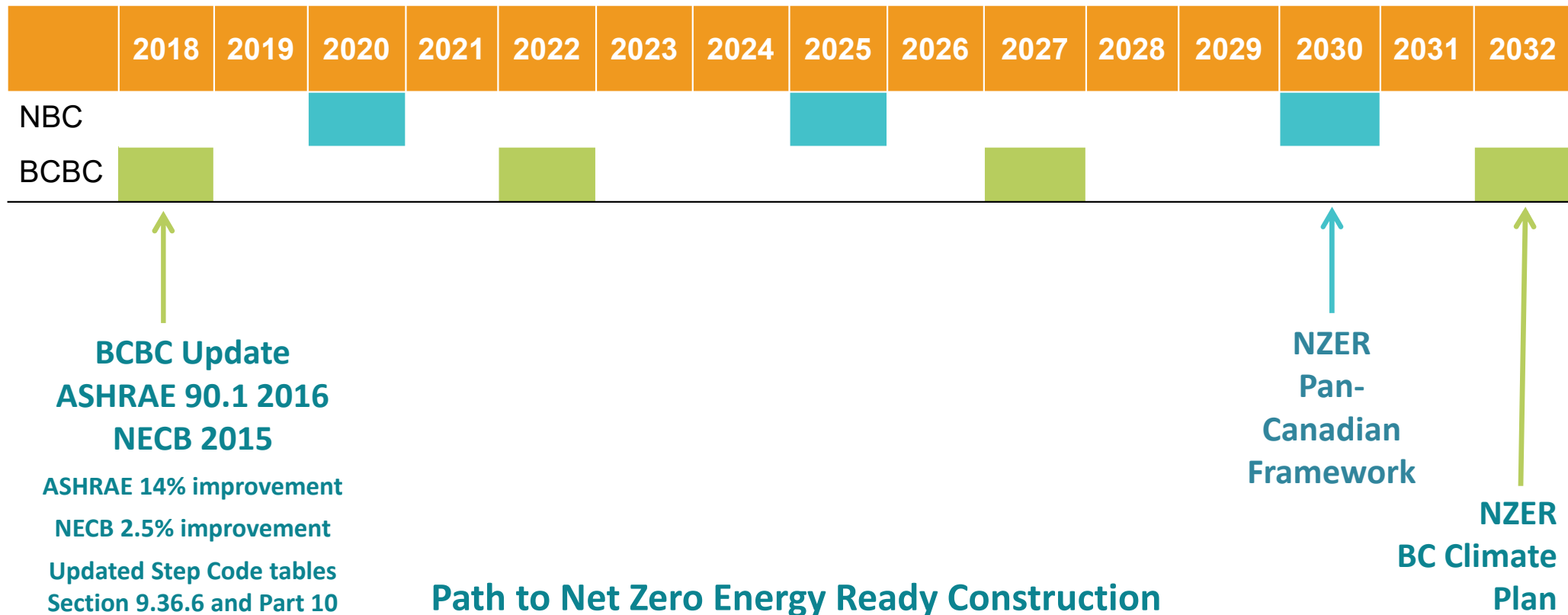
Federal direction for the National Building Code is to adopt increasingly stringent, model building codes starting in 2020, with the goal that all provinces and territories adopt 'net zero energy ready' building requirements by 2030.

BC Climate Leadership Plan

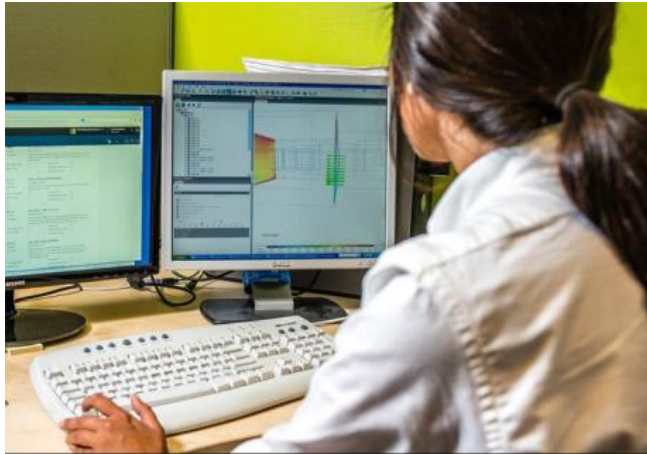
Intent is for phased updates to the BC Building Code so that all new buildings are 'net zero ready' by 2032, using the Step Code as the framework for setting beyond Code requirements.

Only three Building Code cycles away!

National and Provincial Code Updates



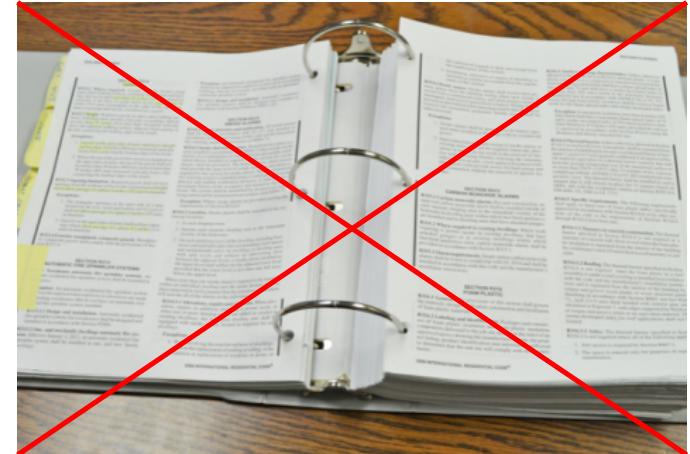
Performance Path Compliance



Energy Advisor + Whole Building Energy Modeling

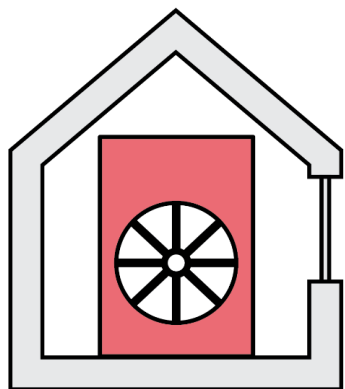


Air-Tightness Testing and Reporting

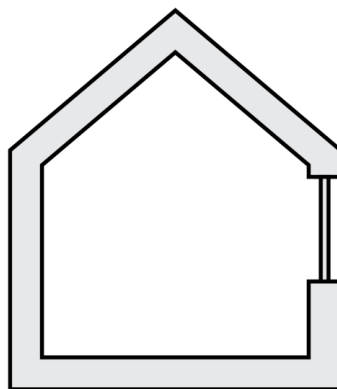


No Prescriptive Requirements

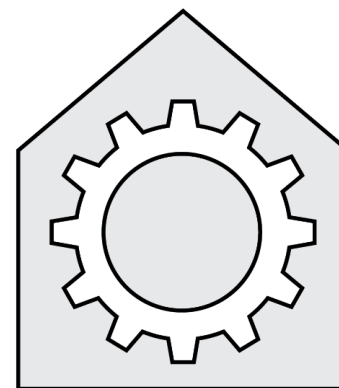
Part 9 Performance Metrics



Airtightness



Envelope



Equipment & Systems

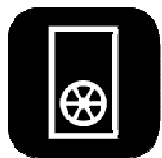
Part 3 Performance Metrics



Thermal Energy Demand Intensity (TEDI)



Total Energy Use Intensity (TEUI)



Air leakage rate, in L/(s.m²) @75 Pa
Pressure Differential

Step Code Implementation in BC

Local Government Notification to Province of BC on Step Code Engagement

City of Richmond	City of Victoria	Village of Belcarra
City of North Vancouver	District of Saanich	District of Peachland
District of North Vancouver	District of North Saanich	District of Oak Bay
District of West Vancouver	Comox Valley Regional District	City of West Kelowna
City of New Westminster	City of Duncan	District of Sparwood
City of Surrey	City of Campbell River	District of Summerland
Township of Langley	City of Kelowna	District of Lake Country
District of Squamish	City of Penticton	City of Nanaimo
City of Burnaby	City of Kimberley	City of Kamloops
Resort Municipality of Whistler	City of Vernon	District of Central Saanich

Cities with Part 3 development

Step Code Implementation in New Westminster

PART 9 **Endorsed by City** **Council** **April 2018**

SMALL BUILDINGS

**Regulated by Part 9
of BC Building Code**

Buildings under 600 m²
(6,458 ft²) in floor area



LARGE BUILDINGS

**Regulated by Part 3
of BC Building Code**

Buildings over 600 m²
(6,458 ft²) in floor area



PART 3 **Recommendation** **to Council** **November 2018**

Implementation Framework – Part 9 Residential

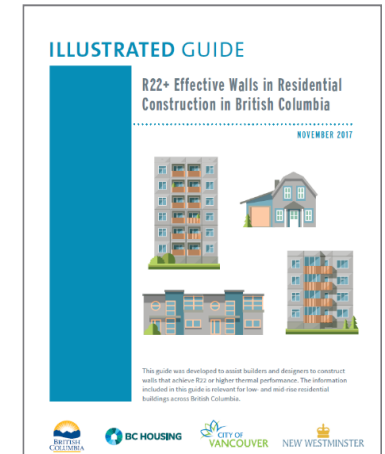
FIVE YEAR IMPLEMENTATION 2018-2022

- City of New Westminster is using a phased approach for Part 9 Energy Step Code adoption (March 1, 2019 effective date applicable to all new building permit applicants).

Part 9 Residential	March 1, 2019	January 1, 2020	January 1, 2022
Single Detached House	Step 1	Step 3	Step 4
Laneway / Carriage Home	Step 1	Step 2	Step 3
Duplex, Triplex or Quadplex	Step 1	Step 3	Step 4
Townhomes, Stacked Townhomes	Step 1	Step 3	Step 4
Industry Training	✓	✓	TBD
Incentives for Energy Modeling	✓	✓	TBD

Passive Design Exclusions

- On January 8, City Council adopted Zoning Bylaw No. 7953, 2018 which incentivizes / removes barriers for homes constructed to a verifiable high performance standard.
 - Nominally increases allowable floor space (FSR) to compensate for internal area lost to thicker insulated walls (R22 effective or higher) when constructing energy efficient buildings.
 - Supports local implementation of the BC Energy Step Code, and is applicable to homes achieving the top three performance levels.
 - Step Code **Level 3** increase in FSR by 0.01
 - Step Code **Level 4** increase in FSR by 0.03
 - Step Code **Level 5** increase in FSR by 0.05



Preparing our Local Market

PREPARING OUR LOCAL MARKET FOR THE ENERGY STEP CODE

- Launched in 2015, High Performance New Home program to support homebuilders, architects and designers with training, technical resources and incentives to prepare our local market for transition to the BC Energy Step Code.



INCENTIVES



TRAINING



POLICY



AWARENESS

Program Incentives for Part 9 Buildings

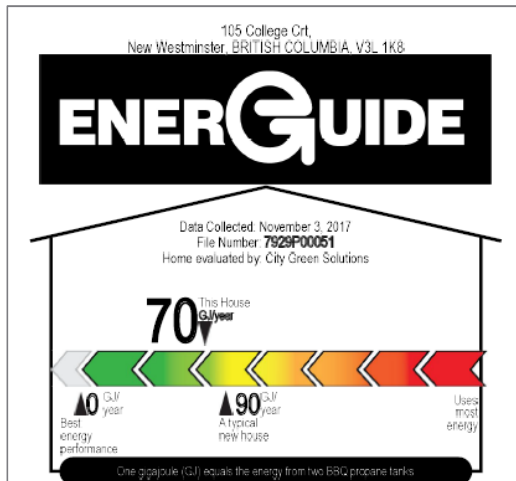
- **EnerGuide Rating System** – Energy modeling, plan evaluation report with upgrade options and home energy labeling
- **Air Tightness Test / Mid-Stage Diagnostic** – Testing at mid-construction and air tightness training provides opportunity to improve practices
- **Energy Coaching** – Technical guidance on building envelope or mechanical upgrade options

The EnerGuide logo, featuring the word "ENERGUIDE" in a bold, black, sans-serif font. The letter "G" is stylized with a circular cutout in the center.

105 College Court

KEY FEATURES

- R26 Effective Walls
- ENERGY STAR® Windows
- 0.49 ACH @ 50Pa (mid-stage blower door test)
- HRV @ 76% efficiency
- Tankless water heater (0.95 Energy Factor)



STEP 3 or 4

630 Ewen Avenue

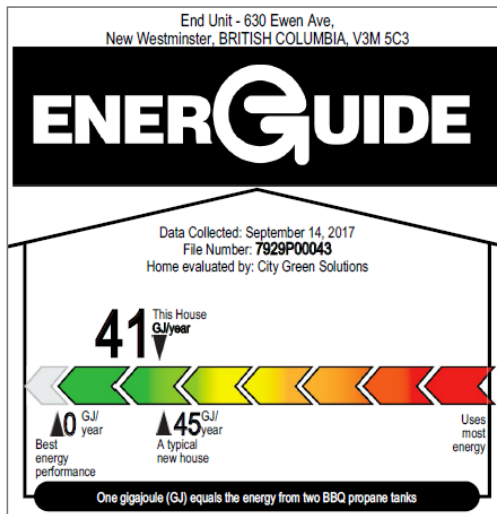
KEY FEATURES

- Exterior insulation (R22+)
- Targeting 2.5 ACH @ 50Pa
- HRV @ 65% efficiency
- Drain water heat recovery

630 EWEN AVENUE,

NEW WESTMINSTER, BC

ISSUED FOR BUILDING PERMIT - SEPTEMBER 3, 2017



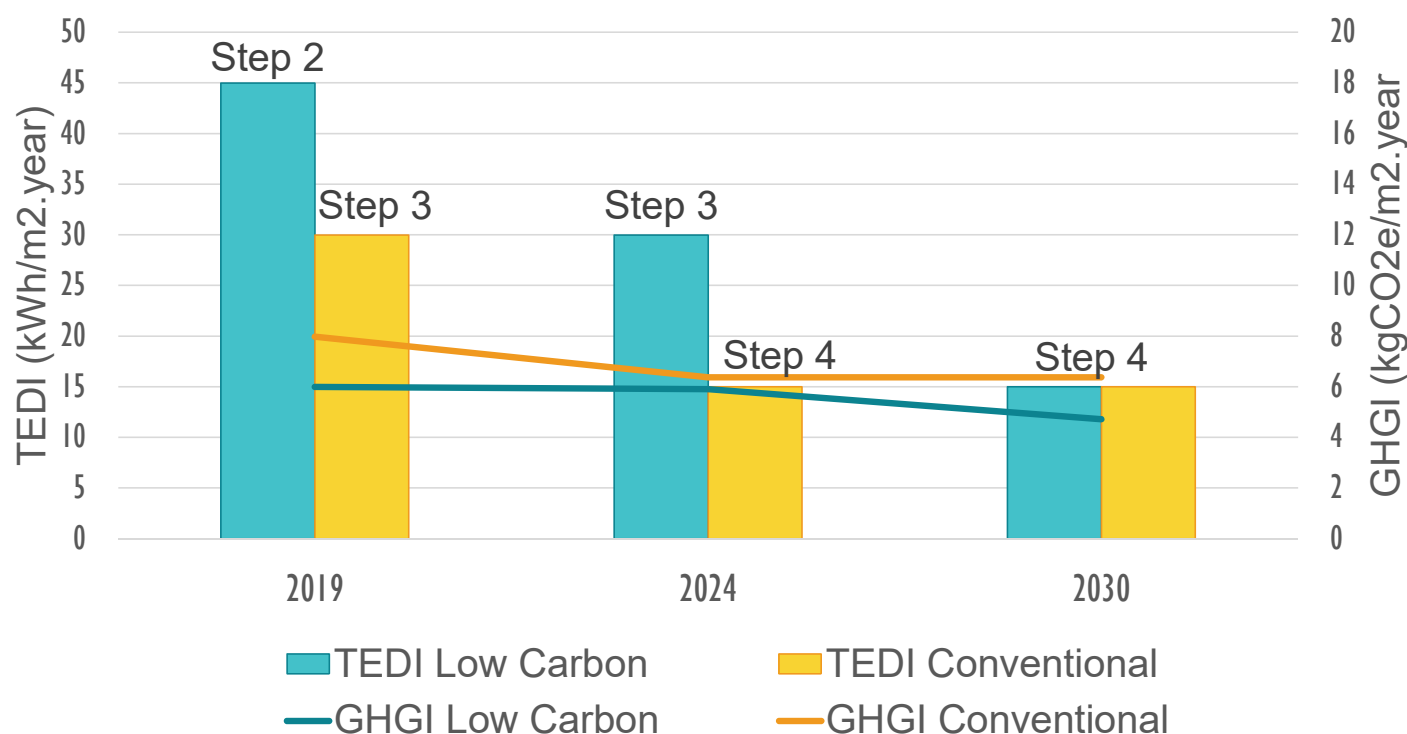
STEP 3

Proposed Part 3 Framework: Part 3 Residential High Rise / Concrete

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Burnaby (Bylaw)		2					3						
Burnaby (Rezoning)		3					4	Proposed Green Building Policy May 2018					
Burnaby LCES		2					3						
Surrey		3					4						
Surrey – Surrey City Energy DES		2					3						
Surrey LCES		2											
Richmond	3							4					
Richmond LCES	2				3			4					
New Westminster		3					4						
New Westminster Low Carbon Energy System / District Energy		2					3						4

Proposed Part 3 Framework – Low Carbon Energy Systems

Step Code Requirement: High Rise MURB with or without LCES



Buildings with a Low Carbon Energy System provide similar GHG intensity even with higher thermal load.

Implementation in New Westminster - Benchmarking

Proposed Approach:

- Adopt a building energy benchmarking administrative requirement for new Part 3 buildings.
- Eligible buildings would be required to set up up an ENERGY STAR Portfolio Manager account and provide designated City staff with read only access and data exchange permission.

Rationale:



- Track actual building performance (not just modeled)
- Benchmarking has been shown as effective tool for reducing operating energy consumption throughout building lifetime¹

¹ https://www.energystar.gov/sites/default/files/buildings/tools/DataTrends_Savings_20121002.pdf

Step Code Regulatory Compliance

- Step Code **Pre-Construction** and **As-Built** compliance verification forms already available and in practice.

PRE-CONSTRUCTION

BC ENERGY COMPLIANCE REPORT - PERFORMANCE PATHS FOR PART 9 BUILDINGS

For Buildings Complying with Subsection 9.36.5, or 9.36.6, of the 2012 BC Building Code (see BCBC Article 2.2.8.3, of Division C)

A: PROJECT INFORMATION

Building Permit #:

Builder:

Project Address:

Municipality / District:

Postal Code:

Building Type: Please Select Building Type

If Other, Please Specify:

Number of Dwelling Units:

Climate Zone: Please Select Climate Zone

PID or Legal Description:

BC Building Code Performance Compliance Path (select one):

☐ 9.36.5 → Complete Sections A, B, C, & E

☐ 9.36.6 → Complete Sections A, B, D, & E

Software Name: Version: Climatic Data (Location):

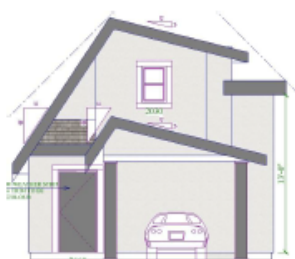
B: BUILDING CHARACTERISTICS SUMMARY (see BCBC Clause 2.2.8.3.(2)(b) of Division C)

	DETAILS (ASSEMBLY / SYSTEM TYPE / FUEL TYPE / ETC.)	EFFECTIVE RSI-VALUE / EFFICIENCY
EXTERIOR WALLS & FLOOR HEADERS		
ROOF / CEILINGS		
FOUNDATION WALLS, HEADERS, & SLABS	Slab Is: <input type="checkbox"/> Below OR <input type="checkbox"/> Above Frost Line AND <input type="checkbox"/> Heated OR <input type="checkbox"/> Unheated	
FLOORS OVER UNHEATED SPACES		
FENESTRATION & DOORS	FDWR: %	
AIR BARRIER SYSTEM & LOCATION		
SPACE CONDITIONING (HEATING & COOLING)		
SERVICE WATER HEATING		
VENTILATION		
OTHER ENERGY IMPACTING FEATURES		

The above information is correct based on drawings prepared by , dated (dd/mm/yyyy) .

VERSION 1.1 (DEC 6, 2017) 1

Plan Evaluation Report



EnerGuide Rating System Plan Evaluation 1106 Edinburgh St – Coach House New Westminster V3M 2V7

EnerGuide File Number: 7929P00055

Prepared by:
Peter Cho, CEA
City Green Solutions
214 - 620 View St
Victoria, BC V8W 1J6
778-316-9053
psw_cho@hotmail.com

Prepared For:
Mike Bakshi

Prepared on Jan 16, 2018

www.citygreen.ca

CityGreen Solutions

214 – 620 View Street, Victoria, BC, V8W 1J6, P 1.866.381.9995, F 1.250.381.9997, newhomes@citygreen.ca

Upgrade Packages Overview

Please confirm that the current plan assumptions below are correct to the planned construction details.

		Current Plans/Assumptions	Upgrade Case (see details section for more info)	Current Plans	Upgrade Package 1	Upgrade Package 2	Upgrade Package 3	Upgrade Package 4	ENERGY STAR
Air tightness	Air Changes per hour @ 50Pa	4.5	3.5 2.5		x	x	x		
Foundation	Slab-on-grade	3" XPS (R-12) under slab	5" XPS (R-20) under slab		x			x	
Main Walls (inc. headers)	2x6 16"OC	2x6 16"OC w/R19 + 1.5" rigid board (R-22 effective)	2x6 16"OC w/R24 + 1.5" rigid board (R-23 effective)		x			x	
Attic and Roof	2x10 16"OC cathedrals & flat attics 2x4, 24"OC truss gables	R-28 batt insulation in cathedrals & flat attics R-40 in gables	A) R-31 batt insulation for cathedral & flat ceiling, R-50 in gables B) 9.5" full depth spray foam (R-56) for cathedral & flat ceilings, R-40 in gables		A			B	B
Exposed Floor	2x10, 16"OC	R-28 batt insulation	A) R-31 batt B) Full depth 9.5" spray foam (R-56) in floor cavities		A			B	
Windows	Vinyl, Double Glazed	ENERGYSTAR vinyl windows, USI 1.60 (similar to previous projects) rated for zone 1	ENERGY STAR w/ USI 1.4 and rated for climate zone 1+2				A	x	
Doors	Exterior Doors	Wooden front door, 1 steel insulated rear door	Wooden front door; ENERGY STAR qualified for rear door				x	x	x
Heating System	Electric Baseboards	100% steady state efficiency							
Fireplace	N/A								
Hot Water	Electric 40 Gallon tank	0.82 EF	R-5 blanket around tank			x		x	
DWHR	N/A	Not Installed	56% or higher efficiency			x		x	
Ventilation	Range hood fans, bathroom fans, Whole House Ventilation	1) Standard range hood fans x 1 2) Standard bathroom fans x 1	1) ENERGYSTAR rated range hood fan 2) ENERGYSTAR bathroom fan 3) ENERGYSTAR and HVI certified HRV with 70%/65% efficiency			x		x	x
Appliances	Fridge; Dishwasher; Clothes Washer	Standard	ENERGY STAR qualified models						x
Lighting	Fixtures/bulbs	Standard fixtures and CFL/LED bulbs	100% ENERGY STAR qualified bulbs/fixtures						x
Modelled Potential EnerGuide Rating (GJ)				43	43	41	43	40	82

*ENERGY STAR package based on the old 0-100 EnerGuide Scale.

EnerGuide Homeowner Information Sheet

Home address: 1106 Edinburgh St-Coach House, New Westminster, British Columbia, V3M 2V7

HOMEOWNER INFORMATION SHEET


ENERGUIDE

Rating: 43 (2016 prices per year)
(GJ/year)

Heated floor area: 41.3 m² (445.5 ft²)
Rated energy intensity: 1.06 GJ/m²/year
Evaluated by: City Green Solutions
File number: 7829P00055
Data collected: January 2, 2018
Year built: 2018

NRCan.gc.ca/myenerguide

Your EnerGuide rating and this report are based on data collected and, where necessary, presumed, from your home evaluation. Rating calculations are made using standard operating conditions.



HOW YOUR RATING IS CALCULATED:

I. Rated annual energy consumption: 43 GJ/year
II. Minus renewable energy contribution: -0 GJ/year
Equals your **EnerGuide rating**: 43 GJ/year

I. Your rated annual energy consumption is the total amount of energy your house would use in a year based on the EnerGuide Rating System standard operating conditions. For your house, this includes 2.38 GJ of passive solar gain.

Energy Source	Rated Consumption (GJ/year)	Equivalent Units (per year)	Greenhouse Gas Emissions (tonnes/year)
Electricity	43	12066.3 kWh	0.3
Total	43		0.3

II. On-site renewable power generation systems can offset some or even all of your home's energy consumption. Renewable energy contributions are factored differently for your rating and your greenhouse gas emissions calculations.

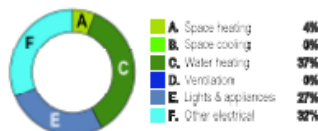
On-site Renewable Energy	Renewable Contribution (GJ/year)	Equivalent Units (per year)	Offset Greenhouse Gas Emissions (tonnes/year)
Electricity	0	0 kWh	0.0
Solar water heating	0	0	0.0
Total	0		0.0

YOUR RATED GREENHOUSE GAS EMISSIONS CALCULATION:

Total greenhouse gas emissions: 0.3 tonnes/year
Minus emissions offset by on-site renewables: -0.0 tonnes/year
Equals your **rated greenhouse gas emissions**: 0.3 tonnes/year

HOW YOUR RATED ENERGY IS USED:


The chart below represents the breakdown of rated annual energy consumption in your home under standard operating conditions. You can use these figures as a guide to help identify where you can lower home energy costs through proper home maintenance, efficient home operation, energy efficiency renovations or equipment replacement.



Category	Percentage
A. Space heating	4%
B. Space cooling	0%
C. Water heating	37%
D. Ventilation	0%
E. Lights & appliances	27%
F. Other electrical	32%

WHERE YOUR HOME LOSES HEAT:

Houses lose heat through their exterior shell, or building envelope. The chart below shows where and how your home loses heat. The quality and upkeep of your home can have a major impact on the amount of energy your heating and cooling systems use annually.



Category	Percentage
a. Attic/Ceiling	8%
b. Main Walls	34%
c. Exposed floors	1%
d. Windows	31%
e. Exterior doors	6%
f. Basement/Foundation	6%
g. Air leakage/ventilation	15%

*EnerGuide is an official mark of Natural Resources Canada. Refer to the glossary section for an explanation of relevant terms.

Figures may not add up due to rounding. Page 1 of 5 Report date: January 16, 2018

Home address: 1106 Edinburgh St-Coach House, New Westminster, British Columbia, V3M 2V7

ENERGUIDE

1106 Edinburgh St-Coach House,
New Westminster, BRITISH COLUMBIA, V3M 2V7

Data Collected: January 2, 2018
File Number: 7829P00055
Home evaluated by: City Green Solutions

43 This House
GJ/year
Best energy performance

40 GJ/year
A typical new house

49 GJ/year
A typical old house

One gigajoule (GJ) equals the energy from 100 propane tanks

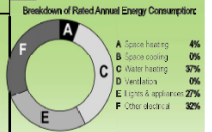
Rated Annual Energy Consumption: 43 GJ

On-site renewable energy contributions: -0 GJ

EnerGuide Rating: 43 GJ


Figures may not add up due to rounding.

Breakdown of Rated Annual Energy Consumption



Category	Percentage
A. Space heating	4%
B. Space cooling	0%
C. Water heating	37%
D. Ventilation	0%
E. Lights & appliances	27%
F. Other electrical	32%

Rated Energy Intensity: 1.06 GJ/m²/year
Rated Greenhouse Gas Emissions: 0.3 tonnes/year



The energy consumption indicated on your utility bills may be higher or lower than your EnerGuide rating. This is because standard assumptions have been made regarding how many people live in your house and how the home is operated. Your rating is based on the condition of your house on the day it was evaluated.

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Visit us today at:
NRCan.gc.ca/myenerguide

Page 5 of 5 Report date: January 16, 2018

An Energy Advisor completes these forms, reports and NRCan file submittals.

Mid-Stage Airtightness Form

- A mid-stage air tightness form under development, in collaboration with several local governments.
- Mid-construction form ready to test drive in January 2019, in advance of March 2019 Step Code regulation in New Westminster.

☐ Coach House ☐ Single-family ☐ Duplex ☐ Rowhouse/Townhome ☐ Apartment <4 storeys ☐ Other

MID-CONSTRUCTION

BC ENERGY COMPLIANCE REPORT – PERFORMANCE PATHS FOR PART 9 BUILDINGS
For Buildings Complying with Subsection 9.36.5. or 9.36.6. of the 2012 BC Building Code (see BCBC Article 2.2.8.3. of Division C)

A: PROJECT INFORMATION

Building Permit #: _____ Building #: _____ Building Type: Please select Building Type
Project Address: _____ Step Required: _____
Builder: _____ Company: _____
E-Mail: _____ Phone #: _____

B: BUILDING CHARACTERISTICS SUMMARY (see BCBC Clause 2.3.8.3.(2)(b) of Division C)

	DETAILS (ASSEMBLY / SYSTEM TYPE / FUEL TYPE / ETC. <i>Note: Any changes from specifications in the building permit application must be UNDERLINED.</i>	EFFECTIVE RSL-VALUE / EFFICIENCY	SPECS & INSTALLATION VERIFIED
EXTERIOR WALLS & FLOOR HEADERS			
ROOF / CEILINGS			
FOUNDATION WALLS, HEADERS & SLABS	Slab Is: <input type="checkbox"/> Below <input type="checkbox"/> Above Frost Line & <input type="checkbox"/> Heated <input type="checkbox"/> Unheated		
FLOORS OVER UNHEATED SPACES			
FENESTRATION & DOORS	FDWR: _____ %		
SPACE CONDITIONING (HEATING & COOLING)			
SERVICE WATER HEATING			
VENTILATION			
OTHER ENERGY IMPACTING FEATURES			

I hereby certify that the above information is correct: _____, dated (dd/mm/yyyy) _____
Signed by Energy Advisor

5977743

C: AIR TIGHTNESS

VAPOUR BARRIER TYPE:
☐ Poly ☐ Other: _____

AIR BARRIER SYSTEM & LOCATION:
Interior: N / A ☐ Internal poly ☐ Taped drywall ☐ Other ☐ (describe): _____
Exterior: N / A ☐ Taped membrane ☐ Taped sheathing ☐ Other ☐ (describe): _____

AIRTIGHTNESS

ADDRESS / BUILDING	REQUIRED ACH ₅₀	PROPOSED ACH ₅₀	ACTUAL PRE-DRYWALL ACH ₅₀	DATE

Interior volume of building (m³): _____

*Note: Pre-drywall tests are typically done at lower pressurization / depressurization: using values measured, estimate ACH at 50 Pascals.
Most recent Actual Pre-drywall measurement is less than 1.5 ACH₅₀ above the ACH₅₀ score included in model. ☐ Yes ☐ No*

Weather at Time of Test ☐ Sunny ☐ Cloudy ☐ Raining
Temperature (°C): _____

TEST CERTIFICATION BY ENERGY ADVISOR
I hereby certify that the above Blower Door Test Information is accurate and determined using standard industry protocol.

Signature: _____ If applicable, enter ERS information:
Full Name (Print): _____ Advisor ID Number: _____
Company: _____ Service Organization: _____
Phone: _____ EnerGuide P #: _____
Email: _____
Date: _____

5977743

Training Opportunities

- City and SIGA hosted an air tightness training session at BCIT's High Performance Building Lab in Burnaby (1/2 day, October 24).
- Hands on workshop on effective air barrier strategies
- Ideal for 18-22 participants + instructors



Training Opportunities

- Two more air tightness training sessions planned for Q1 and Q2 2019.



Challenges / Opportunities

1. Development industry familiarity on conducting air tightness tests on larger buildings.
2. Showing continuous air barrier on drawings – Identifying your air barrier approach.
3. Right sizing mechanical systems in energy efficient buildings. Effective PM 2.5 particulate filtration on HVAC.
4. Driving the top end of the performance chain (Passive House, Net Zero Energy, Zero Carbon buildings)
5. Adequate local government tools / resources for efficient Step Code regulation.

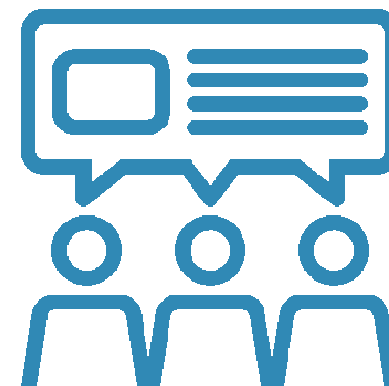


Challenges / Opportunities

6. Supporting local Step Code requirements with provincial utility incentive programs.

Path 1: For the following building types located within **Climate Zone 4** (Lower Mainland and southern Vancouver Island), incentives are based on the BC Energy Step Code.

Building type	BC Energy Step Code performance target	Incentive factor	Maximum incentive
Multi-unit residential (MURB)	Step 2	\$0.70/sq. ft. x indoor floor area (sq. ft.) x % TEUI supplied by FortisBC	\$500,000 per year
	Step 3	\$1.40/sq. ft. x sq. ft. x % TEUI supplied by FortisBC	
	Step 4 and higher	\$2.10/sq. ft. x sq. ft. x % TEUI supplied by FortisBC	
Office and retail	Step 2	\$1.80/sq. ft. x sq. ft. x % TEUI supplied by FortisBC	
	Step 3 and higher	\$3.40/sq. ft. x sq. ft. x % TEUI supplied by FortisBC	
Other building types not subject to BC Energy Step Code (e.g. hospitals, schools, churches, institutional)	10-20%	\$1.80/sq. ft. x sq. ft. x % TEUI supplied by FortisBC	
	21-30%	\$2.20/sq. ft. x sq. ft. x % TEUI supplied by FortisBC	
	>30%	\$3.40/sq. ft. x sq. ft. x % TEUI supplied by FortisBC	



Commercial new construction incentive program:
fortisbc.com/newconstructionfunding



Thank You!

energysavenewwest.ca

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Energy Save New West
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