

The BC Energy Plan

A Vision for Clean Energy Leadership

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Overview

- Policy Context
- BC Green Building Code options
- Energy Efficiency Act
- Net Zero Energy for Homes

BC Green Building Code

- Two energy proposals under development for 2008 amendment to BC Building Code
 - Performance standard for Part 9 buildings – minimum EnerGuide for New Houses (EGNH) 77 rating
 - Prescriptive standards for Part 9 buildings that are approximately equivalent to EGNH 77 level
 - Comprehensive code for other buildings (ASHRAE 90.1-2004) with performance, simplified performance and prescriptive paths

BC Green Building Code – Part 9

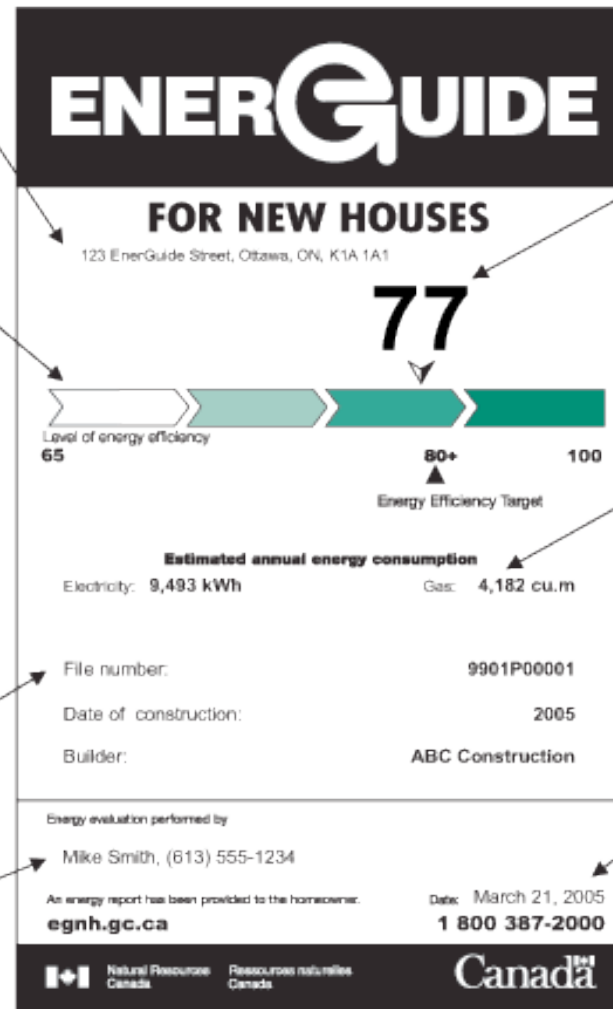
- “Performance Path”
- EnerGuide for New Houses
- Plan evaluation done by builder or consultant
- EnerGuide advisor verifies energy performance with blower-door test (\$300)
- Advisors serving all BC communities

Address
Identifies the house to which the rating applies.

Scale
The right end of the scale represents a house that is built to minimum building code standards. The number 100 represents a house that is very well insulated, airtight, sufficiently ventilated and that requires no purchased energy (such as solar powered home).

File Number
The File Number for New Houses is assigned to homes that have been evaluated.

Evaluated By
Name and telephone number of the energy advisor who performed the evaluation.



Energy Efficiency Rating
Allows comparison of energy performance between houses of the same size. The more efficient the house the higher the rating number.

Estimated Annual Energy Consumption for the House under Standard Operating Conditions
Allows comparison of the energy consumption of the house to similar houses, and helps estimate energy costs.

Date
The date that the energy efficiency evaluation was conducted.

BC Green Building Code – Part 9

- “Prescriptive path” equivalent to EGH 77
- Increased cost-effective insulation in walls
More stringent standards in regions with more than 4500 degree-days of heating
- Reference *Energy Efficiency Act* standards:
 - Furnace efficiency $\geq 90\%$
 - Low-E windows (U value $\leq 2.0 \text{ W/m}^2/\text{K}$)

South Coastal - Natural Gas

303 m² floor area

| | | | | | | | | | | | |
|-----------------|-------|-----------------|-----------------------|-------------------------|-----------|---------------------|---|------------------------|------------------------|---------------------------------|---|
| Single-Detached | Units | Old base - BCBC | Energy Efficiency Act | ekoComfort and 1.5 ac/h | Solar DHW | R20 adv. Crawlspace | W2, C2, B3, tankless DHW, reduce util/dhw | ekoComfort, W6, C2, B1 | ekoComfort, W6, C2, B3 | 2008 Regulations incl. Util/dhw | Integ. space dhw, W6, B1. Util/dhw, HRV |
| | | VSGP0000 | VSGP0000 | VSGP0444 | VSGP009 | VSGC2000 | VSGP9004 | VSGP1444 | VSGP2444 | VSGP2008 | VSGP1500 |

Technical

| | | standard | standard | standard | standard | advanced | advanced | advanced | advanced | advanced | advanced |
|----------------------------|----------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Framing | | | | | | | | | | | |
| Wall insulation | nom RSI | 2.43 | 2.43 | 2.43 | 2.43 | 2.43 | 3.85 | 3.50 | 3.50 | 3.50 | 3.50 |
| Ceiling insulation | nom RSI | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 | 7.00 |
| Basement insulation | nom RSI | 2.10 | 2.10 | 2.10 | 2.10 | 2.10 | 4.20 | 2.10 | 4.20 | 2.10 | 2.10 |
| Coverage | | 0.6 m BG | 0.6 m BG | 0.6 m BG | 0.6 m BG | 0.6 m BG | full height | full height | full height | full height | full height |
| Windows | | double-vinyl | Energy Star | Energy Star | Energy Star | Energy Star | Energy Star | Energy Star | Energy Star | Energy Star | Energy Star |
| Heating system | | mid eff. | condensing | condensing | condensing | condensing | condensing | condensing | condensing | condensing | condensing |
| Furnace fan motor | | PSC | PSC | ECM | PSC | PSC | PSC | ECM | ECM | PSC | ECM |
| DHW | | conv. | conv. | condensing | Solar DHW | conv. | tankless | condensing | condensing | conv. | condensing |
| | L/d | 225 | 225 | 225 | 225 | 225 | 203 | 225 | 225 | 203 | 203 |
| Air tightness | ac/h _{50Pa} | 5.1 | 5.1 | 1.5 | 5.1 | 5.1 | 5.1 | 1.5 | 1.5 | 5.1 | 2.5 |
| Ventilation | Type | exhaust | exhaust | integ.HRV | exhaust | exhaust | exhaust | integ.HRV | integ.HRV | exhaust | HRV |
| | L/s | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | hr/day | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Total critical air changes | ac/h | 0.228 | 0.228 | 0.134 | 0.228 | 0.228 | 0.228 | 0.134 | 0.134 | 0.228 | 0.151 |
| Lighting | | standard | standard | standard | standard | standard | CFL | standard | standard | CFL | CFL |
| Electric utilities | kWh/d | 23.7 | 23.7 | 23.7 | 23.7 | 23.7 | 21.3 | 23.7 | 23.7 | 21.3 | 21.3 |
| Temperature - main floor | C | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| - basement | C | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| EnerGuide value* | | 68.9 | 73.7 | 77.9 | 75.5 | 73.8 | 78.0 | 80.3 | 80.7 | 77.3 | 80.3 |
| GHG production - NG | t/yr | 4,728 | 3,815 | 2,852 | 3,283 | 3,796 | 2,774 | 2,394 | 2,317 | 3,348 | 2,587 |
| - Electricity | t/yr | 3,541 | 3,525 | 3,449 | 3,524 | 3,524 | 3,167 | 3,435 | 3,432 | 3,170 | 3,224 |
| Electricity consumption** | MJ/yr | 35,410 | 35,247 | 34,490 | 35,239 | 35,240 | 31,667 | 34,349 | 34,320 | 31,701 | 32,235 |
| Natural Gas consumption | MJ/yr | 94,557 | 76,302 | 57,043 | 65,652 | 75,912 | 55,481 | 47,875 | 46,335 | 66,966 | 51,746 |
| Total Energy consumption | MJ/yr/m ² | 429 | 368 | 302 | 333 | 367 | 288 | 271 | 266 | 326 | 277 |
| Electricity savings | MJ/yr | -163 | 0 | 757 | 8 | 7 | 3,580 | 898 | 927 | 3,546 | 3,012 |
| Natural Gas savings | MJ/yr | -18,255 | 0 | 19,259 | 10,650 | 390 | 20,821 | 28,427 | 29,967 | 9,336 | 24,556 |
| Total Savings | MJ/yr | -18,418 | 0 | 20,016 | 10,658 | 397 | 24,401 | 29,325 | 30,894 | 12,882 | 27,568 |

Financial

GHG \$30/tonne

| | | | | | | | | | | | |
|--------------------------|---------|--------|-----|--------|--------|-----|-------|--------|--------|-------|--------|
| Incremental capital cost | | -1,909 | N/A | 3,338 | 4,725 | 59 | 3,172 | 4,099 | 4,355 | 1,422 | 4,008 |
| NPV of energy costs | | -2,675 | N/A | 2,981 | 1,537 | 58 | 3,971 | 4,340 | 4,570 | 2,307 | 4,355 |
| Total LCC | Med./8% | -766 | N/A | -357 | -3,188 | -1 | 799 | 241 | 214 | 885 | 348 |
| Sensitivity LCC (low) | Low/13% | 291 | N/A | -2,688 | -3,797 | -24 | -739 | -2,627 | -2,743 | 6 | -1,319 |
| Sensitivity LCC (high) | High/5% | -2,085 | N/A | -11 | -2,436 | 28 | 2,954 | 1,261 | 1,349 | 2,224 | 2,567 |

*Note that the Energuide value is for a standard set of conditions (temperature, utilities, ventilation) not the same as shown here

** Electricity consumption based on ventilation fans operating for 12 months per year

BC Green Building Code – other buildings

- ASHRAE 90.1 (2004) “Energy Standard for Buildings Except Low-Rise Residential Buildings”
- Similar to standard under the Vancouver Building Bylaw (ASHRAE 90.1 2001 with Addendum G)
- Three paths for compliance:
 - Energy cost budget method (modeling)
 - Simplified performance paths for some parts
 - Prescriptive path (specific standards)
- Mandatory provisions for all three

BC Green Building Code

- Compliance Options
 - Letter of Assurance from a professional engineer
 - Compliance & Enforcement Education & Training coming

Energy Efficiency Act – 2006 Standards

- Gas furnaces for new construction
- Manufactured windows and doors
- Gas fireplaces – testing and labeling
- Large boilers – 80% minimum

PST Exemptions

- Energy Star fridges & clothes washers & freezers
- Instantaneous water heaters
- District heating equipment
- Solar, wind and micro-hydro technologies
- Energy Star furnaces, boilers & heat pumps
- Energy Star windows and doors
- Insulation materials
- http://www.sbr.gov.bc.ca/individuals/Consumer_Taxes/Provincial_Sales_Tax/energy_conservation_exemptions.htm.

Progress on 2006 Standards

- 56% market share for Energy Star furnaces in May, 2007 (for new and existing buildings)
- 54 BC based window manufacturers to introduce Energy Star products, 20-30% market share as of fall 2006, prior to PST exemption announcement

Energy Efficiency Act – Future Priorities

- Existing furnaces and boilers
- General service lighting (lumens per watt)
- Standby losses (reducing them to 1 watt), saving 73 megawatts of electricity in BC alone
- Residential furnace blower motors
- Residential and commercial clothes washers
- Large industrial motors



Exhibit 10.2 Potential Electricity Savings from NZEH – New Single Family Dwellings by Milestone Period for Total BC Hydro Service Area (GWh/yr)

| | SFD Electric Heat | SFD Non- Electric Heat | Total |
|---|-------------------|------------------------|---------|
| <i>New Units in Built In Period</i> | | | |
| F2011 | 9,461 | 24,714 | 34,175 |
| F2016 | 9,461 | 24,714 | 34,175 |
| F2021 | 9,461 | 24,714 | 34,175 |
| F2026 | 9,461 | 24,714 | 34,175 |
| Total | 37,844 | 98,856 | 136,700 |
| Annual Electricity Use Per New Dwelling Unit (kWh/yr) | 20,466 | 9,938 | |
| Annual Electricity Use New Dwellings (GWh/yr) Reference Case | | | |
| F2011 | 194 | 246 | 439 |
| F2016 | 387 | 491 | 878 |
| F2021 | 581 | 737 | 1,318 |
| F2026 | 775 | 982 | 1,757 |
| % Total SFD Electricity Use F2026 | 6% | 7% | 13% |
| Annual Net Electricity Use Per New NZE Dwellings (kWh/yr) | 0 | 0 | |
| Annual Electricity Savings New Dwellings (GWh/yr) NZE Housing Scenario | | | |
| F2011 | | | |
| F2016 | 194 | 246 | 439 |
| F2021 | 387 | 491 | 878 |
| F2026 | 581 | 737 | 1,318 |

Policy Context

- GHG reduction of 33% based on 2006 by 2020
- BC Hydro energy savings goal – 10,000 GWh/yr by 2020, codes & standards are expected to achieve 3,500 GWh/yr.

Greening of the Building Code - **Future**

- Investigating ASHRAE 2007
- Considering EGH 80 for 2010

Energy Efficiency Buildings Strategy 2008

- Sets energy demand reduction targets by market segments
- New commitments to actions

Net Zero Energy Homes and Buildings

- Technology Demonstration
- \$ 1 million in Budget 2008
- Planning phase

LiveSmart

- \$60 million for home energy/water retrofits
- Free audits if measures installed
- Federal incentives available now
- Provincial incentives coming in April
- 1-800- 622-6232

BC Green Building Code – other buildings

- Features of a MURB building:
 - Building Envelope: additional insulation (R-22 in walls) and sealing - particularly at balconies
 - Glazing: U-value of 2.61 W/m².K (low-E) for non-operable (up to 49% glazing) – Pg. 27
 - Lighting power density of 12 watts per m² for common spaces (no standard for dwellings) - Pg.64
 - HVAC zoning and controls – Pg.33-35
 - Fresh air economizers for chillers greater than 19kW (3.5 ton, 41,000 BTU/hr) – Pg.37
 - Heat recovery – exhaust air (50%), condenser – Pg.41
 - Power: Voltage drop less than 2-3% - Pg.59

BC Green Building Code – other buildings

- Chapters for:
 - Building Envelope – includes building envelope trade-off option
 - Heating, Ventilating and Air Conditioning – includes Simplified Approach (prescriptive)
 - Service Water Heating
 - Power
 - Lighting – includes building area and space-by-space lighting power density methods
 - Other equipment