

The BC Energy Plan

A Vision for Clean Energy Leadership

Andrew Pape-Salmon
Manager – Energy Efficiency
Ministry of Energy, Mines and
Petroleum Resources



Overview

- 2007 Energy Plan and other commitments
- Energy Efficient Buildings Strategy
- BC Green Building Code proposals
- Energy Efficiency Act
- Supportive programs

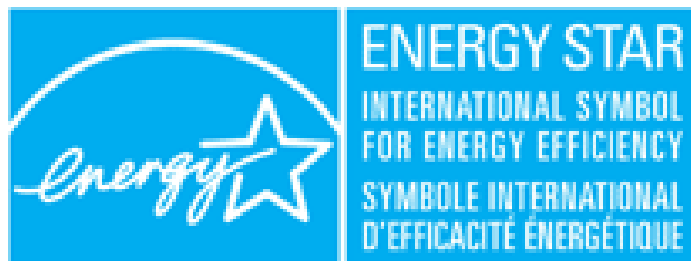
Energy Plan Actions

1. Set an ambitious conservation target, to acquire 50 per cent of BC Hydro's incremental resource needs through conservation by 2020
 - Advancing ongoing efforts to develop energy-efficient products and practices through regulations, codes and standards
 - The government will introduce legislation this spring requiring 50 per cent of all new incremental power needs to be offset through conservation by 2020 (2007 UBCM Announcement)
2. Ensure a coordinated approach to conservation and efficiency is actively pursued in British Columbia
3. Encourage utilities to pursue cost effective and competitive demand side management opportunities
4. Explore with B.C. utilities new rate structures that encourage energy efficiency and conservation

Energy Plan Actions

5. Implement Energy Efficiency Standards for Buildings by 2010
 - Publish a revised Energy Efficient Buildings Strategy
 - A new unified B.C. Green Building Code will be developed over the next year with industry, professional, and community representatives (2007 Throne Speech)
 - The new green building code will implement the highest energy efficiency standards in Canada, which will result in homes in B.C. costing less to heat and reduce impacts on the environment (2007 UBCM Announcement)
6. Undertake a pilot project for energy performance labeling of homes and buildings in coordination with local and federal governments, First Nations, and industry associations
 - New measures will be taken to help homeowners undertake "energy audits" that show them where and how savings can be achieved (2007 Throne Speech)

Energy Efficiency Labels



ENERGUIDE

FOR BUILDINGS / POUR LES BÂTIMENTS

I. M. LURNINLOTZ, Elementary School / école primaire
123, rue Canucount Street, Ottawa (Ontario)



Assessed annual energy intensity / Intensité énergétique évaluée

325 kWh/m²



File number /
Numéro de dossier : 07-AB-000001

Building assessed / Évaluation
du bâtiment : 2007/06/30

Year of construction /
Année de construction : 2001

Rating valid to / Évaluation valide
jusqu'au : 2010/06/30

energuidebuilding.ca / energuidebatiments.gc.ca

Energy Plan Actions

7. New provincial public sector buildings will be required to integrate environmental design to achieve the highest standards for greenhouse gas emission reductions, water conservation and other building performance results such as a certified standard
 - All new government buildings or facilities shall be built to a minimum LEED Gold or equivalent certification (2007 UBCM Announcement)
8. Develop an Industrial Energy Efficiency Program for British Columbia to address specific challenges faced by British Columbia's industrial sector
9. Increase the participation of local governments in the Community Action on Energy Efficiency Program and expand the First Nations and Remote Community Clean Energy Program
 - Municipalities will be given the power to waive development cost charges as a way to encourage green developments, small unit housing and small lot subdivisions (2007 UBCM Announcement)

Other Commitments

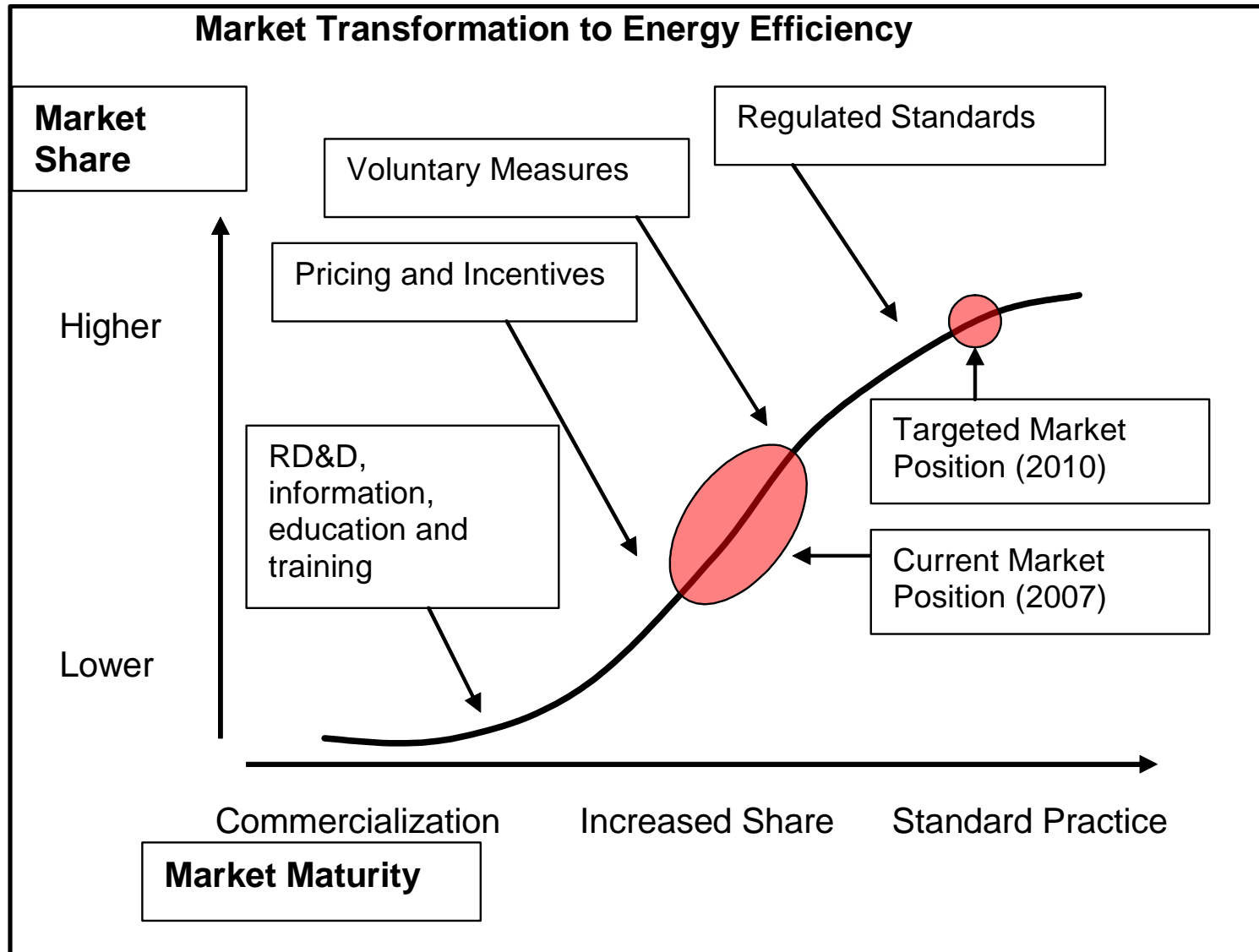
- 33% reduction in greenhouse gas (GHG) emissions below 2007 levels by 2020
 - Joined the Western Regional Climate Action Initiative
 - Includes MB, WA, OR, CA, AZ, NM, UT, MT
- Incentives will be implemented to retrofit existing homes and buildings to make them more energy efficient (2007 Throne Speech)
- New real-time, in-home smart metering will be launched to help homeowners measure and reduce their energy consumption
- Help customers install “smart meters” and then develop a “smart electricity grid” that can precisely track and manage power demand (2007 UBCM Announcement)

Energy Efficient Buildings: **A Plan for BC**

Creating a Legacy of
Energy Efficient
Buildings in
British Columbia



Market Transformation Approach



Revised Energy Efficient Buildings Strategy

- Revised strategy to be released soon
- New targets for 2020 aligned with climate action goals
- Actions in the following areas:
 - Energy use in homes
 - Energy use at work and play
 - Community leadership
 - Government leadership
 - Energy using products
 - Creating a culture of conservation

BC Green Building Code

- Proposals for 2008 amendment of Code
 - Increased prescriptive standards for residential buildings of four stories or less
 - Alternative: energy estimation computer modeling, other acceptable good engineering principles or achieving an EnerGuide for New Houses rating of 77
 - Prescriptive standards for small, non-residential buildings (Part 9)
 - Comprehensive code for other buildings (ASHRAE 90.1-2004) with performance, simplified performance and prescriptive paths
 - Proposed effective date of April 4, 2008

BC Green
Building
Code –
Institutional,
commercial,
industrial and
multi-unit
residential
buildings



BC Green Building Code – ICI/MURB

- 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 lighting requirements of Addendum G)
- Three paths for compliance:
 - Prescriptive path (specific standards)
 - Tradeoff methods and simplified approaches
 - Energy cost budget method (modelling)
- Mandatory provisions for all three

BC Green Building Code – ICI/MURB

- Chapters for:
 - Building Envelope – windows, walls, insulation, sealing, managing air leakage – includes building envelope tradeoff method
 - Heating, Ventilating and Air Conditioning (HVAC) – includes simplified approach
 - Service Water Heating
 - Power
 - Lighting – includes building area and space-by-space lighting power density methods
 - Other equipment

BC Green Building Code – ICI/MURB

- Features of a residential building:
 - Building Envelope: insulation (RSI-2.3 + 1.3ci) and sealing - particularly at balconies
 - Glazing: U-value of 2.61 W/m².K (low-E) for non-operable (up to 49% glazing)
 - Lighting power density of 8 watts per m² for common spaces (no requirement for dwellings)
 - HVAC zoning and controls
 - Fresh air economizers for chillers greater than 19kW (3.5 ton, 41,000 BTU/hr)
 - Heat recovery – exhaust air (50%), condenser
 - Power: Voltage drop less than 2-3%

BC Green Building Code – ICI/MURB

- Cost Increment (for 25% better than Model National Energy Code for Buildings)

Building Type	Economic Analysis (\$/m ²)			
	Net Incremental Capital & Labour	Annual Savings		LCC Payback
		O&M	Energy	
Small Office	\$1.95	\$0.000	\$1.041	2.4 years
Large Office	\$1.27	(\$0.007)	\$1.275	2.5 years
School	\$1.46	(\$0.029)	\$0.831	2.3 years
Extended Care	\$1.12	(\$0.016)	\$1.435	1.0 year
Hospital	\$1.62	(\$0.021)	\$2.084	1.1 years
Hotel	\$3.15	(\$0.004)	\$1.541	2.8 years
MURB	\$11.97	\$0.000	\$2.988	5.5 years
Strip Mall	\$17.43	(\$0.032)	\$3.511	7.4 years
Big Box Retail	\$12.31	(\$0.026)	\$3.169	5.5 years
Suburban Mall	\$0.74	(\$0.015)	\$0.606	1.8 years

BC Green Building Code – ICI/MURB

Table 4. Overall Impact of ASHRAE 90.1-2001 on New Construction Market

	Coastal	Southern Interior	Northern Interior	Total (2005)	Annual*	
					5-Year	15-Year
25-Yr NPV Savings (\$ millions)						
Medium Scenario	\$11.1	\$1.7	\$1.0	\$13.7	\$68.7	\$206.2
Low Scenario	\$43.3	\$5.2	\$2.8	\$51.3	\$256.4	\$769.2
High Scenario	\$0.8	\$0.6	\$0.4	\$1.8	\$8.9	\$26.8
Annual Energy Use Savings						
Electricity (GWh)	9.8	0.9	0.3	11.0	55.2	165.6
Fossil Fuel (TJ)	261	28	15	304	1,521	4,564
Total (TJ)	296	32	16	344	1,720	5,160
Annual Energy Cost Savings (\$ millions)						
Electricity	\$0.59	\$0.07	\$0.02	\$0.68	\$3.40	\$10.21
Fossil Fuel	\$2.51	\$0.27	\$0.15	\$2.93	\$14.63	\$43.88
Total	\$3.10	\$0.34	\$0.17	\$3.61	\$18.03	\$54.10
Incremental Net Costs (\$ millions)						
Capital	\$22.9	\$2.0	\$0.8	\$25.7	\$128.6	\$385.7
Annual Maintenance	\$0.043	\$0.004	\$0.002	\$0.049	\$0.246	\$0.738
Annual Emission Savings (thousand metric tonnes)						
Total CO ₂	16.7	1.8	0.9	19.3	96.5	289.5

* Annual savings/costs in year indicated after invoking Standard

BC Green Building Code – ICI/MURB

- Compliance Options
 - Letter of Assurance (LOA) from a professional engineer or architect
 - Performance that is 25% better than 1997 Model National Energy Code for Buildings (MNECB) is deemed compliant with an LOA

ASHRAE 90.1 (2007)

- New ASHRAE code being printed
- Approximate energy savings of 5% (or more), compared to ASHRAE 90.1 (2004)
- Key changes mainly to include:
 - Cooling equipment standards
 - Gas/oil boiler requirements
 - Other areas

ASHRAE 90.1 (2007)

- MEMPR and BC Hydro to undertake an evaluation of the new code in the coming weeks, including:
 - Differences between 2004 and 2007 for three building archetypes in Vancouver (large office, small commercial, MURB) and two archetypes in each of Prince George and Kelowna (small commercial and MURB)
 - Potential barriers to implementation
 - Computer energy simulation of incremental capital costs, capital infrastructure savings, energy savings and GHG reductions

BC Green Building Code – houses

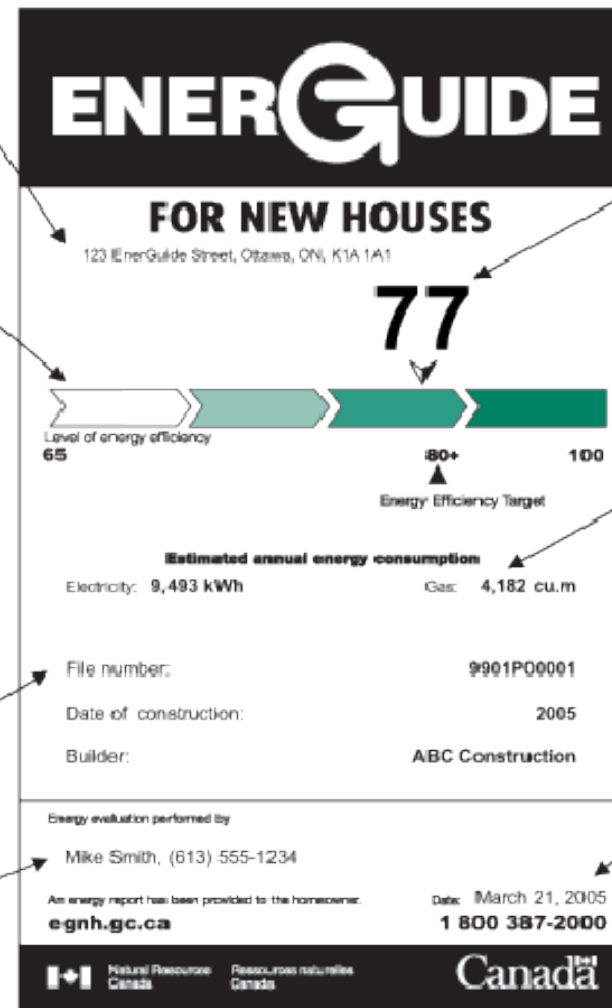
- “Performance Path”
- EnerGuide for New Houses
- Plan evaluation done by builder or consultant
- EnerGuide advisor verifies energy performance with blower-door test (\$300)
- Advisors serving all BC communities

Address
Identifies the house to which the rating applies.

Scale
The low end of the scale represents a house that is built to minimum building code standards. 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
File numbers for New Houses are assigned to homes that have been evaluated.

Evaluated By
Name and telephone number of the advisor who performed the energy 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 – houses

- Increased cost-effective insulation

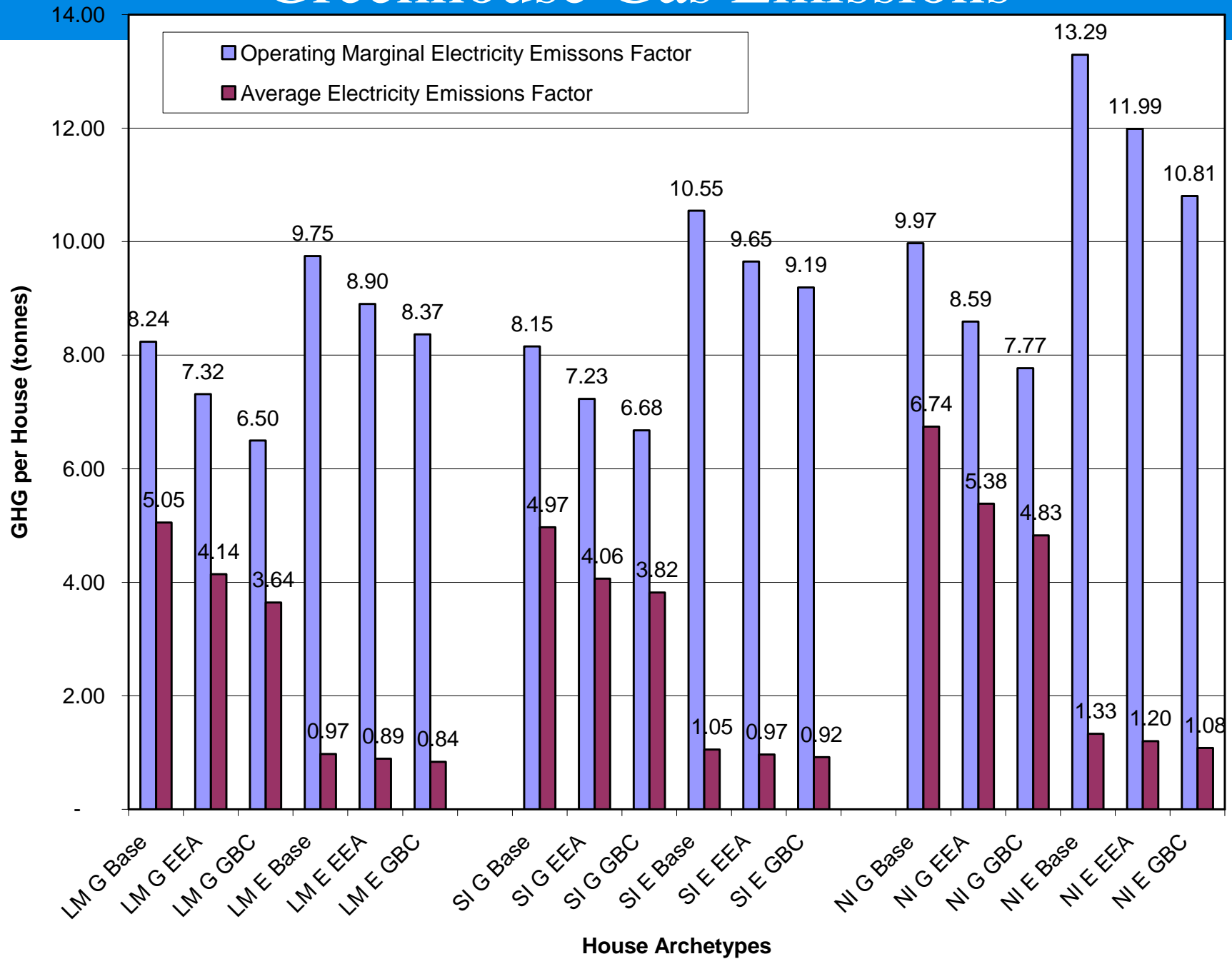
<i>Building Assembly</i>	Value Required		
	Less than 3500 Degree Days	3500 Degree to 4500 Degree Days	More than 4500 Degree Days
Attic Space	7.0	7.7	9.0 ⁽¹⁾
Roof Joist Assemblies (Cathedral Ceilings/Flat Roofs)	4.9	4.9	4.9
Frame Walls (including frame crawl space walls)	3.5	3.5	3.85
Suspended Floors (framed)	4.9	4.9	4.9
Suspended Floors (concrete slab)	2.1	2.1	2.1
Foundation Walls (full height)	2.1	2.1	4.2 ⁽¹⁾
Unheated Concrete Slabs ...	1.8	2.1	2.1
Radiant Heating Slabs ...	2.1	2.1	2.1
Radiant Heating Suspended Floor Assembly	2.1	2.1	2.1

BC Green Building Code – houses

- Footnote (1): alternative to attic and foundation wall insulation in the north, provided any of the following provisions with a total point value of at least 2.1 are also employed

Description	Points
Windows have a maximum heat loss coefficient U-value of 1.6 W/(m ² •K), similar to ENERGY STAR Zone C	0.4
Frame Walls insulation is at least RSI 4.8	1.5
Heat recovery ventilator with 55 % efficiency at a station 1 test temperature of 25°C at an air flow not less than 30 litres per second	2.3
Ground-source or water-source heat pump (Geoexchange) system for 90% of space heating needs with a coefficient of performance of at least 3.0	5.0
DC, variable speed (ECM) blower motor on the forced air furnace	0.2
Tankless or condensing natural gas or propane water heater with EF > 0.8	0.8
A drain-water heat recovery system of at least one meter in length	0.1
Solar domestic water heater with a collector surface area of at least 5.92 m ²	0.5

Greenhouse Gas Emissions



Cost-Benefit Analysis

House Type, Location and Fuel	Incremental Capital Costs	% increase	Net Present Value	Simple Payback	EnerGuide Rating
	\$		\$	Years	
<i>Single Detached</i>					
Lower Mainland (NG heated home baseline demand)	House cost: \$ 500,000				69
Lower Mainland (EE Act savings)	\$ 1,909.00	0.38%	\$ 766.00	9.4	74
Lower Mainland (Additional savings)	\$ 1,422.00	0.28%	\$ 885.00	8.4	77
	\$ 3,331.00	0.67%	\$ 1,651.00	8.9	
Lower Mainland (Electricity heated home baseline demand)	House cost: \$ 500,000				73
Lower Mainland (EE Act savings)	\$ 1,119.00	0.22%	\$ 1,166.00	7.0	75
Lower Mainland (Additional savings)	\$ 784.00	0.16%	\$ 671.00	7.7	77
	\$ 1,903.00	0.38%	\$ 1,837.00	7.3	
Southern Interior (NG heated home baseline demand)	House cost: \$ 400,000				71
Southern Interior (EE Act savings)	\$ 1,119.00	0.28%	\$ 1,555.00	5.5	75
Southern Interior (Additional savings)	\$ 193.00	0.05%	\$ 1,342.00	1.7	77
	\$ 1,312.00	0.33%	\$ 2,897.00	4.2	
Southern Interior (Electrically heated home baseline demand)	House cost: \$ 400,000				72
Southern Interior (EE Act savings)	\$ 888.00	0.22%	\$ 1,547.00	5.2	74
Southern Interior (Additional savings)	\$ 498.00	0.12%	\$ 743.00	5.7	76
	\$ 1,386.00	0.35%	\$ 2,290.00	5.4	
Northern Interior (NG heated home baseline demand)	House cost: \$ 300,000				69
Northern Interior (EE Act savings)	\$ 1,749.00	0.58%	\$ 2,250.00	5.7	74
Northern Interior (Additional savings)	\$ 1,958.00	0.65%	\$ 473.00	11.3	78
	\$ 3,707.00	1.24%	\$ 2,723.00	7.8	
Northern Interior (Electrically heated home baseline demand)	House cost: \$ 300,000				71
Northern Interior (EE Act savings)	\$ 858.00	0.29%	\$ 2,697.00	3.5	74
Northern Interior (Additional savings)	\$ 3,049.00	1.02%	\$ 156.00	13.6	77
	\$ 3,907.00	1.30%	\$ 2,853.00	8.3	

BC Green Building Code – small commercial

- Applies to Part 9 (small) commercial, institutional and industrial buildings
- Roof, wall, suspended floor insulation requirements
- Based party on ASHRAE 90.1 (2004)

BC Green Building Code – small commercial

Building assembly	Value Required		Value Required	
	Less than 4500 Degree Days		4500 Degree Days or more	
	Heated	Semiheated ⁽¹⁾	Heated	Semiheated ⁽¹⁾
Roof				
Insulation above deck	2.6	0.9	2.6	0.9
Metal building	3.3	1.8	3.3	1.8
Attic or other	5.3	3.3	6.7	3.3
Walls, Above Ground				
Mass	1.3	-	2.1	-
Metal Building	2.1	1.8	2.1	2.1
Steel Framed	2.1	2.1	2.1	2.1
Wood Frame or other	2.1	2.1	2.1	2.1
Suspended Floors				
Framed	5.3	2.1	5.3	2.1
Concrete slab	1.5	-	1.5	0.7

Energy Efficiency Act – 2006 Standards

- Furnace efficiency $\geq 90\%$ (effective January 1, 2008) similar to ENERGY STAR
- Low-E windows (U value ≤ 2.0 W/m²/K), effective January 1, 2009) – similar to ENERGY STAR Zone A
- Electronic thermostats for baseboard heaters (effective January 1, 2007)
- Gas fireplace labelling using CSA P4.1 (effective January 1, 2007)
- Large boilers, combustion efficiency $\geq 80\%$ (effective January 1, 2007) – same as ASHRAE 90.1 (2004)

Progress on 2006 Standards

- 56% market share for Energy Star furnaces in May, 2007 (for new and existing buildings), 50% average January-June
- 54 BC based window manufacturers to introduce Energy Star products, 20-30% market share as of fall 2006, prior to PST exemption announcement
- EnerChoice label for efficient gas fireplaces
- Proposal to exempt wooden doors due to their use of renewable resources
- Proposal to exempt windows used for buildings more than 4 stories in height

Energy Efficiency Act – Short-term Priorities

- NRCan fluorescent ballast standard, including replacement products immediately (in advance of NRCan's 2010 effective date)
- Residential appliances – fridges, freezers, clothes washers, dishwashers, dehumidifiers
- Extend furnace regulation to retrofits of existing buildings with an effective date of December 31, 2009
- Gas-, oil- and propane-fired water heaters
 - Participation in SEGWHAI, super efficient gas water heater initiative

Energy Efficiency Act – Long-term Priorities

- General service lighting (lumens per watt)
- Furnace blower motors
- Standby losses (reducing them to 1 watt), saving 73 megawatts of electricity
- Commercial refrigeration
- Commercial HVAC
- Industrial motors
- Hot water system design for new construction (GJ per litre) incorporating impacts of tankless units, heat recovery, pipe insulation and solar thermal

Supportive Programs

- Built Green BC, LEED and Green Globes
- BC Hydro High Performance Building and New Home Programs
- FortisBC new construction programs
- Terasen Gas efficient boiler and thermal metering programs, geo-exchange utility
- Provincial Sales Tax exemptions for insulation, draftproofing materials, ENERGY STAR windows, doors, furnaces, boilers and heat pumps, solar thermal

The Future

- Revised Model National Energy Code for Buildings (Canada Commission on Building and Fire Codes and NRC)
- More emphasis on commissioning of new buildings for energy performance
- Focused efforts on the retrofit of existing buildings, including widespread energy labelling and building re-commissioning
- Evaluating ASHRAE 189 – life-cycle approach to evaluating building performance
- Net-zero energy building demonstrations

The BC Energy Plan

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www.energyplan.gov.bc.ca

