Canadian Home Builders' Association

NECB Roadmap – Part 2
To Assist in the Review of Proposed Changes to the National Energy Code for Buildings

October 2010

Contents

Note: This Roadmap had been prepared for the use of CHBA members. It is intended to assist members in compiling information to support comments they may wish to submit on proposed changes to the NECB. The Roadmap has not been prepared to solicit information from members.

I. Introductory Information

1. Status of the NECB, Major Concerns and the Need for Your Input

Note: Except for the Status of the NECB, the following is the same as provided in the Roadmap – Part 1

Status of the NECB

The provinces and territories are supporting the up-dating of the National Energy Code for Buildings (NECB) with a view to adoption. The Code is scheduled to be published later in 2011.

Proposed changes relative to the 1997 edition of the Code have been published for public comment. See www.nationalcodes.ca/eng/public_review/2010/proposed_changes.shtml. (See Annex C for information on how to find the proposed change forms (PCFs) on the web that describe the changes identified in the Roadmap – Parts 1 and 2.)

Major Concerns

In the development of the proposed changes, there has been no comprehensive compilation of data or analysis that would allow our industry to understand what the overall **construction and cost impacts** will be.

The Need for Input from Builders of Larger Residential Buildings

If you build larger residential buildings, the NECB could have a big impact on your business.

Only by providing comments during the fall public review can builders influence the requirements in this Code. **This is effectively the last opportunity to improve the clarity and practicality of the new Code.**

Comments coming directly from builders and developers, who can best determine how they will be affected, can make a substantial and significant difference. The CHBA is encouraging members to review the proposed changes as soon as they are released, and let the Canadian Commission on Building and Fire Codes (CCBFC) know how they will affect you and your customers.

2. Background – Application, Scope and Structure of the Code, and Options for Compliance

Note: The following is the same as provided in the Roadmap – Part 1

Application of the NECB

The NECB applies to all buildings that do not fall within the application of Part 9 of the National Building Code. For residential buildings, this means all buildings that are

- more than 600 m^2 in building area,
  OR
- more than 3 storeys in building height.

The Code also applies to energy-consuming elements on the building property, such as landscape lighting.

Scope of the NECB

The NECB provides requirements that address:

- heat loss (thermal transmission and air leakage through the building envelope),
- lighting,
- heating, ventilating and air-conditioning systems and equipment,
- service water heating,
- electrical systems and motors.

Options for Compliance

Aside from alternative solutions that may always be proposed for compliance with national model codes, the NECB provides three approaches to compliance:

- Prescriptive Path – "simple" prescriptive requirements (Division B, Parts 1 to 7)
- Trade-Offs – allowed between related building elements (e.g., higher roof insulation levels may be traded off against lower wall insulation levels)
- Performance Compliance Paths – full-building energy-use modeling

The prescriptive path is the simplest approach to complying with the Code but some requirements may prove to be overly restrictive in terms of constructability, cost or market acceptability. In these cases, a different approach will need to be followed.

3. Why a Roadmap, Scope and Structure of Part 2, Next Iterations

Why a Roadmap

Reviewing the new Code is a large undertaking that will require significant time and effort. CHBA has developed this Roadmap to assist in this process.

Scope and Structure of Roadmap – Part 2

Roadmap – Part 2 identifies areas of major concern where the submission of substantive comments depends on compilation of information on equipment installed in your buildings. This Roadmap presents proposed requirements for HVAC and SWH in the order that they will appear in the NECB.

For each of these two subject areas, introductory statements are provided followed by a table that identifies:

- the requirements that raise the greatest concerns,
- the degree of concern by colour from very high (red), significant (orange), potentially significant (yellow),
- what the requirements specify,
- information that you need to compile in order to determine the implications of the requirement on your business and for your customers.

Annexes A and B provide the minimum performance levels that are proposed for HVAC and SWH equipment.

Keep the answers to the questions; you will need them to provide substantive comments during public review. If you build for different markets, compilation of data for both a simpler sample building and a more up-scale building will help in providing informative comments.

The Next Iterations

CHBA will issue additional components to provide guidance on submitting comments to the public review.

II. The Roadmap – Part 2

NECB Part 5 - HVAC

Three areas have been identified as potentially creating technical and cost challenges:

- maximum power for fan systems
- heat recovery
- equipment performance levels.

Requirements		Critical Aspects of the Requirements	Information needed to determine implications
			Note: If you build for different markets, compile information for a simple building and a more up-scale building.
5.2.3.1. **Application (of fan system design requirements)**		The provision specifies the **application** of subsequent requirements where the total of all the fan motor nameplate ratings in a fan system used for heating, cooling ventilation or any combination of these is 10 kW or more.	• Determine if your current buildings include fan systems for heating, cooling, ventilation or any combination of these where the total of all the fan motor nameplate ratings is 10 kW or more. ***If not, skip to the item on Heat Recovery (5.2.10.1.).*** ***If so, then:*** • continue to the next item (5.2.3.2.).

Requirements		Critical Aspects of the Requirements	Information needed to determine implications
5.2.3.2. **Constant-Volume Fan Systems (power demand limit)**		For systems where the fans produce a **constant air flow rate** when the system is operating, the combined supply and return **fan motor power demand** at design conditions must not exceed 1.6 W per L/s of supply air delivered to the conditioned space. Power demand is to be calculated as: $W = 0.001 * F * SP/\eta$ where W = power demand (watts), F = design flow rate (L/s), SP = design static pressure across the fan (Pa), η = combined fan-drive-motor efficiency, expressed as a decimal fraction.	• Determine if the fan motor power demand in constant air flow fan systems in your buildings exceeds 1.6 W per L/s of delivered supply air ***If not, skip to the next item (5.2.3.3.).*** ***If so, then:*** • Determine if equipment is available to allow for reduction in power demand. • Determine the cost of installing fans with lower motor power demand (cost for the building / price increase attributed to each dwelling unit).
5.2.3.3. **Variable Air-Volume Fan Systems** (power demand limit)		For systems where the **air flow through fans varies automatically** depending on load, the combined supply and return **fan motor power demand** at design conditions must not exceed 2.65 W per L/s of supply air delivered to the conditioned space. Power demand is to be calculated as indicated for 5.2.3.2.	• Determine if the fan motor power demand in variable-air-volume fan systems in your buildings exceeds 2.65 W per L/s of delivered supply air. ***If not, skip to the next item (5.2.10.1.).*** ***If so, then:*** • Determine if equipment is available to allow for reduction in power demand. • Determine the cost of installing fans with lower motor power demand (cost for the building / price increase attributed to each dwelling unit).

Requirements		Critical Aspects of the Requirements	Information needed to determine implications
5.2.10.1. **Heat Recovery Systems (General)**		Except where an air exhaust is used to remove smoke or toxic/flammable/corrosive vapours, etc., **heat recovery** must be installed on all systems that exhaust air to the outside of a building when the sensible heat content of the exhaust air system exceeds 150 kW. Heat recovery must be a minimum of 50%. Sensible heat is calculated in kW as: Recoverable Heat = 0.00123 . Q . (Te – To) where te = temperature of exhaust air before heat recovery (oC), to = outdoor 2.5% January design temperature (oC), and Q = rated capacity of exhaust system at normal exhaust air temperature (L/s).	• Determine if air from exhaust systems in the buildings you currently build has a sensible heat content exceeding 150 kW. (See Annex A.) ***If not, skip to the next item (5.2.10.4.).*** ***If so, then:*** • Determine the cost of installing heat recovery on these systems (cost for the building / price increase attributed to each dwelling unit).
5.2.10.4. **Heat Recovery in Dwelling Units.**		The **principal exhaust** for self-contained mechanical ventilation systems serving single dwelling units must be equipped with **heat recovery**. Sensible heat recovery must be not less than 65% at an outdoor test temperature of 0 C and must achieve the applicable minimum efficiency per the table below.	• Determine if HRVs or other heat recovery devices are normally installed on all self-contained dwelling unit ventilation systems. ***If not, skip to B below.*** ***A If so,*** • Determine if these HRVs or other heat recovery devices will meet the applicable heat recovery criteria. ***If so, skip to the next item (5.2.12.).*** *(continued next page)*

<table>
<tr><th>Requirements</th><th></th><th>Critical Aspects of the Requirements</th><th>Information needed to determine implications</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>2.5% January Design Temperature at Building Location, ˚C</th><th>Outside Air Test Temperature at Station 1, ˚C</th><th>Sensible eat-recovery Efficiency</th></tr>
<tr><td>≥ –10</td><td>0</td><td>65</td></tr>
<tr><td>< –10 and > –30</td><td>-25</td><td>55</td></tr>
<tr><td>≤ –30</td><td>-40</td><td>45</td></tr>
</table>
</td><td>B If not, then:
• Determine the cost of installing required heat recovery on these systems (cost for the building / price increase attributed to each dwelling unit).</td></tr>
<tr><td>5.2.12.
Equipment Efficiency
5.2.12.1.
Unit and Packaged Equipment</td><td></td><td>Minimum performance levels are specified for unit and packaged HVAC equipment. See Table in Annex A.</td><td>• Determine if equipment currently being installed meet these performance levels.
If so, skip to the next item (6.2.2.1.).

If not, then:
• Determine the cost of installing equipment that will meet the required performance levels (cost for the building / price increase attributed to each dwelling unit).</td></tr>
</table>

NECB Part 6 - Service Water Heating (SWH)

One area has been identified as potentially creating technical and cost challenges – equipment performance levels.

Requirements		Critical Aspects of the Requirements	Information needed to determine implications
			Note: If you build for different markets, compile information for a simple building and a more up-scale building.
6.2.2.1. **Equipment Efficiency**		Minimum performance levels are specified for service water heating equipment. See Table in Annex B.	• Determine if equipment currently being installed meet these performance levels. ***If so, end review.*** ***If not, then:*** • Determine the cost of installing equipment that will meet the required performance levels (cost for the building / price increase attributed to each dwelling unit).

Annex A - Minimum Performance of HVAC Equipment

Component	Cooling Capacity	Standard	Rating Conditions	Minimum Performance
Air-cooled Unitary Air-conditioners and Heat Pumps — Electrically operated (Except Packaged Terminal Air-conditioners and Room Air-conditioners)				
Split-system	≤ 19 kW	CAN/CSA-C256-M		SEER = 15 (7)
Single package	≤ 19 kW	CAN/CSA-C656-M		SEER = 14
All Phases	> 19 and < 73 kW	CAN/CSA-C746		EER = 9.7 (1)
Air-conditioners, all phases	73 - 222.7 kW (250 000 -760 000 Btu/h)	CAN CSA C746	≥ 19 kW and < 40 kW electric resistance heating section, split and single	COP = 3.28 (3) ICOP = 3.34 (8)
			≥ 19 kW and < 40 kW other heating section, split and single	COP = 3.22 ICOP = 3.28
			≥ 40 kW and <70 kW electric resistance heating section, split and single	3.22 COP 3.28 ICOP
			≥ 40 kW and <70 kW other heating section, split and single	COP = 3.16 ICOP = 3.22
			≥ 70 kW and < 223 kW electric resistance heating section, split and single	COP = 2.93 ICOP = 2.96
			≥ 70 kW and < 223 kW other heating section, split and single	COP = 2.87 ICOP = 2.90
			< 223 kW electric resistance heating section, split and single	COP = 2.84 ICOP = 2.87
	> 222.7 kW (760 000 Btu/h)		< 223 kW other heating section, split and single	COP = 2.78 ICOP = 2.81

Heat Pumps	73 -222.7 kW (250 000 -760 000 Btu/h)	CAN/CSA-C746	≥ 19 kW and < 40 kW electric resistance heating section, split and single	COP = 3.22 ICOP = 3.28
			≥ 19 kW and < 40 kW other heating section, split and single	COP = 3.16 ICOP = 3.22
			≥ 40 kW and <70 kW electric resistance heating section, split and single	COP = 3.10 ICOP = 3.13
			≥ 40 kW and <70 kW other heating section, split and single	COP = 3.04 ICOP = 3.08
			≥ 70 kW electric resistance heating section, split and single	COP = 2.78 ICOP - 2.81
			≥ 70 kW other heating section, split and single	COP = 2.72 ICOP = 2.75
			≥ 19 kW and < 70 kW (cooling capacity) 8.3°C db / 6.1°C wb Outdoor Air	COP = 3.3
			≥ 19 kW and < 70 kW (cooling capacity) -8.3°C db / -9.4°C wb Outdoor Air	COP = 2.25
			≥ 70 kW (cooling capacity) 8.3°C db / 6.1°C wb Outdoor Air	COP = 3.2
	> 222.7 kW (760 000 Btu/h)		≥ 70 kW (cooling capacity)-8.3°C db / 6.1°C wb Outdoor Air	COP = 2.05
Single Package Vertical Air Conditioners and Heat Pumps				
SPVAC and SPVHP Cooling Mode		AHRI 390	< 19 kW	EER = 10
		CSA C746-06	≥ 19 kW and < 40 kW	EER = 9.5
		CSA C746-06	≥ 40 kW and <70 kW	EER = 8.6
SPVHP Heating Mode		AHRI 390	< 19 kW	COP = 3.1
		CSA C746-06	≥ 19 kW and < 40 kW	COP = 3.0
		CSA C746-06	≥ 40 kW and <70 kW	COP = 2.9

Evaporatively cooled and Water/Evaporatively cooled Unitary Air-conditioners and Heat Pumps — Electrically operated (Except Packaged Terminal Air-conditioners and Room Air-conditioners)				
Evaporatively cooled	≤ 19 kW (65 000 Btu/h)	ARI 210/240, CTI 201	< 19 kW	COP = 3.54
Evaporatively cooled, water/evaporatively cooled	>19 and <73kW	CAN/CSA-C746	≥ 19 kW and < 40kW, electric resistance heating section, split and single	COP = 3.37
			≥ 19 kW and < 40kW, all other heating section, split and single	COP = 3.31
			≥ 40 kW and < 70kW, electric resistance heating section, split and single	COP = 3.22
			≥ 40 kW and < 70kW, other heating section, split and single	COP = 3.16
Water/evaporatively cooled air-conditioners	≥ 73 kW	ARI 360, CTI 201	≥ 70 kW, , electric resistance heating section, split and single	COP = 3.22 IPLV = 3.02 (2)
			≥ 70 kW, other heating section, split and single	COP = 3.16 IPLV = 2.96
Condensing Units				
Air-cooled and water/evaporatively cooled	>19 and <73kW	CAN/CSA-C746		In standard
Air-cooled	≥ 73 kW	ARI 365	≥ 40 kW	COP = 2.96 IPLV = 3.28
Water/evaporatively cooled		CTI 201	≥ 40 kW	COP = 3.84 IPLV = 3.84
Water-cooled Unitary Air-conditioners and Heat Pumps — Electrically operated				
Ground/water-source heat pumps	<35kW	CAN/CSA-13256-1-01		In standard
Internal water-loop heat pumps	<40kW	CAN/CSA-13256-2-01		

Water-cooled air-conditioners	<19kW	ARI 210/240, CTI 201	< 19 kW All Types	COP = 3.54 ICOP = 3.60
			≥ 19 kW and < 40kW electric resistance heating (or none)	COP = 3.37 ICOP = 3.43
			≥ 19 kW and < 40kW All Other	COP = 3.31 ICOP = 3.37
			≥ 40 kW and < 70kW, electric resistance heating (or none)	COP = 3.22 ICOP = 3.28
			≥ 40 kW and < 70kW, All Other	COP = 3.16 ICOP = 3.22
	19 - 39.5 kW		≥ 70 kW electric resistance heating (or none)	COP = 3.22 IPLV = 3.02 ICOP = 3.25
			≥ 70 kW All Other	COP = 3.16 IPLV = 2.96 ICOP = 3.19
Direct-expansion Ground-source Heat Pumps — Electrically operated				
Direct-expansion ground-source heat pumps	≤ 21 kW	CSA C748		in Standard
Packaged Terminal Air-conditioners and Heat Pumps				
Packaged terminal air-conditioners and heat pumps, air-cooled, electrically operated		CSA C744	all capacities	COP = 3.66-(0.213 x Cap_c /1000)
PTAC Non-Standard Size (all capacities)				COP = 3.19-(0.213 x Cap_c/1000)
PTHP (Cooling) Standard				COP = 3.6-(0.213 x Cap_c/1000)
PTHP (Cooling) Non-Standard				COP = 3.16-(0.213 x Cap_c/1000)

PTHP (Heating) Standard				COP = 3.2-(0.026 x Cap_c/1000)
PTHP (Heating) Non-Standard				COP = 2.9-(0.026 x Cap_c/1000)
Room Air-conditioners and Room Air-conditioner/Heat Pumps				
Without reverse cycle	< 10.55 kW	CAN/CSA-C368.1-M		in Standard
With reverse cycle with louvered sides without louvered sides		ANSI/AHAM RAC-1		EER = 8.5[(1)] EER = 8.0[(1)]
Room Air Conditioners, with louvered sides	< 1.8kW		< 1.8kW	COP = 2.84
	>= 2.8 kW and < 2.3 kW		>= 2.8 kW and < 2.3 kW	COP = 2.84
	>=2.3 kW and < 4.1 kW		>=2.3 kW and < 4.1 kW	COP = 2.87
	>=4.1 kW and < 5.9 kW		>=4.1 kW and < 5.9 kW	COP = 2.84
	>=5.9 kW		>=5.9 kW	COP = 2.49
Room Air Conditioners, without louvered sides	<2.3 kW		<2.3 kW	COP = 2.64
	>=2.3 kW and < 5.9 kW		>=2.3 kW and < 5.9 kW	COP = 2.49
	>= 5.9 kW		>= 5.9 kW	COP = 2.49
Room air-conditioner heat pumps with louvered sides	<5.9 kW		<5.9 kW	COP = 2.65
	>=5.9 kW		>=5.9 kW	COP = 2.49
Room air-conditioner heat pumps without louvered sides	<4.1 kW		<4.1 kW	COP = 2.49
	>=4.1kW		>=4.1kW	COP = 2.34

Room air conditioner, casement only	All Capacities		All Capacities	COP = 2.55
Room air condition casement -- slider	All Capacities		All Capacities	COP = 2.78
Computer Room Air-conditioners				
Air Conditioners, air cooled	<19 kW	ANSI/ASHRAE 127		2.20 / 2.09
	≥ 19kW and < 70kW			2.10 / 1.99
	≥70kW			1.90 / 1.79
Air Conditioners, water cooled	<19 kW	ANSI/ASHRAE 127		2.60 / 2.49
	≥ 19kW and < 70kW			2.50 / 2.39
	≥70kW			2.40 / 2.29
Air Conditioners, water cooled with fluid economizer	<19 kW	ANSI/ASHRAE 127		2.55 / 2.44
	≥ 19kW and < 70kW			2.45 / 2.34
	≥70kW			2.35 / 2.24
Air conditioners, glycol cooled (rated at 40% propylene glycol)	<19 kW	ANSI/ASHRAE 127		2.50 / 2.39
	≥ 19kW and < 70kW			2.15 / 2.04
	≥70kW			2.10 / 1.99
Air conditioners, glycol cooled (rated at 40% propylene glycol) with fluid economizer	<19 kW	ANSI/ASHRAE 127		2.45 / 2.34
	≥ 19kW and < 70kW			2.10 / 1.99
	≥70kW			2.05 / 1.94
Chilled Water Air Handler	<19 kW	ANSI/ASHRAE 127		8.00 / 6.06
	≥ 19kW and < 70kW			9.00 / 7.06
	≥70kW			11.00 / 9.06

Packaged Water Chillers				
Vapour compression, air- or water-cooled, electrically operated	< 5600 kW	CSA C743		in Standard
Absorption, single- or double-effect, indirect-or direct-fired				
Boilers				
Electric Boilers				[9]
Gas-fired boilers,[4] ≤ 117.23 kW	-up to 88 kW AFUE -over 88 kW see > 117.23kW	CSA 4.9		AFUE = 85% [10]
Gas-fired boilers, > 117.23 kW	-up to 88 kW see above AFUE -over 88 kW > (equal to) 117.23kW	ANSI Z21.13, ANSI/ASME PTC 4.1,	≥ 88 kW < 733 kW	Ec[5] ≥ 82.5% Et ≥ 83.0
			≥ 733 kW	Ec ≥ 83.3%
Oil-fired boilers		CSA B212	< 88 kW	AFUE > 84.7%
			≥ 88 kW < 733 kW	Et[6] ≥83.4 %
			≥ 733 kW	Ec ≥ 85.8 %
Oil-fired boilers (residual), >88 kW		ANSI/ASME PTC 4.1	same as above	
Oil-fired boilers (other), >88 kW		ANSI/ASME PTC 4.1	same as above	

Warm-air Furnaces, Combination Warm-air Furnaces/Air-conditioning Units, Duct Furnaces and Unit Heaters				
Gas-fired warm-air furnaces,[4] ≤ 117.23 kW		CAN/CGA-2.3-M		AFUE ≥ 92.4 %
Gas-fired warm-air furnaces, > 117.23 kW		ANSI Z21.47	Maximum rated capacity, steady state	Et≥ 81%
			Minimum rated capacity, steady state	Et ≥81%
Gas-fired duct furnaces,[4] ≤ 117.23 kW		CGA 2.6-M		Et ≥ 81%
Gas-fired unit heaters,[4] ≤ 117.23 kW		CAN/CGA-2.6-M		Et ≥ 85%
Oil-fired warm-air furnaces, ≤ 66 kW		CSA B212, CSA B140.4		Et ≥ 84.5 %
Oil-fired warm-air furnaces, > 66 kW				Et ≥ 81.3
Oil-fired duct furnaces and unit heaters				Et ≥ 81%

Notes to Table 5.2.13.1.:

(1) EER is the energy efficiency ratio in Btu/(h• W) (no metric equivalent)

(2) IPLV is the integrated part-load value (no units)

(3) COP is the coefficient of performance in W/W

(4) Includes propane

(5) E_c is the combustion efficiency (%)

(6) E_t is the thermal efficiency (%)

(7) SEER is the seasonal energy efficiency ratio

(8) ICOP is the integrated coefficient of performance

(9) No standards for performance efficiency exists for electric boilers. Efficiencies typically approach 100%.

(10) Annual fuel utilization efficiency

Annex B - Minimum Performance of Service Water Heating Equipment

Component	Input	Capacity, L	Vt, L (US gal.)	Input/Vt, Btuh/ W/L (US gal.)	Standard	Rating Conditions	Performance Requirement
Storage-type and Non-storage (Instantaneous) Service Water Heaters							
Electric	≤ 12 kW	50-270			CAN/CSA-C191	In Standard	35 + 0.20 V SL (Top Inlet) 40 + 0.20 V SL (Bottom Inlet)
		>270 and ≤ 454				In Standard	(0.472V)-38.5 W SL (Top Inlet) (0.472V)-33.5 W SL (Bottom Inlet)
	>12 kW	> 454			CSA 4.3	Δt=44.4°C (80°F)	Et ≥ 98% EF ≥ 0.98
Heat pump water heaters	≤ 24 A and ≤ 250 V				CAN/CSA-C745		EF ≥ 2.1
Gas-fired[3]	<22 kW				CSA 4.1		0.67 EF – 0.0005V
	22-117 kW				CSA 4.3		
	> 117 kW			< 310 (4000)	CSA 4.3	Δt= 50oC (90°F)	Et ≥ 80%
			< 37.8 (10)	≥ 310 (4000)			Et ≥ 80%[4]
			≥ 37.8 (10)	≥ 310 (4000)		Δt= 50°C (90°F)	Et ≥ 77% [4]

Oil-fired, instantaneous	≤ 61.5 kW NAECA-covered[5]				DOE test procedures, US Code of Federal Regulations, 10CFR, Part 430, Subpart B, Appendix E		EF ≥ 0.59 − 0.0019 V [6][7]
	Others			< 310 (4000)	CSA 4.3	Δt= 50°C (90°F)	Et ≥ 78%[4] SL ≤ 1.3 + 95/Vt[1][2]
			< 37.8 (10)	≥ 310 (4000)			Et ≥ 80%[5]
			≥ 37.8 (10)	≥ 310 (4000)		Δt= 50°C (90°F)	Et ≥ 77%[5] SL ≤ 2.3 + 67/Vt[1][2]
Oil-fired, storage-type	≤ 30.5 kW	≤ 190			CAN/CSA-B211-M		0.55 EF
	≤ 30.5 kW	> 190			DOE test procedures, US Code of Federal Regulations, 10 CFR, Part 430, Subpart B, Appendix E		0.55 EF
	> 30.5 kW	> 190		< 310 (4000)	CSA 4.3	Δt= 50°C, (90°F)	0.55 EF
			< 37.8 (10)	≥ 310 (4000)			0.55 EF
			≥ 37.8 (10)	≥ 310 (4000)		Δt= 50°C (90°F)	0.55 EF SL ≤ 2.3 + 67/Vt[1][2]
Pool Heaters							
Gas-fired[3]	< 117.2 kW				CSA 4.7		Et ≥ 78%
Oil-fired					ANSI Z21.56		Et ≥ 78%[4]

(Notes to Table 6.2.2.1. next page)

Notes to Table 6.2.2.1.:

(1) Vt is the storage volume in US gallons as measured according to the referenced standard.
(2) SL is the standby loss (%/h).
(3) Includes propane
(4) Et is the thermal efficiency with 70 F (38.9 C) water temperature difference.
(5) Consistent with the U.S. National Appliance Energy Conservation Act of 1987.
(6) EF is the energy factor (%/h).
(7) V is the storage volume in US gallons as specified by the manufacturer.

Annex C – Finding PCFs on the Public Review Web Site

The numbers identifying the proposed changes and proposed change forms (PCFs) on the web are not generally the same as the provision numbers of the requirements as they will appear in the new Code. The following is provided to help reviewers find the PCFs on the web that describe the changes identified in the Roadmap – Parts 1 and 2.

Main Web Links

The main page for the public review can be found at www.nationalcodes.ca/eng/public_review/2010/introduction.shtml

The introductory page for the proposed changes themselves can be found at www.nationalcodes.ca/eng/public_review/2010/proposed_changes.shtml .

Links to proposed changes and how to find specific PCFs

When viewing the proposed changes individually in Code order by Section [www.nationalcodes.ca/eng/public_review/2010/technical_necb.shtml] or by subject [www.nationalcodes.ca/eng/public_review/2010/subject_necb.shtml], use the Web Links provided in the Tables below to find the PCF.

The proposed changes are also posted altogether in a single document [___ add web link___]. When viewing the proposed changes in this document, search on the PCF number provided in the Tables below.

PCFs for Proposed Changes Described in Roadmap – Part 1

NECB Part 3 Building Envelope

Roadmap		Web	
Provision	**Subject**	**Web Link**	**PCF Number** [ID at top of PCF]
3.1.1.5. (1)	Calculations (of overall thermal transmittance)	3.2.1.2. Continuity of Insulation - Move Sentences 3.2.1.2.(2)_(5) to 3.1.1.7.(1)_(4) with changes (Calculation Procedures)	NECB97-DivB-03.02.01.02.(02)_(05)-move-EEB-Calcul_Proced_CRT.doc
3.2.1.4.	Allowable Areas of Fenestration and Doors	3.2.1.4. Allowable Areas of Fenestration and Doors	NECB97-DivB-03.02.01.04.-add-EEB-Allow_Area_Fenest_Door
3.2.2.2.	Thermal Characteristics of Opaque Components of the Building Envelope	3.3.1.1. Thermal Characteristics of Opaque Components of the Building Envelope	NECB97-DivB-03.03.01.01.-move-EEB-Opaque.doc
3.2.2.3. (1)	Thermal Characteristics of Fenestration	3.3.1.2. Thermal Characteristics of Fenestration	NECB97-DivB-03.03.01.02.-move-EEB-Fenestration.doc
3.2.3.2.	(Thermal Characteristics of) Building Assemblies in Contact with the Ground - Walls	3.2.3.2. Walls	NECB97-DivB-03.02.03.02.-replace-EEB-Walls_CRT.doc
3.2.3.3.	(Thermal Characteristics of Building Assemblies in Contact with the Ground) Floors	3.2.3.3. Floors	NECB97-DivB-03.02.03.03.-replace-EEB-Floors_CRT.doc

Note to Table:

1) NECB provision number in Roadmap differs from the provision number on the PCF because the Roadmap was developed based on draft PCFs.

NECB Part 4 Lighting

Roadmap		Web	
Provision	**Subject**	**Web Link**	**PCF Number** [ID at top of PCF]
4.2.1.5. (1)	Calculation of Interior Lighting Power Allowance Using the Building Area Method	4.3.2.1. Interior Lighting Power Allowance by Building Type	NECB97-DivB-04.03.02.01.-move-EEB-ILPA_Bldg_Area_Method.doc
4.2.1.6. (1)	Calculation of Interior Lighting Power Allowance Using the Space-by-Space Method	4.3.3.1. Interior Lighting Power Allowance by Space Function	NECB97-DivB-04.03.03.01.-move-EEB-ILPA_Space_Method.doc
4.2.3.	Exterior Lighting Power	4.2.1.2. Entrance and Exit Lighting	NECB97-DivB-04.02.01.02.-move-EEB-Ext_Light_Power.doc

Note to Table:

1) NECB provision number in Roadmap differs from the provision number on the PCF because the Roadmap was developed based on draft PCFs.

PCFs for Proposed Changes Described in Roadmap – Part 2

NECB Part 5 HVAC

Roadmap		Web	
Provision	**Subject**	**Web Link**	**PCF Number** [ID at top of PCF]
5.2.3.1.	Application (of fan system design requirements)	5.3.1.1. Fan System Design - Application - Move Article 5.3.1.1. to 5.2.3.1. with changes	NECB97-DivB-05.03.01.01.-move-EEB-Fan_System_Design.doc
5.2.3.2.	Constant-Volume Fan Systems (power demand limit)	5.3.1.2. Constant-volume Fan Systems	NECB97-DivB-05.03.01.02.-move-EEB-Cst_Volume_Fan_Syst.doc
5.2.3.3.	Variable Air-Volume Fan Systems (power demand limit)	5.3.1.3. Variable-air-volume Fan Systems	NECB97-DivB-05.03.01.03.-move-EEB-Variable_Volume_Fan_Syst.doc
5.2.10.1.	Heat Recovery Systems (General)	5.2.10.1. Heat Recovery Systems	NECB97-DivB-05 02 10 01 -insert-EEB-Heat_Recovery_Syst.doc
5.2.10.4.	Heat Recovery in Dwelling Units.	5.3.4.3. Heat Recovery in Dwelling Units	NECB97-DivB-05.03.04.03.-move-EEB-Heat_Recvry_Dwelling.doc
5.2.12., 5.2.12.1.	Equipment Efficiency, Unit and Packaged Equipment	5.2.13.1. Unit and Packaged Equipment	NECB97-DivB-05 02 13 01 -move-EEB-Unit_Packaged_Equip_revised After comment period.doc

NECB Part 6 SWH

Roadmap		Web	
Provision	**Subject**	**Web Link**	**PCF Number** [ID at top of PCF]
6.2.2.1.	Equipment Efficiency	6.2.2.1. Equipment Efficiency	NECB97-DivB-06 02 02 01 (01)-replace-EEB-Equipment_Efficiency.doc