Overview of the Proposed Tiered Energy Compliance Paths in NECB and NBC 9.36

MBOA Spring Seminar April 29, 2021

Norman A. Garcia, P.Eng. (he/him/his) Inspection and Technical Services Municipal Relations

The facts presented in this presentation are all publicly available documents and do not represent the opinion of the presenter and his employer. The presenter does not guarantee the accuracy or reliability of the information provided herein.

I wish to acknowledge that we are gathered on Treaty 1 territory, traditional territory of the Anishinaabeg, Cree, OjiCree, Dakota, and Dene Peoples, and on the homeland of the Métis Nation.







We are spewing 152 million tons of manmade global warming pollution into the thin shell of our atmosphere every 24 hours — as if it were an open sewer. Solar radiation in the form of lightwaves passes through the atmosphere

mm

mmn

man

AIR TRANSPORT

THAWING PERMAFROST

COAL MINING

COAL PLANTS

INDUSTRIAL PROCESSES

OIL PRODUCTION

FERTILIZATION

LAND TRANSPORT

LANDFILLS

© 2017 Don Foley

The Largest Source of Global Warming Pollution Is the Burning of Fossil Fuels



Data: U.S. Department of Energy/CDIAC, updated: Peters, G.P. et al., Carbon dioxide emissions continue to grow amidst slowly emerging climate policies. Nat. Clim. Chang. 10, 3-6 (2020)

Billion Metric Tons of Carbon

Global Surface Temperature – Departure from Average 1880 – 2019





Data: L. Cheng, K.E. Trenberth et al., "Improved estimates of ocean heat content from 1960 to 2015," Science Advances, 10 March 2017 with updated 2017-2019 data from K.E. Trenberth.

Hurricane Florence

September 14, 2018

Wilmington NC 🖕







© 2010 Sean R. Heavey

Tamil Nadu, India December 2, 2015

-blant

Jena stime

pho -

200

1226-

SIT

The same extra heat that evaporates more water from the ocean, causing bigger downpours and floods...

São Paulo State, Brazil



Data: Westerling, et al.; Climate Central, "The Age of Western Wildfires," Fig. 9, September, 2012 - updated, 2020 USFS data

Fort McMurray, Alberta, Canada May 3, 2016

© 2016 DarrenRD/Wikimedia CC BY-SA 4.0 International



Data: 2019 Munich Re, Geo Risks Research, NatCatSERVICE. As of January 2020.

Unnamed Glacier, Southwest Greenland Summer 1935

Images courtesy Anders Bjørk, © Natural History Museum of Denmark/Tholstrup (2013) and Danish Geodata Agency (1935)-

"Climate Change is a Medical Emergency."

Professor Hugh Montgomery, Co-Chair, The 2015 Lancet Commission on Health and Climate Change June 2015

Tropical Diseases on the Move



G James Hastings-Trew

*The exact point of origin of many diseases is uncertain

The Cost of Carbon



PARIS2015 UN CLIMATE CHANGE CONFERENCE COP21.CMP11 Nins Line Normal State Norma

Nearly every nation on earth including Canada
 Legally binding

PARIS CLIMATE AGREEMENT



 $\begin{array}{c} \mathbf{2.} \\ \mathbf{3.} \\$

Limit the avg. global temperature increase to < 2° centigrade + achieve net zero emissions by mid-century Enhance resilience and adaptation to climate impacts certain to occur Align financial flows in the world with these objectives



PAN-CANADIAN FRAMEWORK



on Clean Growth and Climate Change

Canada's Plan to Address Climate Change and Grow the Economy

√2016

 ✓ Canada's commitment to the Paris Agreement
 ✓ Prime Minister Justin Trudeau announced Canada will cut carbon emissions to 40-45% below 2005 levels by 2030.

Construction Voyer - Laval, Quebec

Minto Communities - Ottawa, Ontario





- ✓ Net Zero Energy (NZE) is a building that uses an enhanced building envelope, solar orientation and high-efficiency equipment to produce as much clean energy as it uses over the course of a year.
- ✓ Net Zero Energy Ready (NZER) is a highly energy efficient building that minimizes energy use such that on-site or community renewables or energy from a clean grid can be used to reach NZE.



As building official, we play a important role in the fight as climate change.



√2016

- ✓ Roadmap to NZER by 2032 (originally 2030)
- ✓ Focused on reducing energy loads
- ✓ Silent on electricity generation
- ✓ Under Standing Committee on Energy Efficiency (SC-EE)



REGULATORY RECONCILIATION AND COOPERATION TABLE (RCT)

TABLE DE CONCILIATION ET DE COOPÉRATION EN MATIÈRE DE RÉGLEMENTATION (TCCR)



The **Canadian Free Trade Agreement (CFTA)** is an intergovernmental trade agreement signed by Canadian Ministers that entered into force on July 1st, 2017.

✓ The reduction or elimination of variations in the technical requirements of Construction Codes

- ✓ The timely adoption of Construction Codes
- ✓ A transformed National Code Development System to meet the needs of all jurisdictions
- ✓ Freely available National Codes



Bill 38 - The Building and Electrical Permitting Improvement Act

- ✓ Introduced in October 14, 2020
- ✓ Modernize planning and permitting processes
- ✓ Reduce red tape
- ✓ Enhance economic opportunities
- ✓ Manitoba obligated to adopt the latest code edition
 - no later than 24 months after publication (2020-2025), and
 - 18 months after publication for the subsequent versions (after 2025)















Standing Committees

- Energy Efficiency in Buildings (SC-EEB)
- Earthquake Design (SC-ED)
- Environmental Separation (SC-ES)
- · Fire Protection (SC-FP)
- Hazardous Materials and Activities (SC-HMA)
- Housing and Small Buildings (SC-HSB)
- HVAC and Plumbing (SC-HP)
- Structural Design (SC-SD)
- Use and Egress (SC-UE)

PTPACC - Provincial/Territorial Policy Advisory Committee on Codes CCBFC - Canadian Commission on Building and Fire Codes

System	NECB	NBC 9.36
Building Envelope	\checkmark	\checkmark
Lighting	\checkmark	
HVAC	\checkmark	\checkmark
Domestic Hot Water	\checkmark	✓
Electrical Power System	\checkmark	





For the 2020 edition, significant changes in:

- ✓ Fenestration and door areas
- ✓ Thermal transmittance of opaque assemblies and fenestrations
- ✓ Lighting
- $\checkmark~$ HVAC and service water heating
- ✓ Tiered performance requirements
- ✓ Airtightness testing (voluntary)
- ✓ Alignment with EnerGuide Rating System

National Energy Code for Buildings

Energy Performance Tiers	Energy Performance Proposed vs. Reference
1	100% (NECB 2020)
2	75% (25% better)
3	50% (50% better)
4	40% (60% better)

 AHJ's (through by-law) chooses a date to implement a specific tier. Example: Tier 1 upon adoption Tier 2 by 2025 Tier 3 by 2030 Tier 4 by 2032

✓ New airtightness testing requirements (not mandatory at this time)

NBC 9.36. Energy Efficiency for Housing & Small Buildings

NBC 9.36 COMPLIANCE PATHS	SUBSECTIONS
Prescriptive	9.36.2. Building Envelope 9.36.3. HVAC Requirements 9.36.4. Service Water Heating Requirements
Performance	 9.36.5. Energy Performance Compliance ✓ Any energy modelling software complaint to ASHRAE 140 ✓ EnerGuide Rating System
* Performance Tiered-energy	* 9.36.6 (NEW)
* Prescriptive Tiered-energy	* 9.36.7 (NEW)

NBC 9.36. Energy Efficiency for Housing & Small Buildings 9.36.5. Energy Performance Compliance Path



ANSI/ASHRAE Standard 140-2014

Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs

Site Informative Arries C for approval dates.

This standard is under summaure mammerses by a Standard Phases Gammanse (SPC) for which the Searchard Commisser has residential a documents program for regular publication of adhersis or measure, including properties for compare documents, scenarios, activation or requests for charge to any part of the standard. This charge submittal form, restandards, and documents, scenarios, activation or requests for charge to any part of the standard. This charge submittal form, restandards, and documents, scenarios, activation of an ASHRAE Standard may be purchased from the ASHRAE website (source for the standard). This form ASHRAE, Classerse Service, 11(9) Table Concellent Res, Adaptas, editors instruction control (source concellent). The Table SHRAE Standard may be purchased from the ASHRAE website (source for the standard). To from ASHRAE, Classerse Service, 11(9) Table Concellent Res, Adaptas, editors (SU27-3306, Transition instruction), face (FB-371-371). The standards, the standard rest of the standard form the ASHRAE standard rest (source concellent) and the standard. The regress period standards and the standard form the ASHRAE standard rest (source concellent) and the standard form the ASHRAE standard rest (source concellent) and the standard form the ASHRAE standard rest (source concellent) and the standard form the ASHRAE standard rest (source concellent) and the standard form the standard

© 3014 ASHRAE ISSN 1041-2334











NBC 9.36. Energy Efficiency for Housing & Small Buildings

9.36.6. <u>PERFORMANCE</u> Tiered-Energy Compliance Path

Energy Performance Tiers	Overall Energy Performance Improvement	Envelope Performance Improvement	Airtightness Level
1	≥ 0%	NA	Test only (no pass/fail)
2	≥ 10%	≥ 5%	2.5/3.0 ACH*
3	≥ 20%	≥ 10%	2.5/3.0 ACH*
4	≥ 40%	≥ 20%	1.5/2.0 ACH*
5	≥ 70%	≥ 50%	1.5/2.0 ACH*

* Depending on test method.

NBC 9.36. Energy Efficiency for Housing & Small Buildings 9.36.7. <u>PRESCRIPTIVE</u> Tiered-Energy Compliance Path

Energy Performance Improvement Tier	Overall Energy Performance Improvement of Building Relative to 9.36.2-9.36.4	Minimum Sum of Energy Conservation Points
1	0%	=
2	10%	10
3	20%	TBD
4	40%	TBD

- ✓ Points-based system
- Builders pick from a "menu" a.k.a. called energy conservation measures (ECMS's)
 - Above-grade and below-grade walls
 - Fenestrations and doors
 - Airtightness levels
 - Water heaters
 - HRV performance
- $\checkmark~$ Each ECM with corresponding points
- ✓ HRV mandatory

Example: Tier 2 = min.10 ECM points

Table [9.36.6.5.] 9.36.6.5.

Energy Conservation Measures and Points for Above-Ground Walls (1)_

Forming Part of Sentences 9.36.6.5.(2) and (4)

<u>Energy Conservation Measures for Above-Ground</u> <u>Walls – Minimum Effective RSI Values, (m^{2.}K)/W</u>	<u>Heati</u>	ng Degr in C	ee-Days elsius D	s of <i>Build</i> egree-D	<u>ding Loc</u>)ays	ation,
Zone 7A Current MB 9.36 = RSI 2.8 Current NBC 9.36 = RSI 2.97	<u>Zone</u> <u>4</u> ≤ <u>3000</u>	<u>Zone</u> <u>5</u> <u>3000</u> <u>to</u> <u>3999</u>	<u>Zone</u> <u>6</u> <u>4000</u> <u>to</u> <u>4999</u>	<u>Zone</u> <u>7A</u> <u>5000</u> <u>to</u> <u>5999</u>	Zone 7B 6000 to 6999	<u>Zone</u> <u>8</u> ≧ 7000
		Energ	<u>y Conse</u>	rvation	Points	
<u>2.97</u>	<u>2.0</u>	=	=	=	=	=
<u>3.08</u>	<u>3.2</u>	<u>1.4</u>	<u>1.6</u>	<u>2.1</u>	=	=
<u>3.69</u>	<u>7.4</u>	<u>5.4</u>	<u>6.2</u>	<u>6.7</u>	<u>5.4</u>	<u>5.2</u>
2.25	0.0	<u> </u>	<u> </u>	7.4	<u> </u>	~ ~

Credit: Mr. John Hockman

Example: Tier 2 = min.10 ECM points

✓CAN/CGSB-149.10-

2019

✓ACH₅₀ NLA₁₀ NLR₅₀



<u>Energy Conse</u> <u>Airtightness – A</u>	Energy Conservation Measures for Airtightness – Airtightness Levels (1)Heating Degree-Days of Building Location, I Celsius Degree-DaysAirtightness – Airtightness Levels (1)Celsius Degree-Days		<u>n, in</u>				
		<u>Zone</u> <u>4</u> ≤ <u>3000</u>	<u>Zone 5</u> <u>3000 to</u> <u>3999</u>	<u>Zone 6</u> <u>4000 to</u> <u>4999</u>	<u>Zone</u> <u>7A</u> <u>5000 to</u> <u>5999</u>	<u>Zone</u> <u>7B</u> 6000 to <u>6999</u>	<u>Zone</u> <u>8</u> ≧ 7000
			<u>Ene</u>	rgy Conse	rvation Po	<u>ints</u>	
	Airtightness Levels from	Table 9	9.36.6.3/	<u> (PCF 16</u>	<u>10)</u>		
	1 (2.5 ACH50)	=	=	=	=	=	=
	<u>2</u> (2.0 ACH50)	<u>2.0</u>	<u>3.4</u>	<u>3.5</u>	<u>4.6</u>	<u>6.1</u>	<u>6.1</u>
	<u>3</u> (1.5 ACH50)	<u>4.0</u>	<u>6.7</u>	<u>7.0</u>	<u>9.3</u>	<u>12.1</u>	<u>12.11</u>
	4 (1.0 ACH50)	<u>5.9</u>	<u>10.1</u>	<u>10.5</u>	<u>13.9</u>	<u>18.0</u>	<u>18.0</u>
	<u>5</u> (0.6 ACH50)	<u>7.6</u>	<u>13.0</u>	<u>13.4</u>	<u>17.8</u>	<u>22.7</u>	<u>22.7</u>

Example: Tier 2 = min.10 ECM points

ECM points for:

Service Water Heating Equipment

Building Volume ECM Points

Volume m3	ECM points	Volume m3	ECM points
380 < V ≤ 390	1	330 < V ≤ 340	6
370 < V ≤ 380	2	320 < V ≤ 330	7
360 < V ≤ 370	3	310 < V ≤ 320	8
350 < V ≤ 360	4	300 < V ≤ 310	9
340 < V ≤ 350	5	V ≤ 300	10

NBC 9.36. Energy Efficiency for Housing & Small Buildings 9.36.7. <u>PRESCRIPTIVE</u> Tiered-Energy Compliance Path

Energy Performance Improvement Tier	Overall Energy Performance Improvement of Building Relative to 9.36.2-9.36.4	Minimum Sum of Energy Conservation Points
1	0%	=
2	10%	10
3	20%	TBD
4	40%	TBD

- ✓ Points-based system
- Builders pick from a "menu" a.k.a. called energy conservation measures (ECMS's)
 - Above-grade and below-grade walls
 - Fenestrations and doors
 - Airtightness levels
 - Water heaters
 - HRV performance
- $\checkmark~$ Each ECM with corresponding points
- ✓ HRV mandatory

What does it mean to all Manitobans and Canadians?



How can you participate?

National Research	Council Canada Canad
Valional Nesearch	
Programs and services Areas of	f R&D Research facilities Publications Careers About the NRC
ome > Programs and services > Technical a	and advisory services > Codes Canada > Public reviews on proposed changes to Codes Canada publications
Programs and services	Public reviews on proposed changes to Codes Canada publications
Research collaboration NRC research programs Technical and advisory services	The public review process provides an opportunity for the public to take a detailed look at proposed changes and to comment on each one as to whether it should be approved, altered, or rejected.
Codes Canada About Codes Canada	Once proposed changes to Codes Canada publications are recommended by the appropriate Standing Committee(s), the Canadian Commission on Building and Fire Codes invites Code users and stakeholders to participate in the review of those changes during year of the second stakeholders to participate of the second stakeholderstakeholders to participate of the second sta
Public review	public reviews held in the fall. (As the provinces and territories sometimes hold their own public reviews on proposed changes to provincial or territorial codes, please check with your provincial or territorial ministry responsible for construction codes.) When
Code seminars	necessary, public reviews may also be held at other times of the year. All public reviews are broadly announced in Construction
Codes Canada 2015: Significant technical changes	Innovation, NRC Construction's newsletter, and through e-mail notification. The proposed changes are posted on-line for a two-mon period.
Request a code change	
Technical enquiries	
Online testates	Important: The 2018 public review is now closed.
Online training	The next Public Review is currently scheduled for fall 2010
Provincial/territorial ministries	The next Public Review is currently scheduled for fair 2019.

How can you participate?

C A https://www.nrc-cr	rc.gc.ca/eng/solutions/advisory/codes_centre/code_change_form.html	\$	
Government Gouvernement of Canada du Canada		Canada.ca Services Departments Fra	
National Research Co	uncil Canada	Canac	
Programs and services Areas of R&D	Research facilities Publications Careers About the NRC		
Home > Programs and services > Technical and advi	sory services > Codes Canada > Request a code change > Code change request form		
Programs and services	Code change request form		
Research collaboration			
NRC research programs	Note	Related links	
Technical and advisory services	Free form toxt fields are limited to 5000 characters in length	Privacy notice statement	
Codes Canada	Free form text fields are innited to 5000 characters in length.	Guidelines for requesting changes to	
About Codes Canada		Codes Canada publications	
Public review			
Code seminars			
Codes Canada 2015: Significant	Contact information		
Request a code change	Salutation (required)		
Technical enquiries	Choose •		
Online training			
Provincial/territorial ministries	First name (required)		
Model code adoption across Canada			
Canadian Commission on Building and	Middle initial(s)		

How can you participate?



For more information:

Norman A. Garcia, P.Eng. (he/him/his) Engineer Inspection and Technical Services Municipal Relations, Province of Manitoba norman.garcia@gov.mb.ca 508-401 York Ave., Winnipeg, MB R₃C oP8



References

- https://www.gov.mb.ca/mr/pubs/bill38_guide.pdf
- <u>http://publications.gc.ca/collections/collection_2017/eccc/En4-294-2016-eng.pdf</u>
- <u>https://www.cfta-alec.ca/wp-content/uploads/2020/11/Construction-Codes-Summary-RA-2019.pdf</u>
- <u>https://www.efficiencycanada.org/what-you-need-to-know-about-the-new-building-codes/</u>
- <u>https://ecbcs.org/Data/Sites/1/media/docs/td1911/ebc-technical-day-november-2019-meli-stylianou.pdf</u>
- <u>https://www.reminetwork.com/articles/canada-wavers-on-airtightness-testing/</u>
- <u>https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/Net%2oZero%2oEnergy</u>
 <u>%2oPilot%2oLessons%2oLearned%2oFINAL%2oEN.pdf</u>