

Proposed Ontario Building Code Harmonization:

Moving from SB12 2017 to NBC 936 2020

A panel discussion



CACEA

Canadian Association of
Consulting Energy Advisors



Our Mission

To support a sustainable profession of successful and credible Canadian Energy Advisors (EA).

Our Mandate

Ensure credible, skilled members and be a valued, respected sector partner.

Our Members

Includes EAs, suppliers, stakeholders and allies, and those in the process of becoming registered EAs.

Members across Canada access to:

- **knowledge and information;**
- a **supportive network;**
- a **unified voice** to influence change; and
- **discounts** to equipment, training, and more.

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*CACEA promotes sustainable building practices and contributes to the following
Canadian Home Labeling Programs:*



THE OWENS CORNING BUILDING SCIENCE TEAM



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WESTERN CANADA

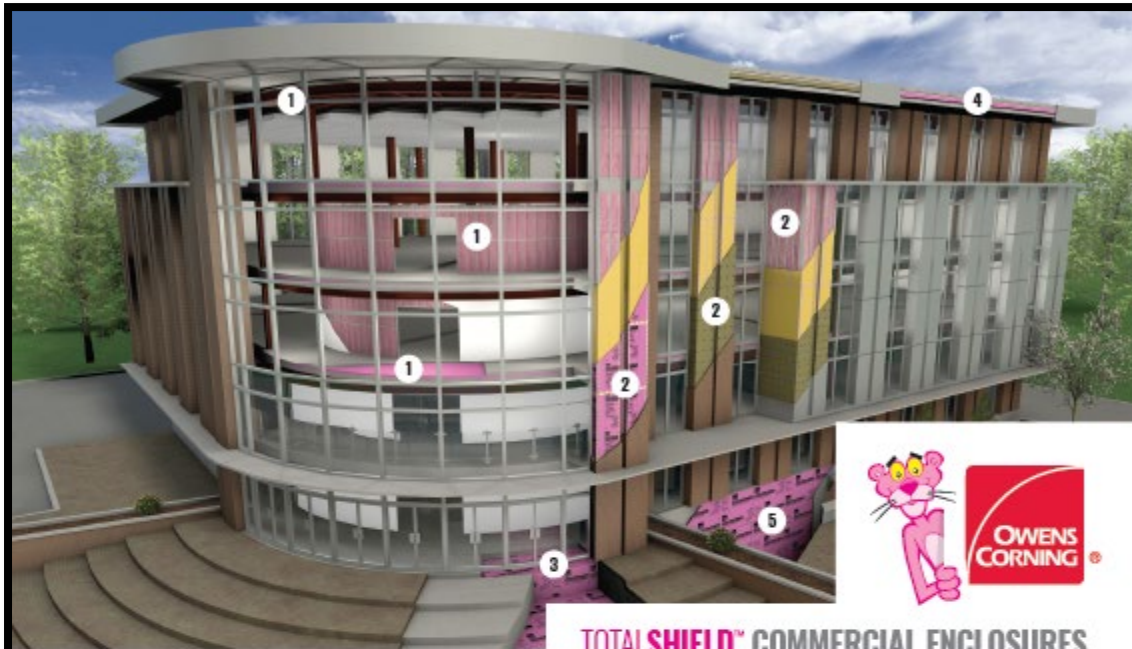
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FOAMULAR® NGX™ C-300 Extruded
Polystyrene Rigid Insulation

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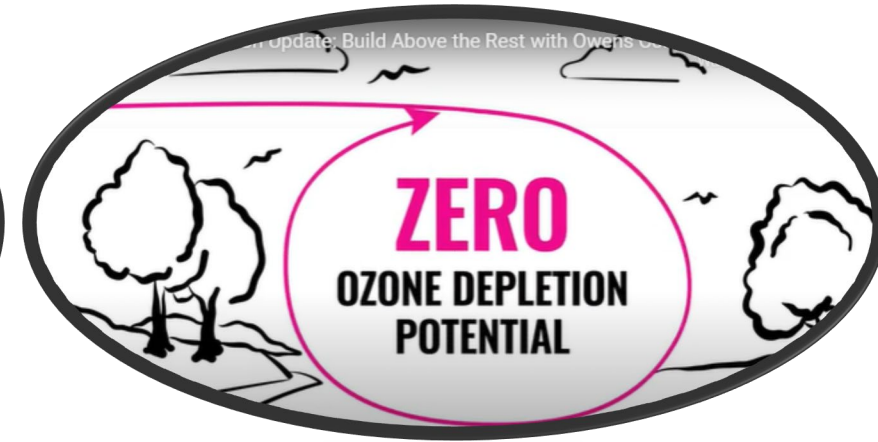
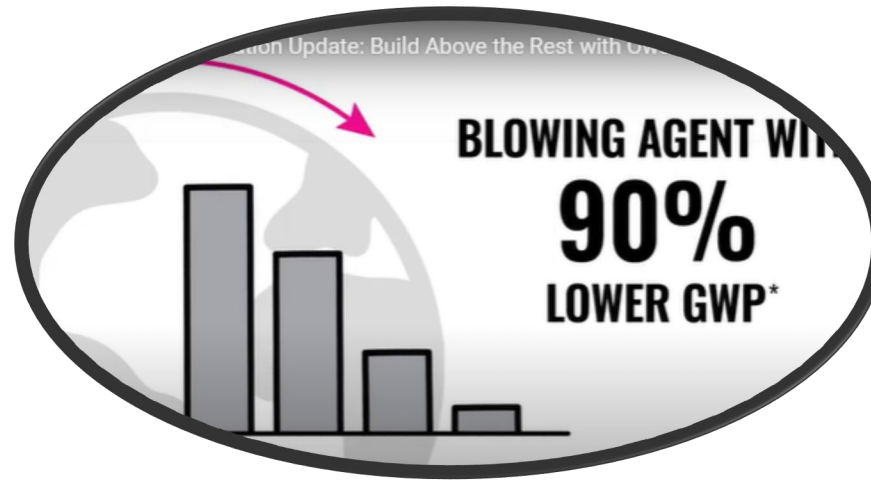
HIGHEST RECYCLED CONTENT IN THE INDUSTRY²

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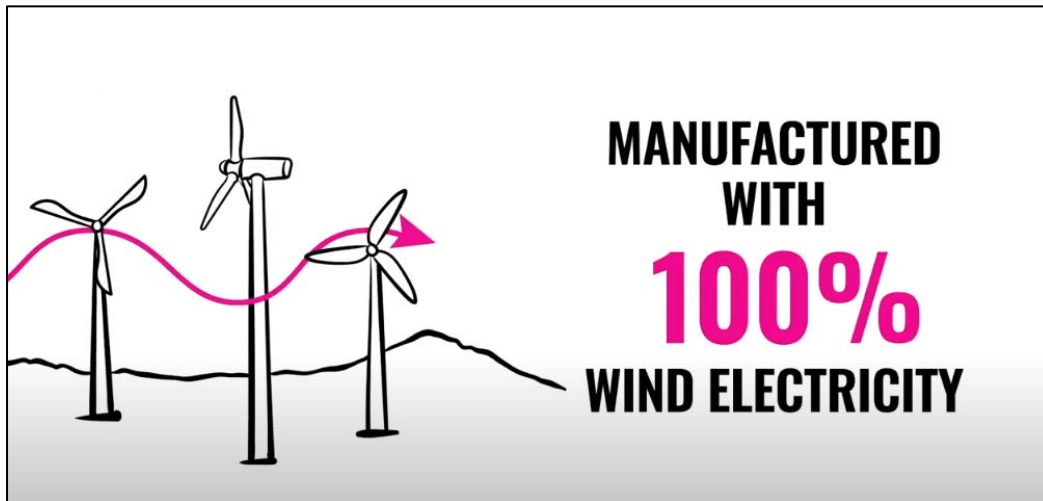
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Your
Facilitator



Andy Oding REA

Vice President and Director, Building Science
Building Knowledge Canada

Agenda

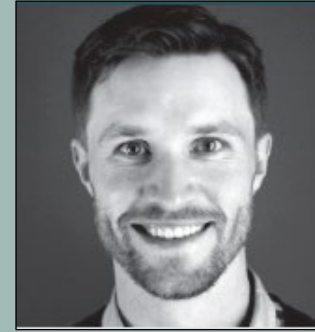
- Introduction of the Panelists
- Brief Overview of NBC 936 2020
- CACEA Professional Energy Advisors and Industry Experts Discussion
- Questions

CACEA Professional Energy Advisors and Industry Experts



Angela Bustamante
REA

Director, Technical Services
and Quality Assurance
Building Knowledge Canada



Mark Rosen
REA

Owner
Building Energy Inc.



Dave Potter

Building Code Course
Instructor
Ontario Building Officials
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Miyoko Oikawa
REA

Manager, Research and
Innovation,
Doug Tarry Home

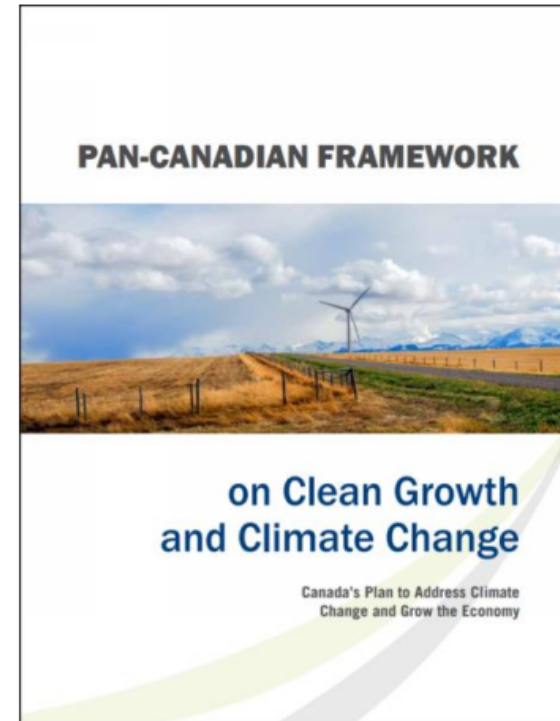


Jack Zhou
REA

Managing Partner
A & J Energy Consultants

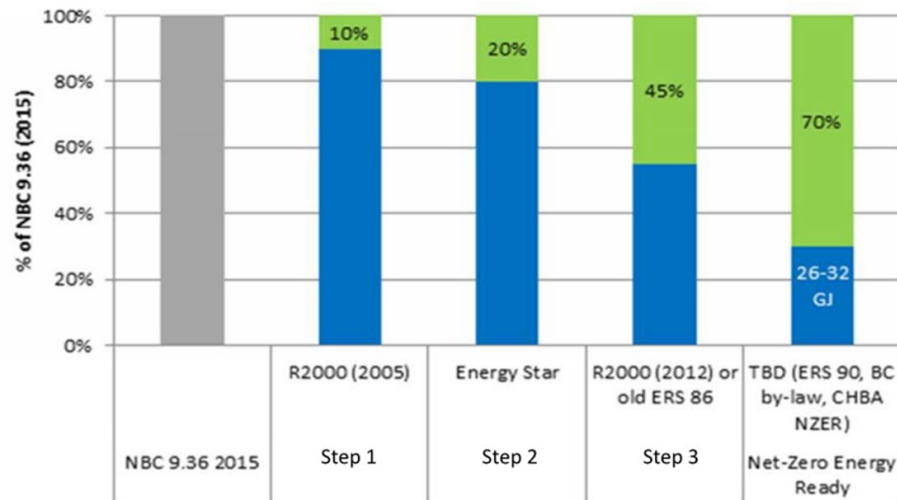
Pan-Canadian Framework

Provinces and territories adopt “net-zero energy ready new construction” in model building code by 2030 and agree to improve energy efficiency of existing housing and buildings



Housing and Small Buildings

Housing and Small Building Conceptual Performance Improvement



Direction given by the CCBFC in the Long Term Energy Strategy to develop a tiered energy code:

- Laying out a pathway to net zero energy ready
- Focused on reducing loads, silent on electricity generation.

Development falls under SCEE, whose scope covers both NBC 9.36 and the NECB.



CODES CANADA
Build on expertise

Most of the Provinces and Territories have adopted NBC 9.36:

- British Columbia – NBC 9.36 + BC Step Code.
- Alberta – NBC 9.36.
- Saskatchewan – NBC 9.36.
- Manitoba – NBC 9.36.
- Ontario – Ontario energy code SB-12.
- Quebec – Quebec energy code .
- New Brunswick – NBC 9.36
- Prince Edward Island – NBC 9.36
- Nova Scotia – NBC 9.36
- Newfoundland (organized municipalities) – NBC 9.36.
- Yukon, North West Territories, Nunavut – NBC 9.36.

Winter 2022 OBC Energy Code Update: Public Review : Energy Efficiency in Homes and Small Buildings – Harmonization with 2020 NBC Tiered Energy Code 9.36

Background:

ON MMAH Executive Summary Notes

- While the Building Code will change to be increasingly harmonized, and the code development process will change in accordance with the **Reconciliation Agreement on Construction Codes under the Canadian Free Trade Agreement**, Ontario will continue to uphold high standards and leading practices for construction, and offer design flexibility through objective-based design solutions.
- Greater harmonization with the National Construction Codes will **help to maintain the competitiveness of Ontario's construction sector and reduce inter-provincial barriers for Ontario's manufacturers and distributors of building, plumbing and fire safety components**

THE PROPOSED 2020 TIERED ENERGY CODE PART 9.36

OBSERVATIONS FROM AN ONTARIO PERSPECTIVE

Table [9.36.6.2.]

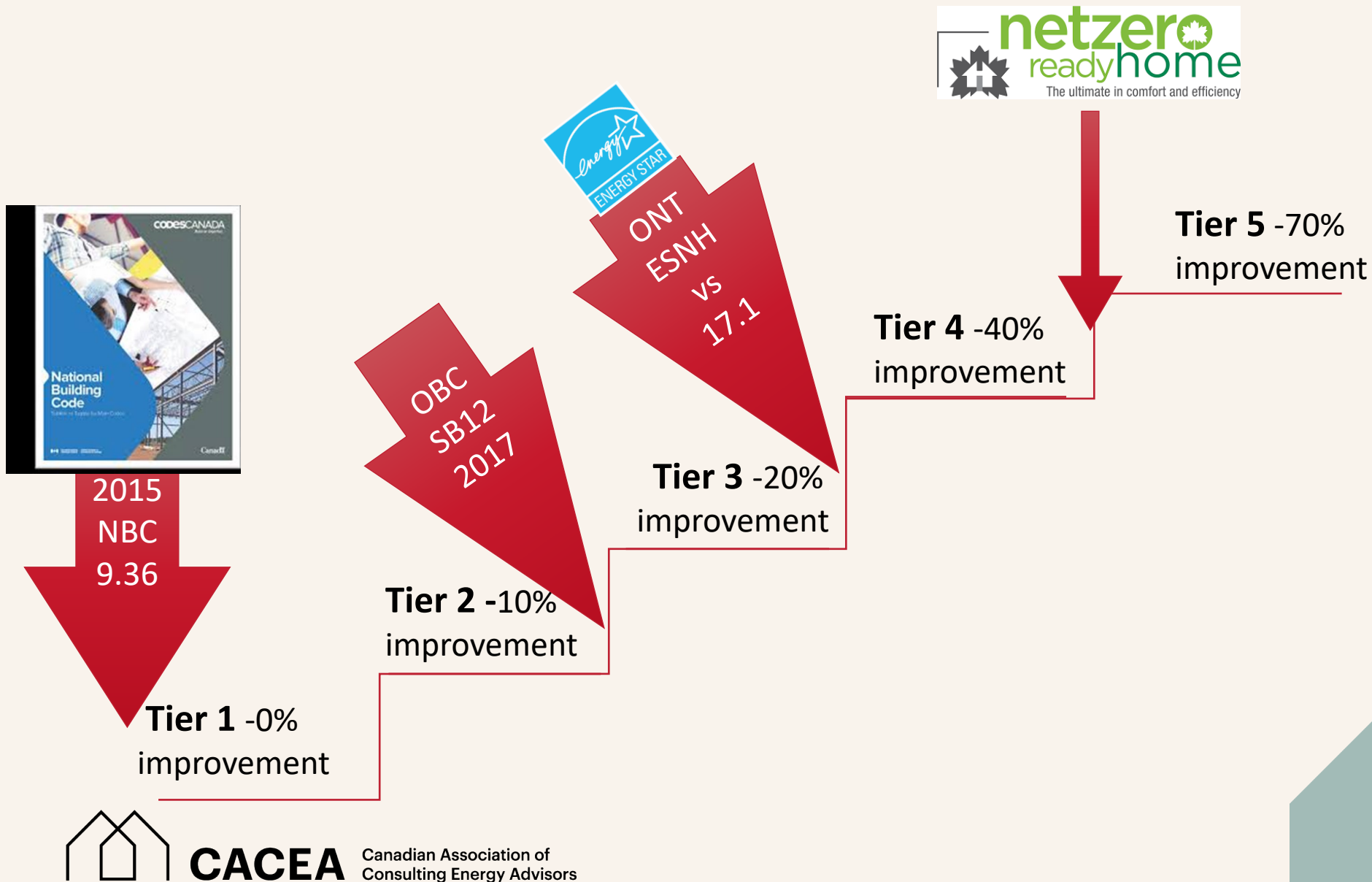
Energy Performance Tiers for *Buildings* or Houses
Forming Part of Sentence 9.36.6.2.(1)

		Applicable Energy Performance Tier					
Volume V _T	Target Metrics		1	2	3	4	5
> 300 m ³ and where volume is not determined	Percent Heat Loss Reduction (1)		n/a	≥ 5%	≥ 10%	≥ 20%	≥ 40%
	or	Percent Improvement (2)	≥ 0%	≥ 10%	≥ 20%	≥ 40%	≥ 70%
		Percent House Energy Target (3)	≤ 100%	≤ 90%	≤ 80%	≤ 60%	≤ 30%
≤ 300 m ³	Percent Heat Loss Reduction (1)		n/a	≥ 0%	≥ 5%	≥ 15%	≥ 25%
	or	Percent Improvement (2)	≥ 0%	≥ 0%	≥ 10%	≥ 30%	≥ 60%
		Percent House Energy Target (3)	≤ 100%	≤ 100%	≤ 90%	≤ 70%	≤ 40%

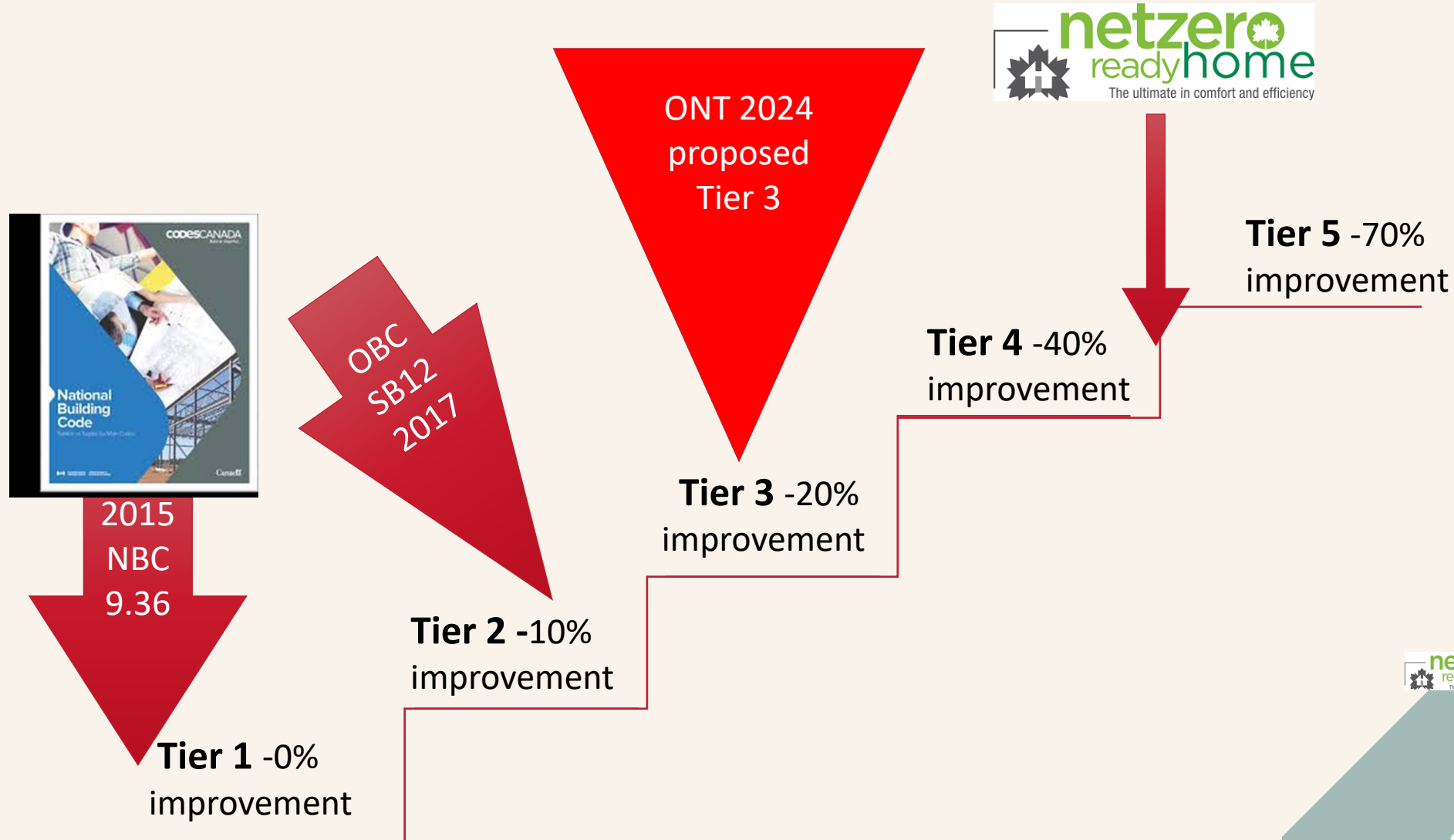
ENVELOPE
TARGET

TOTAL ENERGY
TARGET

OBC SB12 2017 vs Proposed NBC 2020 Tiered Energy Code Part 9.36



OBC SB12 2017 vs Proposed NBC 2020 Tiered Energy Code Part 9.36



THE PROPOSED 2020 TIERED ENERGY CODE PART 9.36 AN ONTARIO PERSPECTIVE

Important considerations:

- Ontario MMAH has indicated intent to harmonize SB12 with NEW 2020 Tiered 9.36, 18-22 months from date of publication. **This means potential adoption in 2024-2025.**
- Administration and adoption of specific minimum tiers is the **responsibility of the Province** (not Codes Canada)
- Air tightness is **NOT mandatory**. It is optional.
- **Small homes**(300m³>) are given reduced targets or credits
- **WINDOWS/COOLING LOADS AND SHGC**: Added cooling load metric – the peak cooling load of the proposed cannot exceed that of the reference house.
- **Occupant loads** (lights and appliances) have been removed from total annual energy calculations.
- **More compliance options** than current NBC 2015 and OBC SB12 2017

THE PROPOSED 2020 TIERED ENERGY CODE PART 9.36 AN ONTARIO PERSPECTIVE

Important considerations:

- Ontario MMAH has indicated intent to work with industry through 2022-23
- Has identified Tier 3 (Part 9) to the “exclusion of all other tiers”
- Air tightness targets are changed to match current OBC 2017 SB12 (3.0ACH / 3.5ACH)
- No mandatory Drain Water Heat Recovery
- May be open to developing some prescriptive “packages”

Implementation timing is the biggest concern.

Compliance with Proposed NBC 9.36 2020: Three Options

1. Tiered Prescriptive Path 9.36.7: point based picklist, think ENERGY STAR BOP points (*ON MMAH proposing 20 ECM pts for Tier 3*)
2. EnerGuide for Homes: Use of embedded reference house with report generation for building officials
3. Performance: Use 3rd party energy modeling software that complies with IRC/NRCan requirements (section 9.36.5). Compare reference house vs proposed



Tiered Prescriptive Path 9.36.7: Point based picklist

Prescriptive Path

- Approach uses energy conservation measures which have energy conservation points.
- Similar to the ENERGY STAR for New Homes prescriptive BOPs, builders choose sufficient measures such that sum of points meets the Tier target.
- Approach enables flexibility and is easy to extend by including new measures in the future.
- HRVs are mandatory in this path, all other measures are optional.

<u>Table [9.36.6.2.] 9.36.6.2.</u> <u>Energy Performance Improvement Tiers</u>		
<u>Energy Performance Improvement Tier</u>	<u>Overall Energy Performance Improvement of Building Relative to Energy Performance Achieved through Compliance with Subsections 9.36.2. to 9.36.4.</u>	<u>Minimum Sum of Energy Conservation Points</u>
<u>1</u>	<u>≥ 0% (compliance with 9.36.2. to 9.36.4.) (1)</u>	<u>=</u>
<u>2</u>	<u>10%</u>	<u>10</u>
<u>3</u>	<u>20%</u>	<u>Reserved</u>
<u>4</u>	<u>40%</u>	<u>Reserved</u>
<u>Note to Table [9.36.6.2.] 9.36.6.2.</u> <u>(1) The building is in compliance with the baseline energy efficiency requirements; therefore, it has no conservation points associated with it.</u>		

Ontario proposes 20 pts for tier 3

Tiered Prescriptive Path 9.36.7

Let's go find 20 ECM pts for Tier 3

Windows and Doors

In other words ...

- Double pane ENERGY STAR Zone 2 rating = 3.6pts
- Triple pane (1.2U+SHGC .21<) OR ER 34 (U 1.4+SHGC 0.45) = 7.0pts



Table [9.36.7.5.1]
Energy Conservation Measures and Points for Fenestration and Doors ⁽¹⁾ ⁽²⁾

<u>Components</u>	<u>Energy Conservation Measure, reduced overall thermal transmittance</u>	<u>Heating Degree-Days of Building Location, in Celsius Degree-Days</u>					
		<u>Zone 4 < 3000</u>	<u>Zone 5 3000 to 3999</u>	<u>Zone 6 4000 to 4999</u>	<u>Zone 7A 5000 to 5999</u>	<u>Zone 7B 6000 to 6999</u>	<u>Zone 8 ≥ 7000</u>
		<u>Energy Conservation Points</u>					
<u>Fenestration and doors¹</u>	<u>Maximum U-value 1.60, or minimum ER² 25</u>	<u>1.9</u>	<u>1.8</u>	=	=	=	=
	<u>Maximum U-value 1.40, or minimum ER² 29</u>	<u>3.8</u>	<u>3.6</u>	<u>1.6</u>	<u>1.8</u>	=	=
	<u>Maximum U-value 1.20, or minimum ER² 34</u>	<u>6.9</u>	<u>7.0</u>	<u>4.6</u>	<u>5.5</u>	<u>3.2</u>	<u>3.4</u>

Tiered Prescriptive Path 9.36.7

Let's go find 20 ECM pts for Tier 3

Air Tightness

Table [9.36.6.3.-B]

Air Leakage Rates for Attached Zones Tested Using the Unguarded Parameter
Forming Part of Sentences 9.36.6.3.(3) and (6)

<u>Airtightness Level</u>	<u>Air Leakage Metric</u>				
	<u>ACH₅₀</u>	<u>NLA₄₀</u>		<u>NLR₅₀</u>	
		<u>cm²</u>	<u>in.²/100 ft.²</u>	<u>L/s · m²</u>	<u>cfm₅₀/ft.²</u>
	<u>Air Leakage Rates</u>				
<u>1</u>	<u>3.0 (1)</u>	<u>1.92</u>	<u>2.76</u>	<u>1.17</u>	<u>0.23</u>
<u>2</u>	<u>2.5</u>	<u>1.6</u>	<u>2.3</u>	<u>0.98</u>	<u>0.19</u>
<u>3</u>	<u>2.0</u>	<u>1.28</u>	<u>1.84</u>	<u>0.78</u>	<u>0.15</u>
<u>4</u>	<u>1.5</u>	<u>0.96</u>	<u>1.38</u>	<u>0.59</u>	<u>0.12</u>
<u>5</u>	<u>1.0</u>	<u>0.64</u>	<u>0.92</u>	<u>0.39</u>	<u>0.077</u>
<u>6</u>	<u>0.6</u>	<u>0.38</u>	<u>0.55</u>	<u>0.23</u>	<u>0.046</u>

Energy Conservation Measures for
Airtightness – Airtightness Levels (1)

Heating Degree-Days of Building Location, in
Celsius Degree-Days

<u>Zone</u>	<u>Zone 5</u>	<u>Zone 6</u>	<u>Zone</u>	<u>Zone</u>	<u>Zone</u>
<u>4</u>	<u>3000 to</u>	<u>4000 to</u>	<u>7A</u>	<u>7B</u>	<u>8</u>
<u>≤</u>	<u>3999</u>	<u>4999</u>	<u>5000 to</u>	<u>6000 to</u>	<u>≥</u>
<u>3000</u>			<u>5999</u>	<u>6999</u>	<u>7000</u>
<u>Energy Conservation Points</u>					

Airtightness Levels from Table 9.36.6.3.-B (PCF 1610)

<u>1</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>
<u>2</u>	<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>	<u>4.0</u>	<u>6.7</u>	<u>7.0</u>	<u>9.3</u>	<u>12.1</u>	<u>12.11</u>
<u>4</u>	<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>	<u>7.6</u>	<u>13.0</u>	<u>13.4</u>	<u>17.8</u>	<u>22.7</u>	<u>22.7</u>

In other words ...

- 2.5ach = 3.4 pts
- 1.5ach = 10.1 pts
- 0.6ach = 13.0 pts

Tiered Prescriptive

Path 9.36.7

Let's go find 20ECM
pts for Tier 3

Above grade walls

RSI 3.08 = Reff 17.5

RSI 3.69 = Reff 21 = R22 + R5ci

In other words...

- 2x6 w R22 = 1.4pts
- 2x6 w R20 + R5ci = 5.4 pts
- 2x6 w R22 + R5ci = 6.0 pts
- 2x6 w R20 + R10ci = 9.3 pts

Table [9.36.7.4.]
Energy Conservation Measures and Points for Above-Ground Opaque Assemblies ⁽¹⁾

Above-Ground Opaque Building Assembly	Energy Conservation Measure, Increased thermal insulation	Heating Degree-Days of Building Location, in Celsius Degree-Days					
		Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000 to 4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 ≥ 7000
		Energy Conservation Points					
Walls ¹	RSI 2.97 effective	2.0					
	RSI 3.08 effective	3.2	1.4	1.6	2.1		
	RSI 3.69 effective	7.4	5.4	6.2	6.7	5.4	5.2
	RSI 3.85 effective	8.2	6.0	6.9	7.4	6.2	6.0
	RSI 3.96 effective	8.9	6.8	7.7	8.2	7.0	6.8
	RSI 4.29 effective	10.2	8.1	9.2	9.7	8.6	8.4
	RSI 4.40 effective	10.8	8.7	9.9	10.3	9.3	9.1
	RSI 4.57 effective	11.4	9.3	10.6	11.1	10.1	9.9
	RSI 4.73 effective	11.9	9.7	11.1	11.5	10.6	10.4
	RSI 4.84 effective	12.3	10.2	11.6	12.1	11.2	10.9
	RSI 5.01 effective	12.9	10.7	12.2	12.7	11.8	11.6
	RSI 5.45 effective	14.0	11.9	13.6	14.0	13.3	13.1

AN *EXAMPLE* ZONE 5-6 (Toronto-Ottawa)

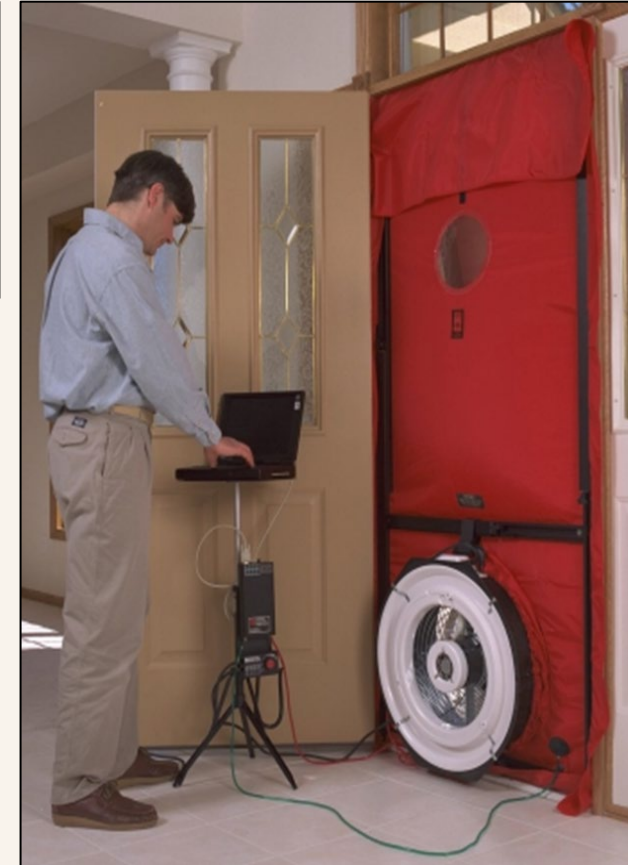
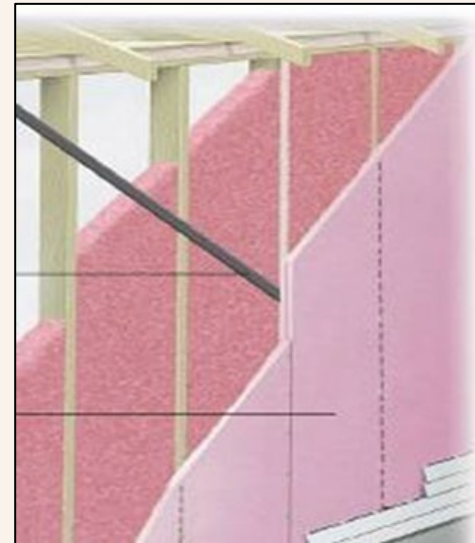
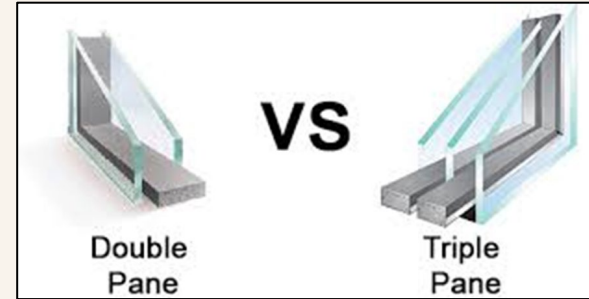
Tier **3+** *NBC 2020*

Attic: R60 +
Walls: 2X6 R22 + R5ci
Below Grade Walls: R22 BATT + R5ci
Below Grade Slab: NR
Windows: 1.2U> (TRIPLE ? Maybe...)

Air Tightness: 2.5 ACH50 Attached /
3.0 ACH50 Detached <

HVAC:

- RIGHT SIZED Nat Gas 96% < Furnace
- HRV/ERV
- >.95 UEF NAT GAS CONDENSING HOT WATER
- DWHR ? ...TBD



Why is the Proposed 9.36 Upper TIER 5 NBC a Concern ?

- Tier 5 = 3x or 4x cost of Tier 4. Why?
- Is Tier 5 beyond Net Zero Ready and even Net Zero?

Table 2: Estimated per-unit incremental costs relative to NBC 9.36 prescriptive requirements.

		Electrically-heated homes (\$/unit)					Gas-heated homes (\$/unit)				
		Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Single	Attached	-400	200	2,600	5,600	20,200	-200	1,500	2,000	5,100	18,000
	Detached	-800	1,200	3,900	10,200	30,100	-600	2,100	3,600	8,900	30,800
MURB	Quad-plex	-500	1,200	3,900	5,400	23,000	-600	2,800	3,500	5,400	14,500
	10-unit	-1,900	1,600	2,100	3,500	14,700	-2,000	900	2,400	3,200	13,900

2018-2019 Costing study of tiers provided to Standing Committee EE

What Does Tier 4 and Tier 5 Look Like When Applied to an Ontario SD Home?

TIER 4



2000sqft SD Zone 5, Toronto ALL ELECTRIC

R60 Attic

R50 Cathedral

AG Wall 2x6 @ w/ R20 Batts + R7.5 Ci

EXP Floor R40

Basement 2x4 w/ R22 + R7.5 Ci

R10 under entire slab,

Triple 1.2U.- Zone 3 SHGC .40>

1.5 ACH @ 50Pa (Level 3)

75 SRE + ECM Motor (30 Watts) HRV/ERV

Air Source Heat Pump (HSPF 8.7 SEER 21) with Electric Backup/Elec Furnace

Heat Pump Water Heater 2.5 < COP

47% DWHR (2 Showers)

ENERGY STAR certified DW/CW/FR

100% LED or CFL

ENV: 36 % / TE: 60%

UPGRADE COST TIER 4 -TIER 5
\$16,000

- 1200kWh/4.3GJ reduction per year
- \$150 annual electric savings
- 0.04 tonnes GHG emissions reduction per year

TIER 5

2000sqft SD Zone 5, Toronto ALL ELECTRIC

R80 Attic

R50 Cathedral

AG Wall 2x6 @ w/ R20 Batts + **R15 Ci**

EXP Floor R40

Basement 2x4 w/ R22 + **R15 Ci**

R10 under entire slab,

Triple **0.9 U.**- Zone 3 SHGC .40>

0.6 ACH @ 50Pa (Level 5)

81% SRE + ECM Motor (30 Watts) HRV/ERV

Air Source Heat Pump (**HSPF 11 SEER 23**) with Electric Backup/Elec Furnace

Heat Pump Water Heater **3.5 < COP**

67% DWHR (2 Showers)

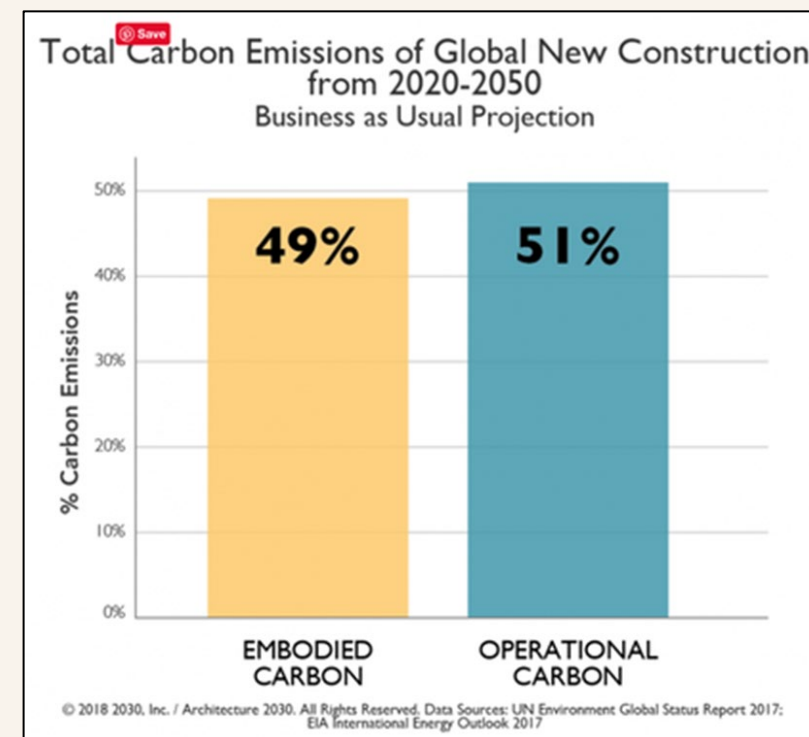
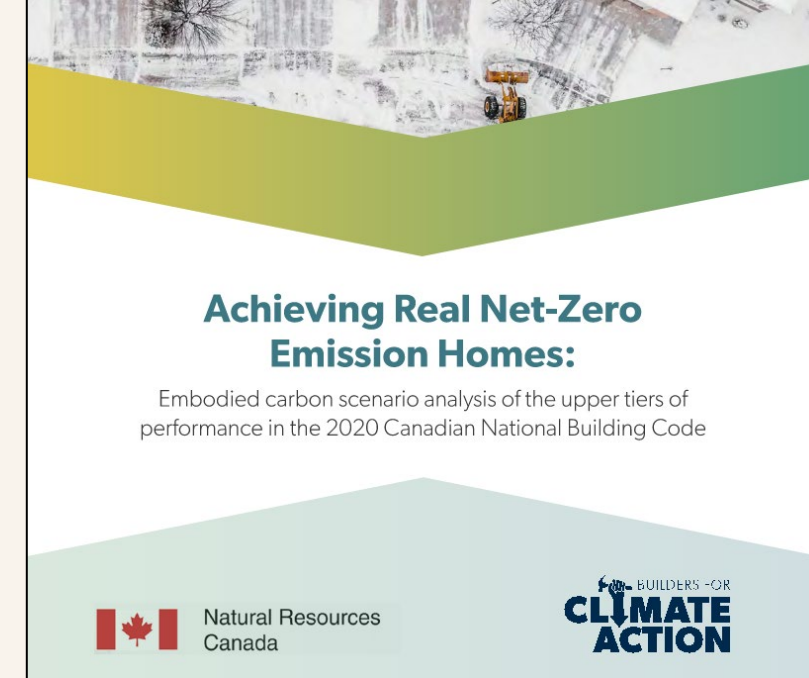
NA ENERGY STAR certified DW/CW/FR

NA 100% LED or CFL

ENV: 41 % / TE: 70%

The increase of 93 kg CO₂e/m² in MCE between Tier 3 to Tier 5 for the high carbon material selection (HCM) model presents a cautionary warning that the pursuit of energy efficiency without consideration of material emissions can cause dramatic increases in overall emissions.

<http://endeavourcentre.org/>



The Experts Weigh In



The integration of 9.36 NBC 2020 is very aggressive timing.

Given the incredibly tight timelines, what are 2 key, critical deliverables that you feel need to be part of the "critical path" to launching?

As REA and CACEA qualified professionals, are you already working with builders/developers to assess impact of Tier 3.

What are positive points you've heard ?

What are concerns you've heard from your clients?

What technologies or solutions do you feel will need to be part of a builder's specifications , moving ahead to Tier 3 and beyond?

What technologies or solutions do you feel will need to be part of a builder's specifications , moving ahead to Tier 3 and beyond?

The Administration part of the code is left to the Provinces and Territories.

This said, who are the professionals equipped to provide support developing compliance with 9.36 (e.g. prescriptive OR performance modeling, etc.)

As professional qualified energy advisors, what sets CACEA professionals apart from others?

Questions?

Thank you