Introduction to the NECB

We will cover;

– Scope/Structure of the NECB
– Application/Compliance Paths

We will touch on;

– Roles and Responsibilities
– Possible concerns/Approvals
Presenter

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National Energy Code for Buildings
National Energy Code for Buildings
(maybe) it ain’t no big thing...
National Energy Code for Buildings is about building a better cow.
**better: bet-er**

*noun*

– 1. of superior quality or excellence: *a better coat; a better speech.*

– 2. morally superior; more virtuous: *They are no better than thieves.*

– 3. of superior suitability, advisability, desirability, acceptableness, etc.; preferable: *a better time for action.*

– 4. larger; greater: *the better part of a lifetime.*
better why?
better why?

- HVAC: 51%
- Lighting: 25%
- Office Equipment: 3%
- Refrigeration: 2%
- Computers: 1%
- Other: 7%
- Water Heating: 2%
better where?

NECB is applicable to;

- ALL new buildings
  - Group A, B, and F1
- ALL new buildings greater than 600m² or exceeding 3 storeys
  - Group C, D, E, F2, and F3
- Additions
- Section 9.36? Yup...
better where?

NECB is NOT applicable to;

- farm buildings
- renovations (mostly...)
better how?

NECB has three modes of compliance;

– Prescriptive
  (do this. don’t do that...)

– trade off; simple and detailed
  (I want to do this, and will do that instead...)

– energy performance compliance path
  (I am doing this because the computer model says I can)
better how?

NECB Div B Appendix A-1.1.2.1.
better how? - simplified

1. prescriptive
2. simple trade off
3. detailed trade off

energy performance compliance

More expertise needed
better how? - simplified

Prescriptive

ADAPTIVE TO T.O.

Envelope: Minimum RSI values for floors, roofs and walls.

Mechanical: Minimum equipment efficiencies + duct insulation

Lighting: Maximum Lighting Power Density (LPD) for installed lighting (whole building or space-by-space) + controls

Electrical Power Sys: Monitoring and motors primarily

Service Water: Minimum equipment efficiency standards + controls + piping insulation

Simple Trade Off

ENVELOPE LIMITED

Envelope: Area x U-value calculation performed; wall for wall, roof for roof. Windows are permitted in this calculation

Mechanical: Formula for "HVAC Trade-Off index"

Lighting: Calculation of Installed Interior Lighting Energy (IILE)

Electrical Power Sys: Monitoring and motors primarily

Service Water: Service Water Heating Trade Off index (SWH-TOI) formula provided

Detailed Trade Off

ENVELOPE LIMITED

Envelope: Area x U-value calculation modelled; windows, walls, and roofs. Requires ASHRAE 140 compliant software

Mechanical: ASHRAE 140 compliant model - proposed versus prescriptive

Lighting: ASHRAE 140 compliant model - proposed versus prescriptive

Electrical Power Sys: Monitoring and motors primarily

Service Water: ASHRAE 140 compliant model - proposed versus prescriptive

Performance Compliance

(MUTUALLY EXCLUSIVE)

Envelope: Area x U-value calculation modelled; windows, walls, and roofs. Requires ASHRAE 140 compliant software

Mechanical: ASHRAE 140 compliant model - proposed versus prescriptive

Lighting: ASHRAE 140 compliant model - proposed versus prescriptive

Electrical Power Sys: Monitoring and motors primarily

Service Water: ASHRAE 140 compliant model - proposed versus prescriptive

Defined Compliance

'Designed' Compliance
better who?

NECB uses conventional building systems;

- envelope
- lighting
- service water
- HVAC
- electrical Power systems

A
S
M
E
better who?

NECB uses conventional building systems;

- envelope
- lighting
- service water
- HVAC
- electrical Power systems
- performance modeling?
better what?

NECB increases energy efficiency

– 25% improvement in efficiency over MNECB 1997
– Similar level of performance to ASHRAE 90.1 – 2013*
– Does not address life safety, durability, energy source or renewable energy generation, or operations

*not equal...similar
better what?

In-scope of NECB;

• Part 3: envelope
• Part 4: lighting
• Part 5: HVAC
• Part 6: service water heating
• Part 7: electrical power systems
• Part 8: energy performance compliance
better what?

In-scope of NECB:

• Part 3: envelope
• Part 4: lighting
• Part 5: HVAC
• Part 6: service water heating
• Part 7: electrical power systems
• Part 8: energy performance compliance

SAME OLD STUFF
better what?

Part 3

Part 5

Part 6

Part 4

Part 7
better what?

Part 3: Building Envelope (cont.)

• Points of note;
  – ALL assemblies are Effective Thermal Resistance
    • NECB 2011 User’s Guide
    • ASHRAE Fundamentals

THIS MATTERS NOW...
better what?

Part 3: Building Envelope

- Points of note;
  - (virtually) **ALL** prescriptive values vary with climate zone

### NECB Table 3.2.2.2.
**Overall Thermal Transmittance of Above-ground Opaque Building Assemblies**

<table>
<thead>
<tr>
<th>Heating Degree-Days of Building Location, Celsius Degree-Days</th>
<th>Zone 4: &lt; 3000</th>
<th>Zone 5: 3000 to 3999</th>
<th>Zone 6: 4000 to 4999</th>
<th>Zone 7A: 5000 to 5999</th>
<th>Zone 7B: 6000 to 6999</th>
<th>Zone 8: ≥ 7000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Overall Thermal Transmittance (W/m² K)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walls</td>
<td>0.315 (R18)</td>
<td>0.278 (R20)</td>
<td>0.247 (R23)</td>
<td>0.210 (R27)</td>
<td>0.210 (R27)</td>
<td>0.183 (R31)</td>
</tr>
<tr>
<td>Roofs</td>
<td>0.227 (R21)</td>
<td>0.183 (R31)</td>
<td>0.183 (R31)</td>
<td>0.162 (R35)</td>
<td>0.162 (R35)</td>
<td>0.142 (R40)</td>
</tr>
<tr>
<td>Floors</td>
<td>0.227 (R21)</td>
<td>0.183 (R31)</td>
<td>0.183 (R31)</td>
<td>0.162 (R35)</td>
<td>0.162 (R35)</td>
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</tr>
</tbody>
</table>

**Note:**
- R-values are equivalent effective imperial thermal resistance values

### NECB Table 3.2.2.3 and 3.2.2.4.
**Overall Thermal Transmittance of Fenestration and Doors**

<table>
<thead>
<tr>
<th>Heating Degree-Days of Building Location, Celsius degree-days</th>
<th>Zone 4: &lt; 3000</th>
<th>Zone 5: 3000 to 3999</th>
<th>Zone 6: 4000 to 4999</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fenestration and Doors</td>
<td>2.4</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
<td>1.6</td>
</tr>
</tbody>
</table>
better what?

Part 3: Building Envelope (cont.)

• Points of note;
  – FDWR (Fenestration and Door to Wall Ratio) is a factor
  – FDWR is calculated dependent on climate

\[
FDWR \leq \frac{(2000 - 0.2 \cdot HDD)}{3000}
\]
Part 3: Building Envelope (cont.)

• Points of note;
  – FDWR (Fenestration and Door to Wall Ratio) is a factor
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\[
FDWR \leq \frac{(2000 - 0.2 \cdot HDD)}{3000}
\]
Part 3: Building Envelope (cont.)

• Points of note;
  – Includes interior spaces if ΔT greater than 10 °C
  – 2 trade-off paths; simple & detailed (these will be your friend…)
    • Simple Trade-off: hand calculations, like for like
    • Detailed Trade-off: computer model, anything for anything
  – Air leakage is coming; this version includes only components
  – Watch out for: spandrel panels, overhead doors, trade-off limitations
better what?

Part 4: Lighting

• Points of note;
  – Accounts for *installed* lights, ballasts, transformers, and controls
  – Calculations may be done by either Building Area or Space-by-Space methodologies (talk to your engineer...)
  – Automatic light controls required in most spaces, some daylighting controls
  – Exterior lights are included
  – Watch out for: calculations, energy trade-offs, lumens vs. watts
better what?

Part 5: Heating, Ventilation and Air Conditioning

• Points of note;
  – Covers sizing, installation, and equipment
  – Duct leakage covered
  – Pumping, piping, and controls – oh my!
  – Lots of minimum equipment efficiency standards to be found
  – Watch out for: trade-off calculations a little bit tricky, lots of tabled data to sort through; an engineer’s paradise
Part 6: Service Water Heating

• Points of note;
  – Covers efficiency, installation, and controls
  – Swimming pools included in this section
  – Trade-off calculations look more onerous than they really are
  – Combination heating / service water also covered
  – Watch out for: probably the simplest chapter, largely an equipment and sizing check
better what?

Part 7: Electrical Power Systems and Motors

• Points of note;
  – Monitoring of building systems for buildings distributing over 250 kVA
  – Individual suite/tenant electrical metering required
  – Mail it to your electrical engineer...
  – Watch out for: only prescriptive chapter without a trade-off path
better what?

Part 8: Building Energy Performance Compliance

• Points of note;
  – **MUST** use ASHRAE 140 compliant software
  – Proposed building must use the same or less energy than a building of the same shape, size, use, operation, and consumption profiles as a building built to prescriptive standard
  – Watch out for: **Can** use trade-offs on reference building; modeling assumptions are paramount
better when?

May 1, 2015
• Adoption

November 1, 2015
• In force
• May 1, 2016 – end of transition period
better help?

You are not in this alone...

NECB 2011 User’s Guide
• http://www.nrc-cnrc.gc.ca/ci-ic/article/v19n1-7

NRCan resources
• http://www.nrcan.gc.ca/energy/efficiency/buildings/eenb/codes/4043
So what?

An energy code;

• Is doing what we do more efficiently
• Requires design choices
• Needs an enforcement plan
• Has construction – & inspection – consequences
• Helps level the playing field
• Is an opportunity  (no, really. I am not kidding...)

So what?

An energy code;
• Makes cows smile