Linking Programs with Building Energy Codes

Meli Stylianou
With contributions from Anil Parekh, Chris McLennan and Ritzwan Ullah
National Energy Codes Responsibilities

NRCan - Office of Energy Efficiency
- Policy lead and funder
- Link to Provincial/Territorial engagement and adoption
- Lead on capacity building

NRC - Codes Canada
- Manages code development process
- Convenes committees, working groups, task groups

NRC - High Performance Buildings Research Team
- Provides expertise, analysis to support committee mandates
- Prepares proposed code change requests & justifications

NRCan - CanmetENERGY – Ottawa
- Develops new data, analysis methods, tools (HTAP, BTAP) to support NRC, codes committees
- Undertakes analysis as needed to complement NRC’s capacity

Housing: Section 9.36
Housing and Buildings

Housing
Section 9.36, NBC
- Building Envelope
- HVAC System
- Domestic Hot Water

Buildings
NECB
- Building Envelope
- Lighting
- HVAC System
- Domestic Hot Water
- Electrical Power System
Significant changes energy codes

1. Airtightness testing
2. Fenestration and door areas
3. Thermal transmittance of opaque assemblies and fenestration
4. Lighting
5. HVAC and service water heating
6. Tiered performance requirements
7. Alignment with EnerGuide system
EnerGuide Rating System (ERS)

- Rating system to assess and rank the energy efficiency of a home (similar to automobile fuel guide for highway and city driving or grade-report card)
- Based on the systems approach of ‘house as a system’ – includes all components and systems with their interdependent effects
- Applicable to low-rise residential buildings
- Predominantly considers fixed and permanent fixture of a home for energy evaluations (envelope components, space heating, hot water and ventilation systems)
Components of ERS

Standard Operating Conditions
- Three occupants
- Heating set-point of 21 °C / 19 °C
- Cooling at 25.6 °C
- 190 L of DHW per day at 55 °C
- Household electricity consumption of 19 kWh/day
- Ventilation rate 28 l/s for a period of 8 hrs/day
- 30-year average weather data

Reference House
- Same geometry as proposed house
- Windows area equally distributed
- Insulation and system efficiency as per the Code
- Standard Operating Conditions

ERS Rating

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources, 2019
Energy Efficiency Programs (Voluntary)

- Housing Energy Efficiency Program requirements are ‘additional’ set of stringent requirements. Local building code always take precedence.
- Housing – low-rise residential buildings (lower than 3-storeys and less than 600 m²)
  - Energy Star for New Homes
    - Focus on tract-builder mass market
    - Prescriptive with sets of builder-option choices; and performance path
    - Achieve 15% to 20% better than current code requirement
    - +25,000 homes every year (+16% of new construction)
  - R-2000 Standard
    - Leading-edge and performance based
    - Achieve 50% better than current code requirement
    - Very close to net-zero energy (NZR) ready target
    - ~250 to 350 certified homes every year
2015 National Building Code Part 9

• Part 9 deals with the housing (less than 3-storeys and 600 m² of footprint)
• NBC is a ‘model’ code for provinces and local jurisdictions.
• Energy efficiency requirements (Sec 9.36) include prescriptive and performance paths (+95% use prescriptive path approach)
### Proposed Tiered Performance Path 9.36.6

<table>
<thead>
<tr>
<th>Tier</th>
<th>Overall Energy Performance Improvement</th>
<th>Envelope Performance Improvement</th>
<th>Airtightness Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≥0%</td>
<td>N/A</td>
<td>Test only</td>
</tr>
<tr>
<td>2</td>
<td>≥10%</td>
<td>≥5%</td>
<td>2.5 / 3.0 ACH</td>
</tr>
<tr>
<td>3</td>
<td>≥20%</td>
<td>≥10%</td>
<td>2.5 / 3.0 ACH</td>
</tr>
<tr>
<td>4</td>
<td>≥40%</td>
<td>≥20%</td>
<td>1.5 / 2.0 ACH</td>
</tr>
<tr>
<td>5</td>
<td>≥70%</td>
<td>≥50%</td>
<td>1.5 / 2.0 ACH</td>
</tr>
</tbody>
</table>
Code and Programs

EnerGuide Rating Scale, GJ/yr

Example

- **90**: 2015 NBC Code
- **72**: ENERGY STAR™ for Home Standard
- **45**: R-2000 Standard
- **0**: R-2000 Net Zero Standard

Model Code – regulation

- **20%** better than Code -> A prescriptive energy performance brand
- **50%** better than Code -> A leading-edge, best in class performance brand for premier builders
- **Net-zero** -> A best-in-class, performance brand for innovative builders

Proposed Code

- **Step 3**: 20% better than Code
- **Step 4**: 50% better than Code
- **Step 5**: Net-zero
Tiered Prescriptive Path 9.36.7

- Prescriptive approach uses a points-based system
- Builders choose from a list of energy conservation measures (ECMS), each ECM receives points.
- Choose enough ECMs to reach the compliance target: 10% Tier 2 needs 10 points.
- Currently have ECMs for above and below grade walls, tested airtightness, water heaters, HRV performance, small dwellings.
- HRVs are mandatory.
Next Steps

• Changes go for pre-public review (for input from the Provinces and Territories)
• Changes go for public review (January 2020)
• Codes committee reviews and modifies (if necessary)
• Post public review (Provinces and Territories review once more)
• Decision from the Canadian Commission on Building and Fire Codes
• Codes are published (~2021)
While that is happening…

- Process to develop code for alterations to existing building starts…