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Linking Programs with Building Energy Codes

Meli Stylianou

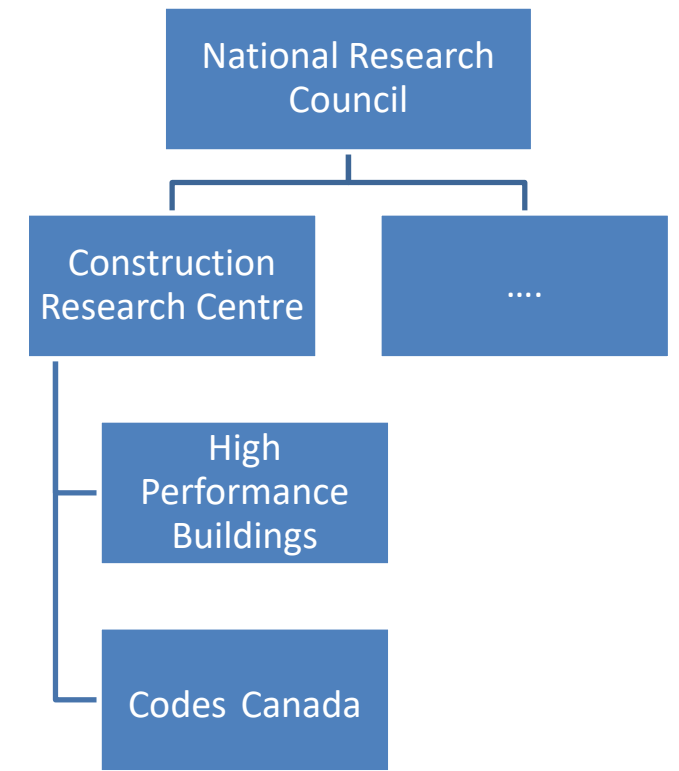
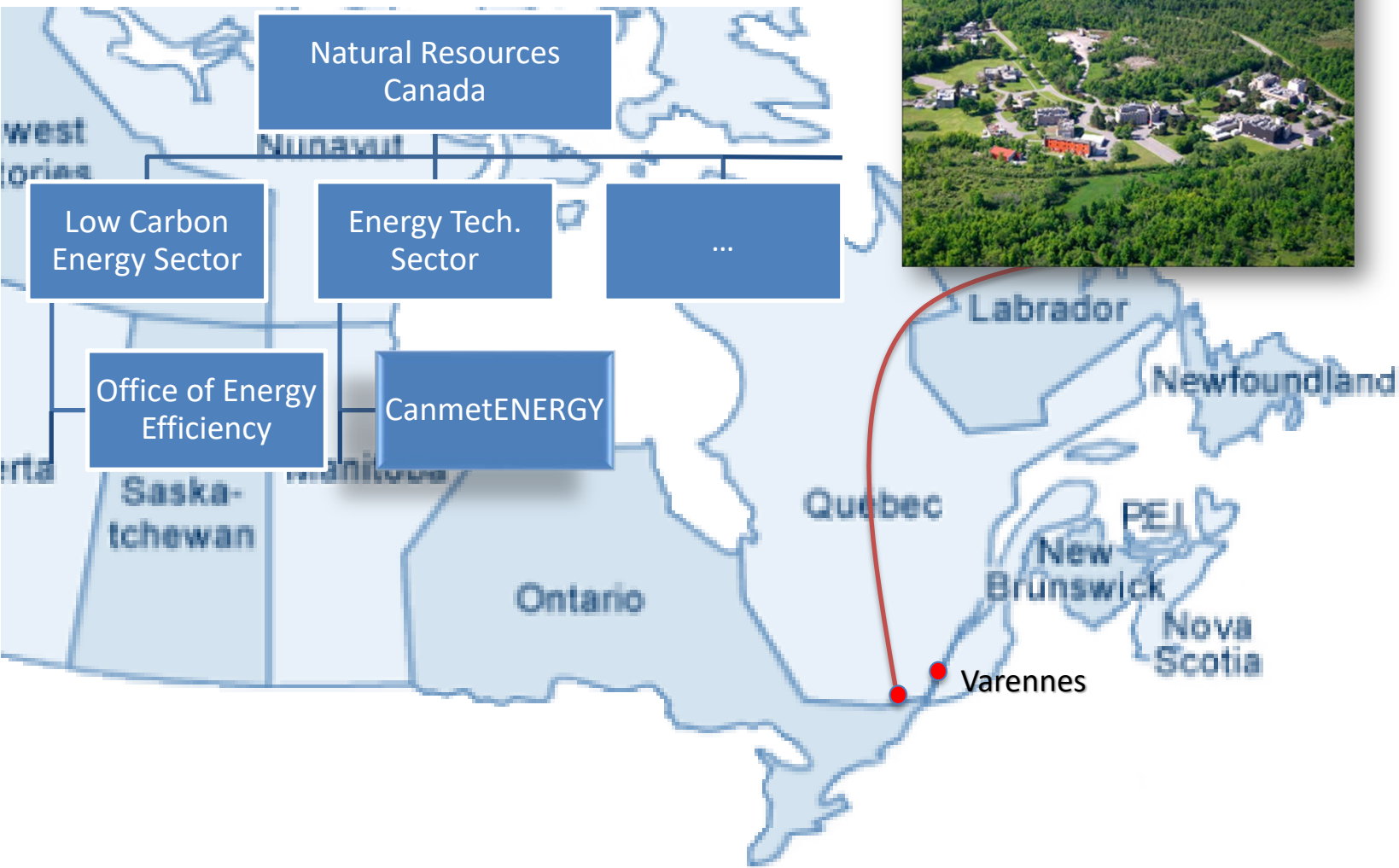
With contributions from Anil Parekh, Chris McLennan and Ritzwan Ullah

CanmetENERGY

Leadership in ecoInnovation



CanmetENERGY - Ottawa



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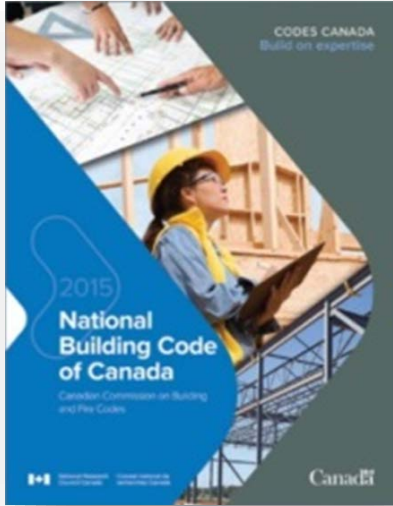


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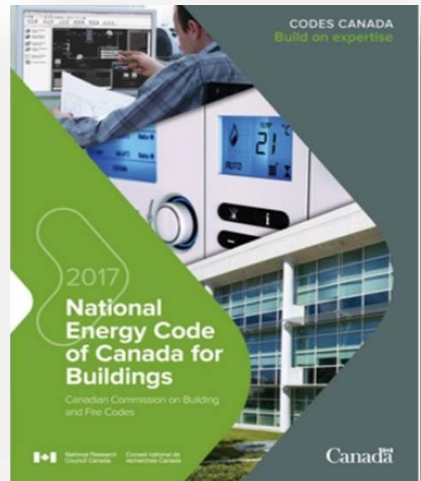
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National Energy Codes Responsibilities



Housing: Section 9.36



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

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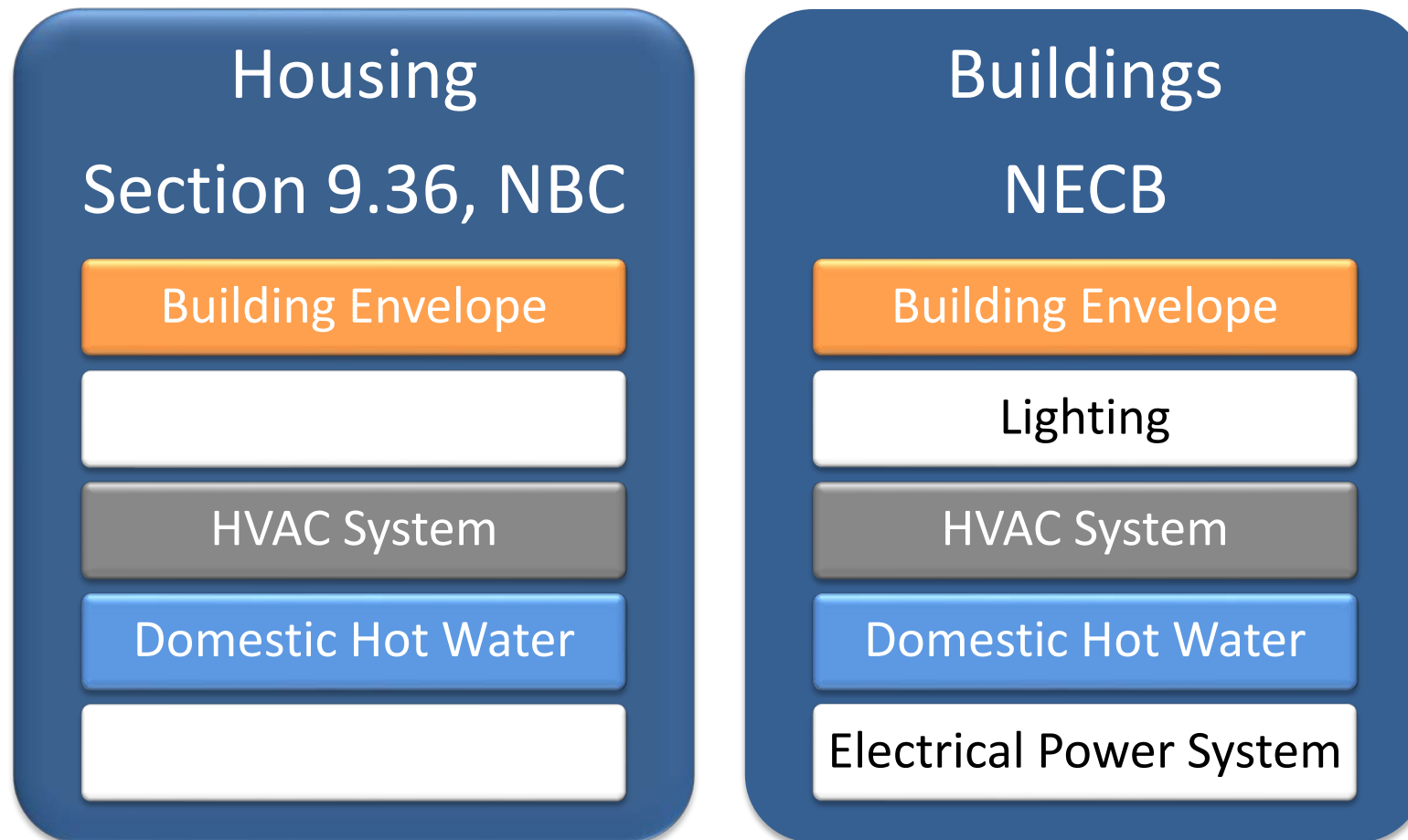


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Housing and Buildings



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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

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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)



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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



70+ years old homes
about 2040 MJ/m²/year



30+ years old homes
about 1590 MJ/m²/year



2015 OBC current construction
about 410 MJ/m²/year



Net-Zero Energy Home

ERS Rating

298

232

90

0

GJ/year



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



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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)

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Proposed Tiered Performance Path 9.36.6

Tier	Overall Energy Performance Improvement	Envelope Performance Improvement	Airtightness Level
1	≥0%	N/A	Test only
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

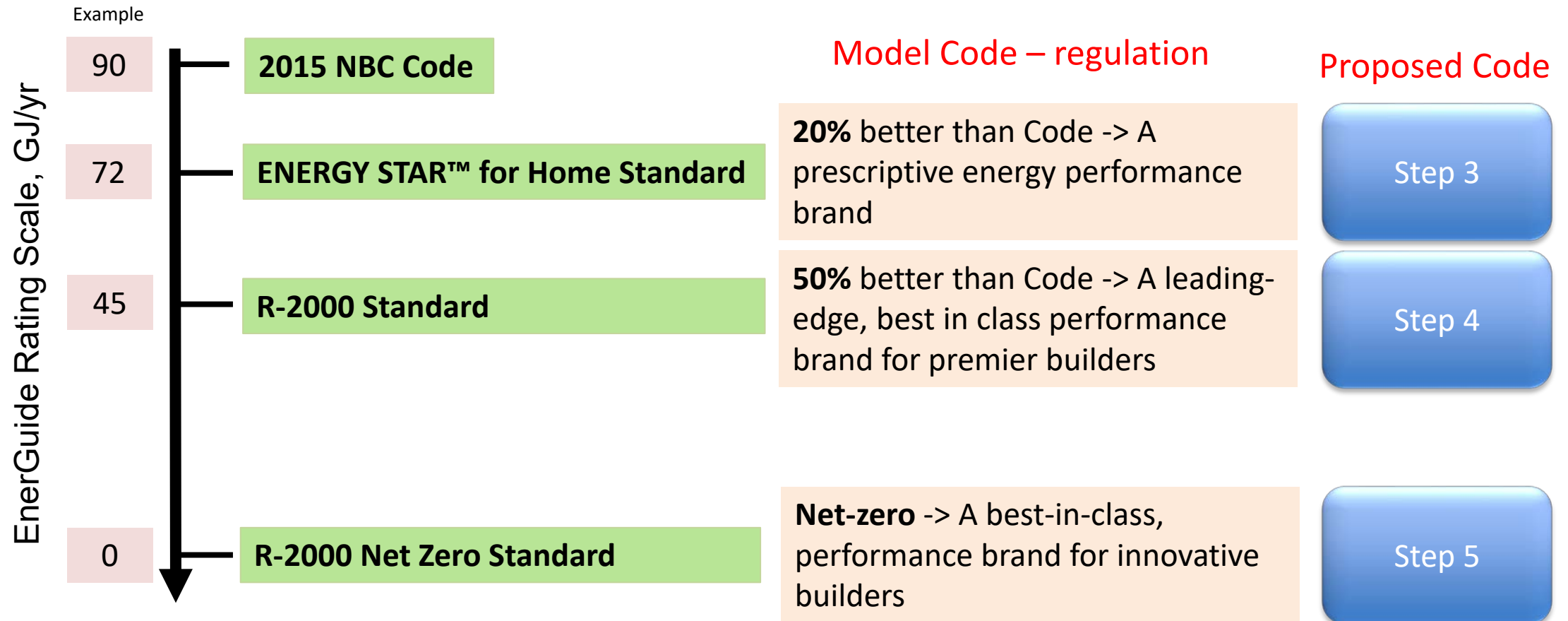
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Code and Programs



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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)

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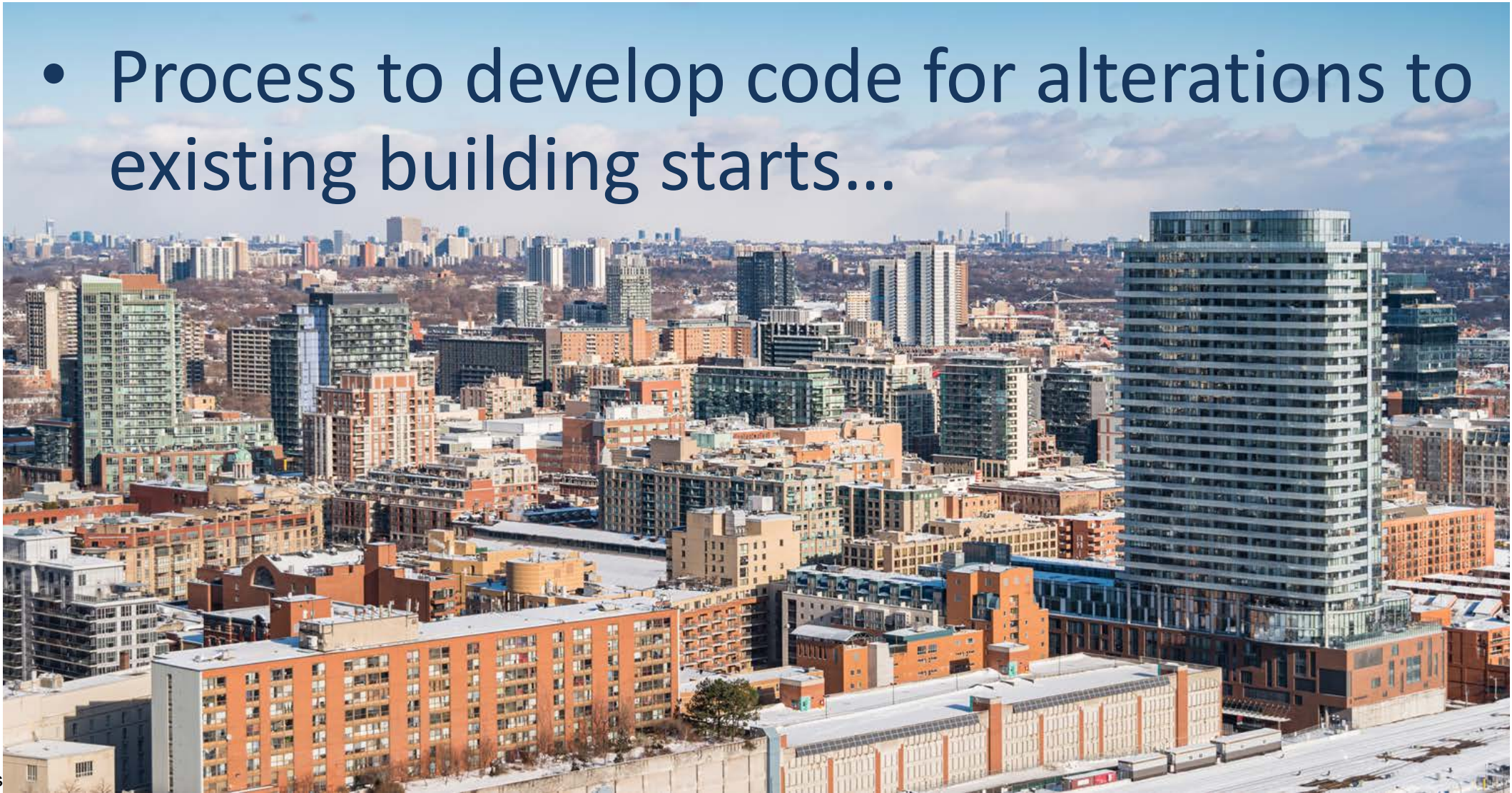
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While that is happening...

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



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