

Energy efficiency in housing and small buildings— performance path



Section 9.36.

Building Type	Compliance Options		
	Part 9 - Prescriptive	Part 9 - Performance	NECB
<ul style="list-style-type: none"> - Houses, houses with secondary suites - Buildings containing only dwelling units and common spaces $\leq 20\%$ floor area 	X	X	X
<ul style="list-style-type: none"> - <u>Residential</u> buildings - <u>Mixed-use</u> buildings, where all non-residential portions (except F2) have a floor area $\leq 300 \text{ m}^2$ - <u>Non-residential</u> buildings (except F2) having a floor area $\leq 300\text{m}^2$ 	X		X
<ul style="list-style-type: none"> - Any building where non-residential occupancies have a floor area $> 300\text{m}^2$ - Buildings containing F2 occupancies (any size) 			X

Subsection structure

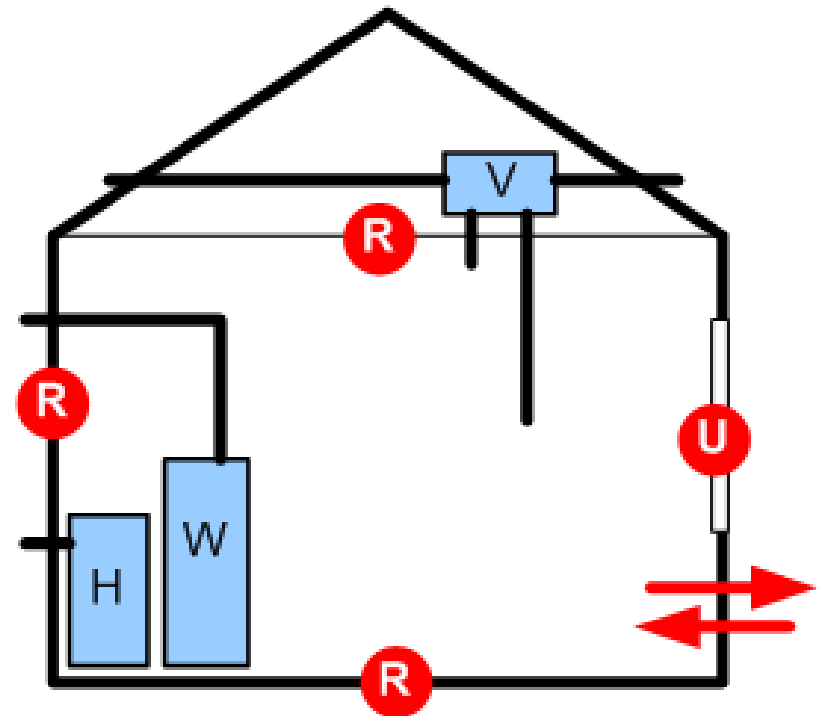
- General
 - 9.36.5.1. Scope and application
 - 9.36.5.2. Definitions
 - 9.36.5.3. Compliance
- Calculation
 - 9.36.5.4. Calculation methods
 - 9.36.5.5. Climatic data
 - 9.36.5.6. Building envelope calculations
 - 9.36.5.7. HVAC system calculations
 - 9.36.5.8. Service water heating system calculations

Subsection structure

- Proposed house
 - 9.36.5.9. General requirements for modeling
 - 9.36.5.10. Modeling building envelope
 - 9.36.5.11. Modeling HVAC
 - 9.36.5.12. Modeling service water heating
- Reference house
 - 9.36.5.13. General requirements for modeling
 - 9.36.5.14. Modeling building envelope
 - 6.36.5.15. Modeling HVAC
 - 9.36.5.16. Modeling Service Water Heating

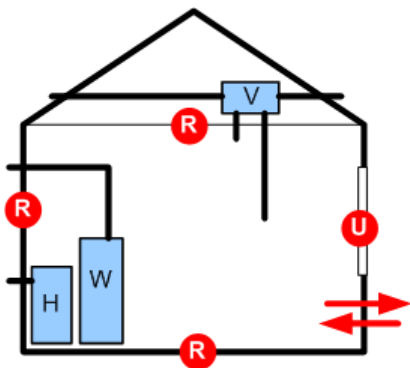
Recall – Prescriptive approach

- Building envelope
- HVAC & service water heating
- No trade-off across building envelope and HVAC



Performance path concept

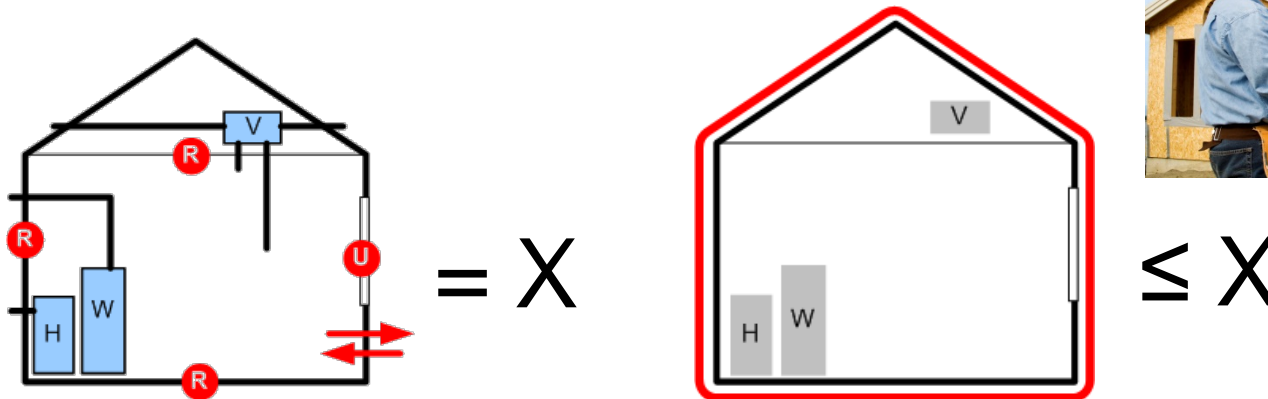
- Reference house modeled as proposed house using prescriptive path values (+ assumptions)



= X is the benchmark

Performance path concept

- Reference house modeled as proposed house using prescriptive path values (+ assumptions)
- Proposed house modeled against reference result
- If proposed house uses \leq energy = OK



Application

- Houses
- Houses with secondary suites
- Buildings containing only dwelling units and common spaces $\leq 20\%$ floor area
- Cannot be applied to non-residential occupancies or buildings

Calculations—general

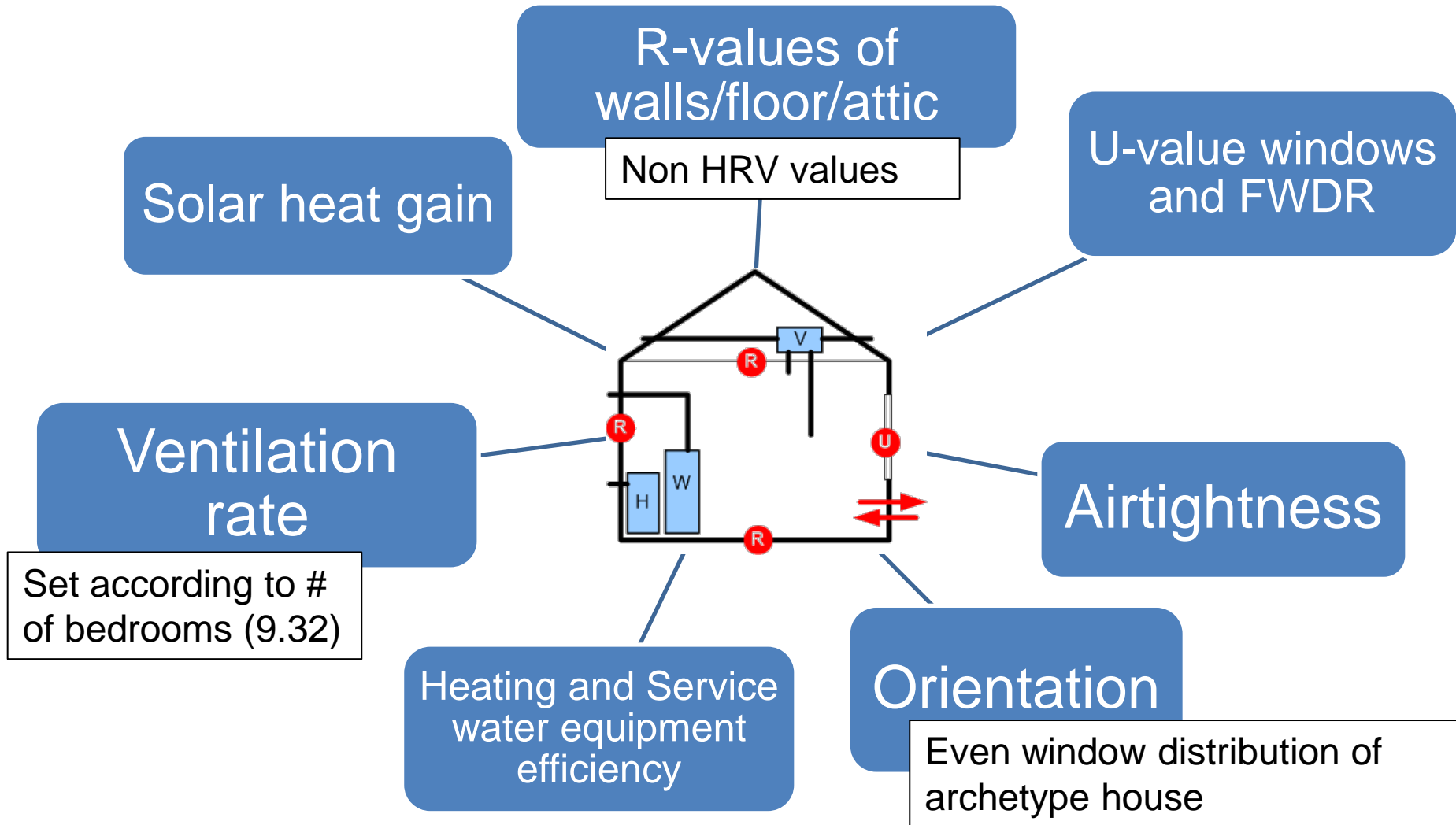
- Provide
 - Guidance for calculation method (what included)
 - Temperature set-points
 - User-dependent load assumptions and exclusions
- Used for both proposed and reference houses
- Calculation method tested to ASHRAE 140, “Evaluation of Building Energy Analysis Computer Programs”

Software

- No specific software/calculation tool
- ERS and its software (HOT2000) is one tool
 - Addresses other issues (fuel source including renewables, plug loads)



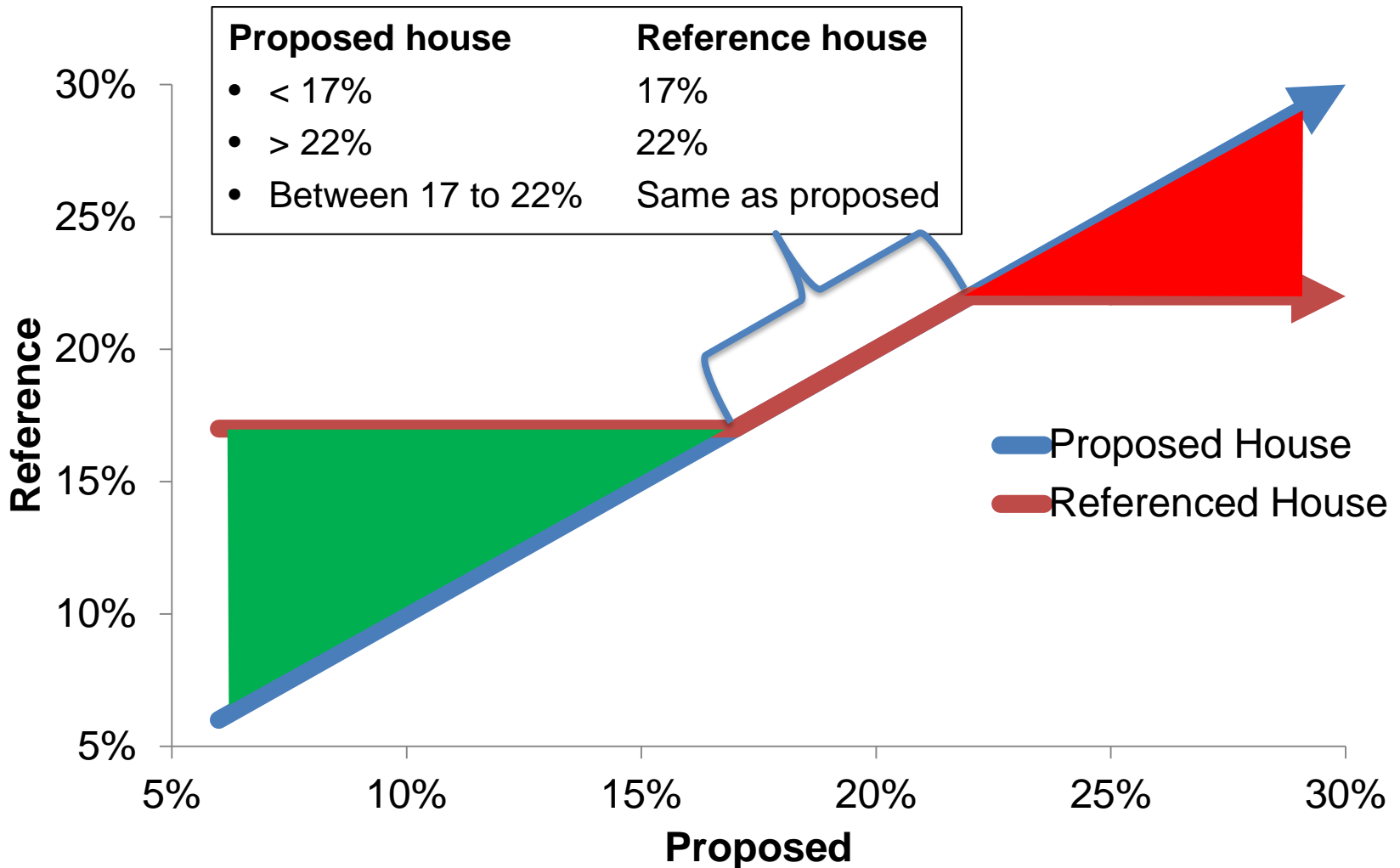
Components addressed



Prescriptive, reference and proposed house

	Prescriptive	Performance Reference House	Performance Proposed House
FDWR	Variable	17%-22%	Actual
R-Values Walls/floor/attic	Variable – depending on use of heat recovery ventilator	Fixed - no heat recovery ventilator	Actual
U-values Windows	Variable - ER ratings permitted	Fixed	Actual
Solar Heat Gain Coefficient	Not defined	Fixed (U value route, SHGC)	Actual (if SHGC not available – use same as reference house)
Orientation	Not defined	Neutral (even distribution)	Actual
Airtightness Criteria	Not defined; prescriptive details	Fixed (2.5 air changes/hr (ACH))	3.2 ACH, 2.5 ACH (with details), or as tested
Ventilation rate	Fixed (9.32)	Fixed - Minimum rate by bedroom	Actual - at least minimum rate by bedroom
Ventilation volume	Not defined	8 hrs operated 365 days	8 hrs operated 365 days
Heating efficiency	Fixed	Fixed (based on fuel/appliance type)	Actual
Service Hot Water	Fixed	Fixed (based on fuel type)	Actual

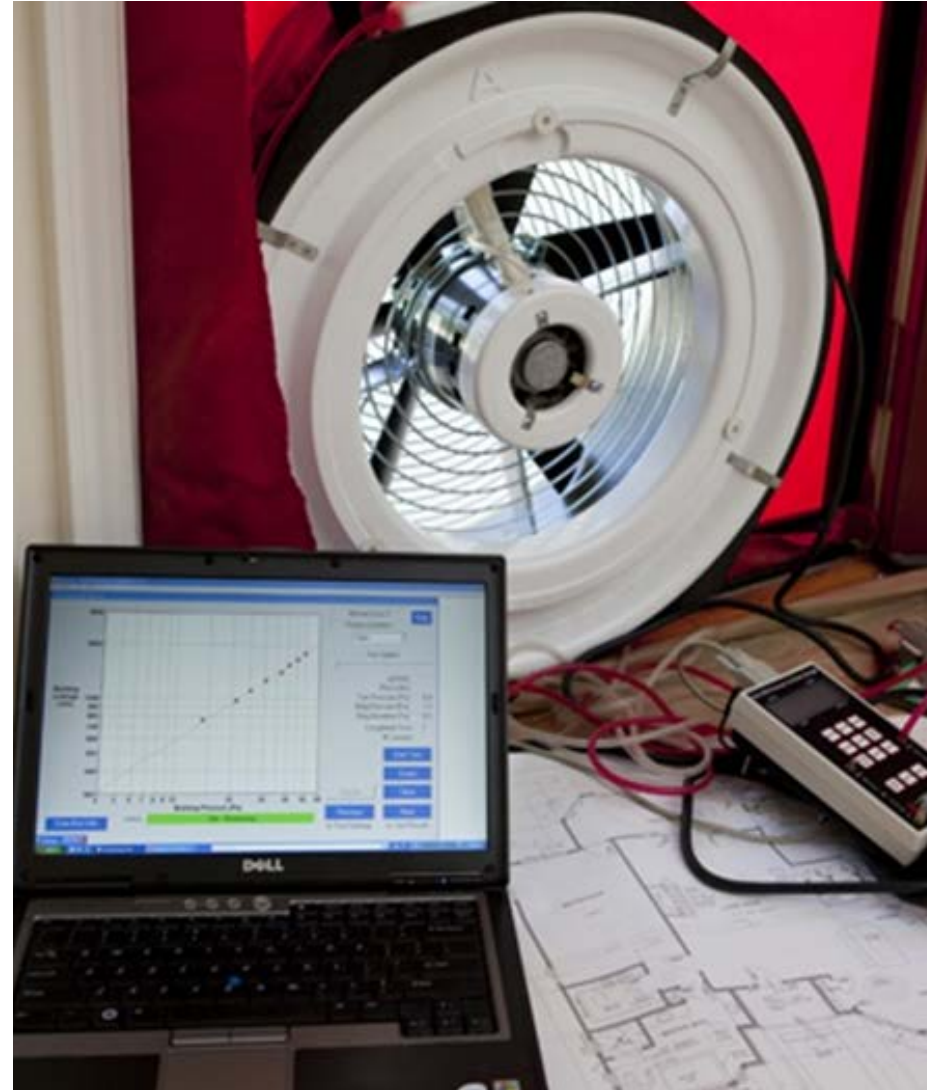
Fenestration and door to wall ratio



Airtightness

- Reference 2.5 air changes/hour (ACH)
- Proposed house:
 - 3.2 ACH if built for non-energy objectives
 - 2.5 ACH if
 - built to above + higher performance, **or**
 - as tested

Yes, whole building air leakage test results can be used!



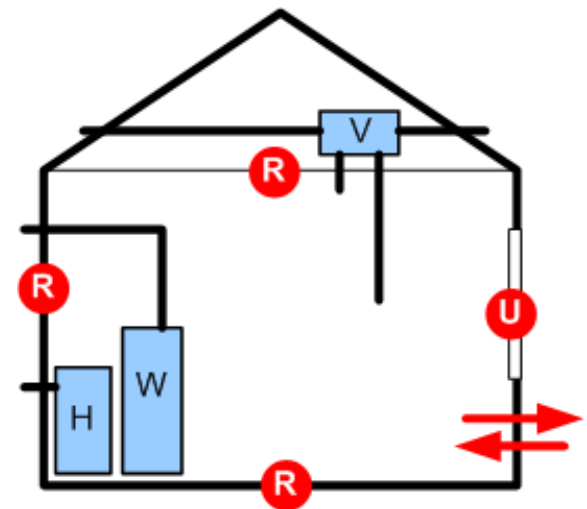
Proposed house

- Orientation of actual house can differ 22.5° from design
- Heat recovery limited to sensible heat
- Drain-water heat recovery permitted



Reference house

- HVAC and service water heating
 - Same equipment type and fuel as proposed house
- If proposed equipment not listed
 - HVAC: gas warm-air furnace at 92% AFUE
 - Service water heating: gas storage type



Summary

- All paths apply to houses and most MURBs
- Prescriptive path :
 - All residential buildings in Part 9 and some small non-residential bldgs.
- Performance :
 - Aligned with H0T2000 to avoid duplication with incentive programs
 - Blower door testing option for houses

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Public review - fall 2014

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Canadian Codes Centre

Today's construction technologies and techniques differ vastly from those in use at the time the first National Building Code (NBC) was produced in 1941. To keep pace with changes, and ensure that the latest innovations and applications are applied safely to the construction industry, a new edition of the NBC is published approximately every five years.

NRC's Canadian Codes Centre (CCC) plays a vital role in this process by providing technical and administrative support to the Canadian Commission on Building and Fire Codes (CCBFC) and its related committees, which are responsible for the development of Canada's National Model Construction Codes. These codes are the following:

- [National Building Code of Canada 2015](#)
- [National Fire Code of Canada 2015](#)
- [National Plumbing Code of Canada 2015](#)
- [National Energy Code of Canada for Buildings 2015](#)
- [Quebec Construction Code, Chapter I Building, and National Building Code of Canada 2010 \(amended\)](#)
- [National Energy Code of Canada for Buildings 2011 \(NECB\)](#)
- [National Building Code of Canada 2010 \(NBC\)](#)
- [National Fire Code of Canada 2010 \(NFC\)](#)



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Thank you



Thank you!