

# Canada Energy Codes and Research Support

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recherches Canada

**Canada**

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## Overview

**About NRC**

**Codes development process in Canada**

**Energy and GHG requirements**

**Examples of current research work**

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# The National Research Council of Canada

## Mandates:

- Advance knowledge
- Support business innovation
- Support federal policy

## We work with:

- 8,000 SMEs (advice & funding)
- 1,000 companies (R&D)
- 70 colleges and universities
- 35 federal departments
- 36 countries

## Resources:

- 4,000 personnel
- \$1.1B in annual expenditure
- 178 buildings in 72 locations



## 5 Divisions, 13 Research Centres

**DIGITAL TECHNOLOGIES** • Digital Technologies

**EMERGING TECHNOLOGIES** • Canadian Photonics Fabrication Centre  
• Herzberg Astronomy and Astrophysics  
• Metrology  
• Quantum and Nanotechnology

**ENGINEERING** • **Construction**  
• Clean Energy Innovation  
• Ocean, Coastal and River Engineering

**LIFE SCIENCES** • Aquatic and Crop Resource Development  
• Human Health Therapeutics  
• Medical Devices

**TRANSPORTATION AND MANUFACTURING** • Aerospace  
• Automotive and Surface Transportation



# NRC Construction Capabilities



## Building Codes in Canada

**Since 1941 collaboration and partnership between Provinces and Territories and NRC**

- Adopted and enforced by Provinces and Territories
- Open & transparent model codes development
- Objective-based codes supported by research
- Impact analysis for all changes
- Updated every 5 years
- Bilingual documents

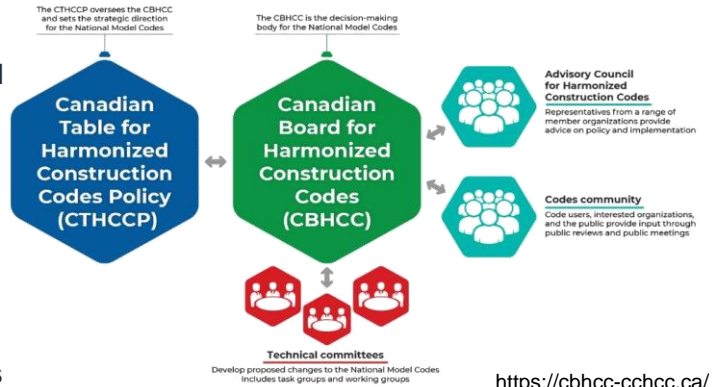


# Codes Development System

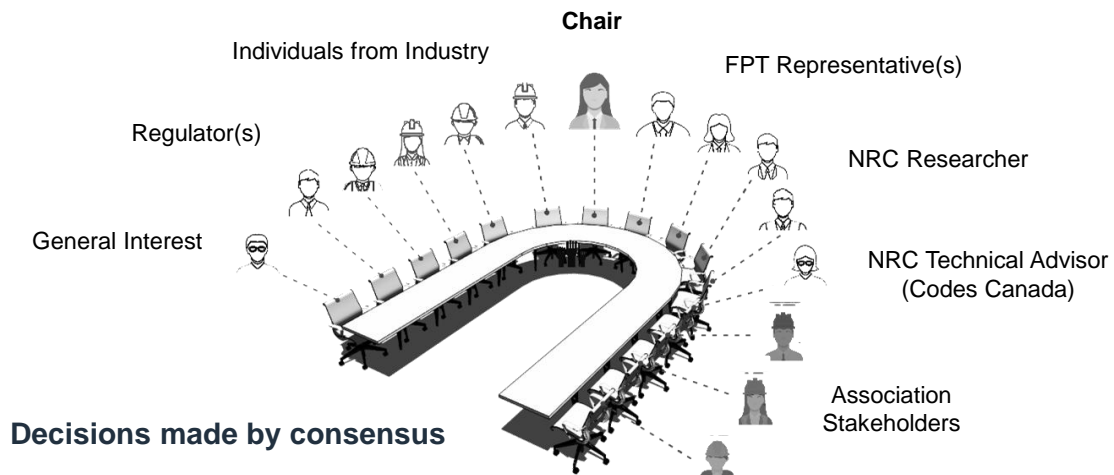
**CTHCCP** – policy direction set by Deputy Minister representatives. One from each of 13 Provinces and Territories and one Federal representative.

**CBHCC** – decision making body of public servants. One from each of 13 Provinces and Territories and one Federal representative.

**Technical Committees** – volunteers from construction sector.



## Codes Committees



## 2030 Code Cycle – Focus Areas

Accessibility

Alterations to Existing Buildings

Climate Change Adaptation

Climate Change Mitigation

Climatic Data

Fire and Life Safety

Harmonization

Housing Supply

Indoor Environment

Performance-Based Solutions

Seismic Design

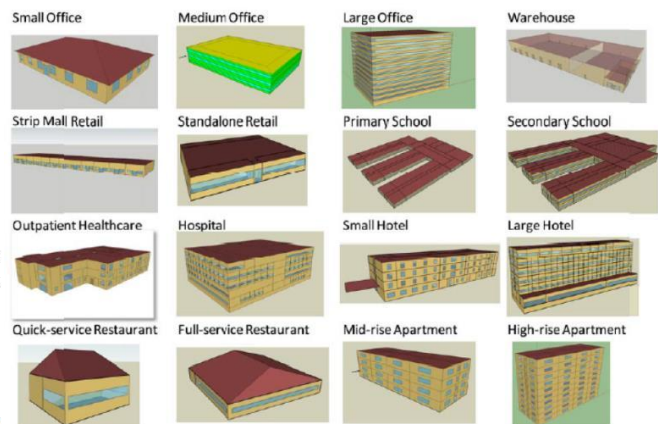
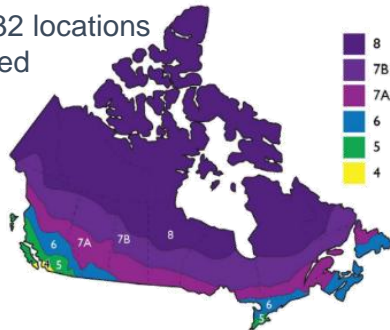


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## Assessing Impact for Energy Codes

### Simulation based approach:

- 16 building archetypes
- 240 housing archetypes
- Up to 32 locations analysed



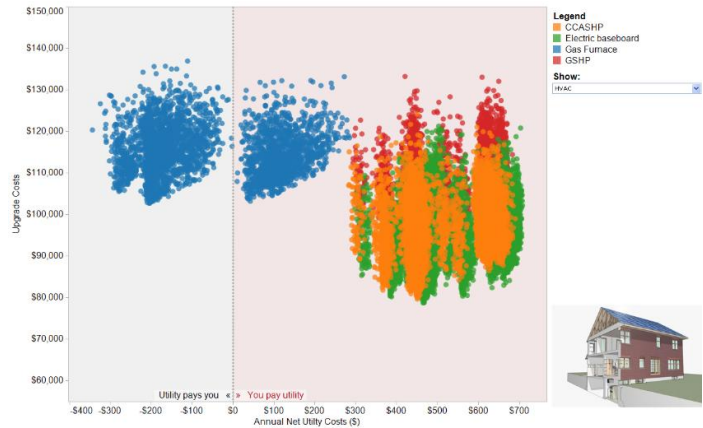
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# Simulation Outputs

Large scale analyses show range of performance and costs.

Enables enhanced understanding of proposed changes.



# Air Tightness Example

Impact of 'setting' leakage to 1.5 L/s.m<sup>2</sup> @ 75 Pa.

Impact varies (table relative to 2.7 L/s.m<sup>2</sup> @ 75 Pa):

- By building type
- By location

Archetype	Climate Zone					
	4	5	6	7A	7B	8
Secondary School	2.4%	4.6%	5.2%	4.4%	3.6%	4.9%
Primary School	2.7%	4.9%	5.5%	5.0%	4.3%	5.8%
Small Office	1.5%	3.9%	4.7%	4.6%	4.3%	5.7%
Medium Office	1.5%	3.0%	4.3%	3.7%	3.5%	5.7%
Large Office	1.1%	3.6%	4.3%	4.1%	3.8%	6.2%
Small Hotel	2.2%	5.3%	6.0%	4.6%	4.1%	6.2%
Large Hotel	1.1%	2.9%	3.2%	2.2%	1.9%	2.9%
Warehouse	10.5%	17.6%	18.4%	17.3%	15.9%	20.6%
Retail Standalone	3.6%	6.1%	6.6%	6.3%	5.4%	7.5%
Retail Strip mall	5.3%	10.0%	10.8%	10.0%	8.8%	11.7%
Quick Service Restaurant	1.6%	3.2%	3.5%	3.2%	2.7%	3.5%
Full Service Restaurant	1.7%	2.9%	3.1%	2.8%	2.3%	2.9%
Midrise Apartment	1.7%	3.1%	3.4%	2.6%	2.9%	4.5%
Highrise Apartment	0.7%	1.9%	3.2%	1.3%	1.7%	3.1%
Hospital	1.8%	3.4%	3.6%	3.4%	2.7%	3.4%
Outpatient	1.3%	3.0%	3.2%	2.8%	2.4%	3.1%

## Current Status for Energy and GHG

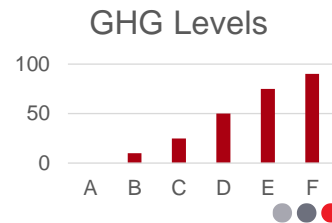
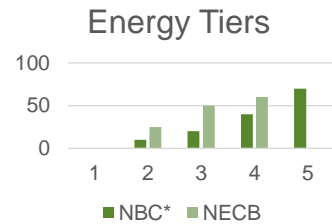
Energy performance tiers defined with top tier representing 'net-zero energy ready' performance:

- For housing and small buildings 5 tiers.
- For building 4 tiers.

Operational GHG levels defined with top level representing 'zero carbon' performance:

- 6 levels for all houses and buildings.

In all cases calculated as % improvement compared to a reference value.



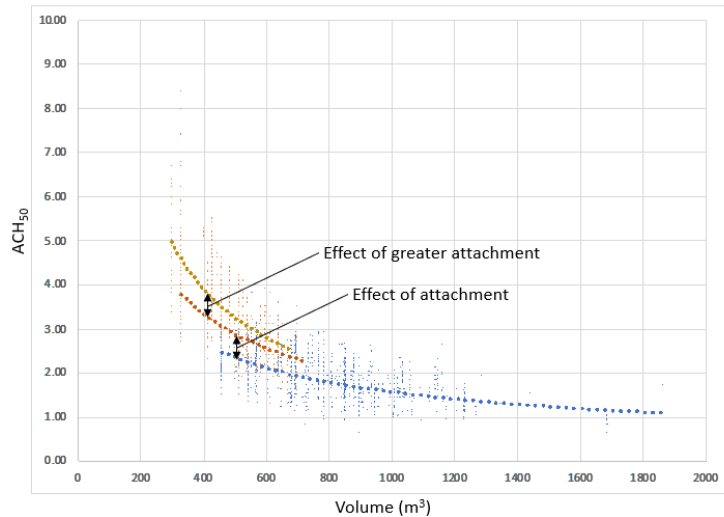
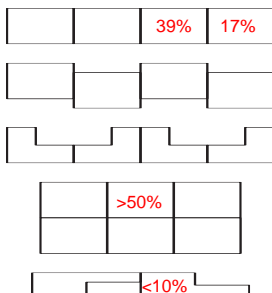
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## Infiltration Testing and Attribution

Depending on form % attachment varies.

Guarded testing difficult to schedule and conduct.



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# Infiltration Testing and Attribution

Air tightness testing is optional, depending on path different AC/H values assumed.

Which metric to use?  
(ACH50, NLA10, NLR50)

How to apply to performance modelling?

How to efficiently test attached forms?

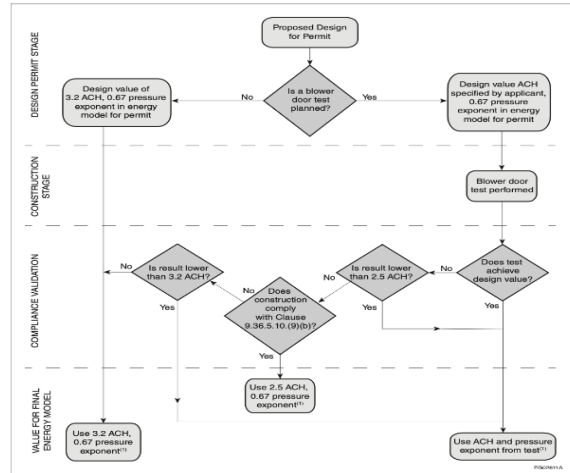


Figure A-9.36.7.3.(9)  
Determining the appropriate airtightness value to use in the energy model calculations in the tiered energy performance compliance path  
Note to Figure A-9.36.7.3.(9):  
(1) Airtightness value and pressure exponent of reference house shall be as per Sentence 9.36.5.14.(2).

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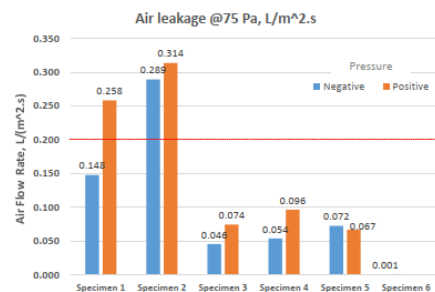
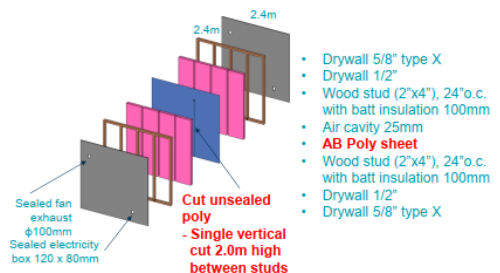
## Part 9 – Party Wall Detailing

Worked with home builders to identify methods used in practice.

Notably different performance for different configurations.

Best performance from supported air barriers. Even with deliberate penetrations.

Acoustical and fire performance also measured.



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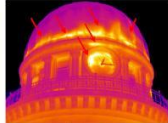
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# Air Tightness Testing in Buildings

## Testing of Part 3 buildings:

- Where is the leakage
- What causes variation in results
- Guidance for guarded tests



## Summary

**NRC supports science, industry and regulation.**

**NRC Codes Canada supports the national code development process.**

**NRC Research outputs support codes and standards development.**

**Impact of changes varies by building type and location.**

**Many questions still to be answered!**

# Thank you – Merci

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