

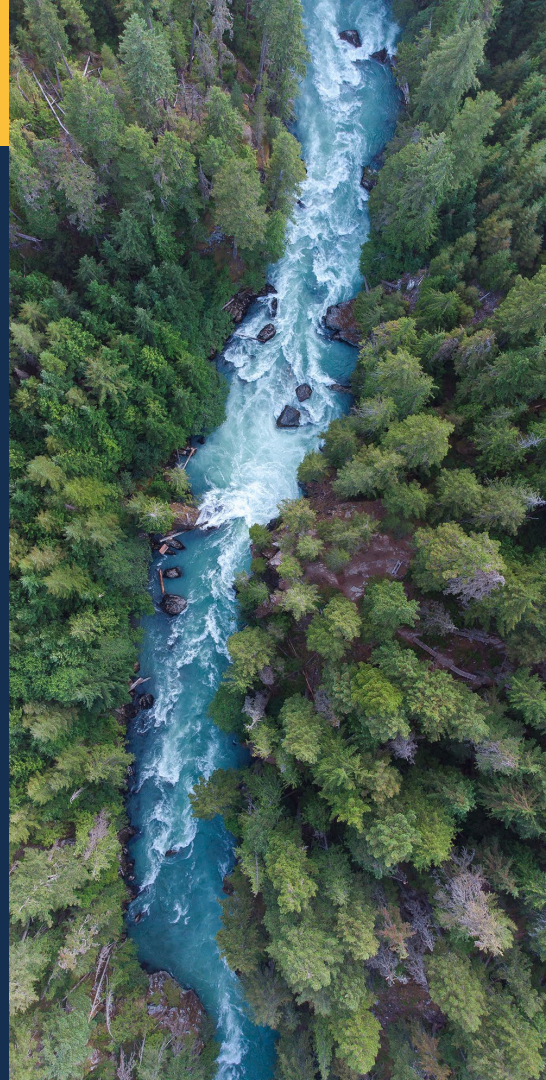


Natural Resources
Canada

Ressources naturelles
Canada

Overheating in the National Building Code of Canada

Canada 

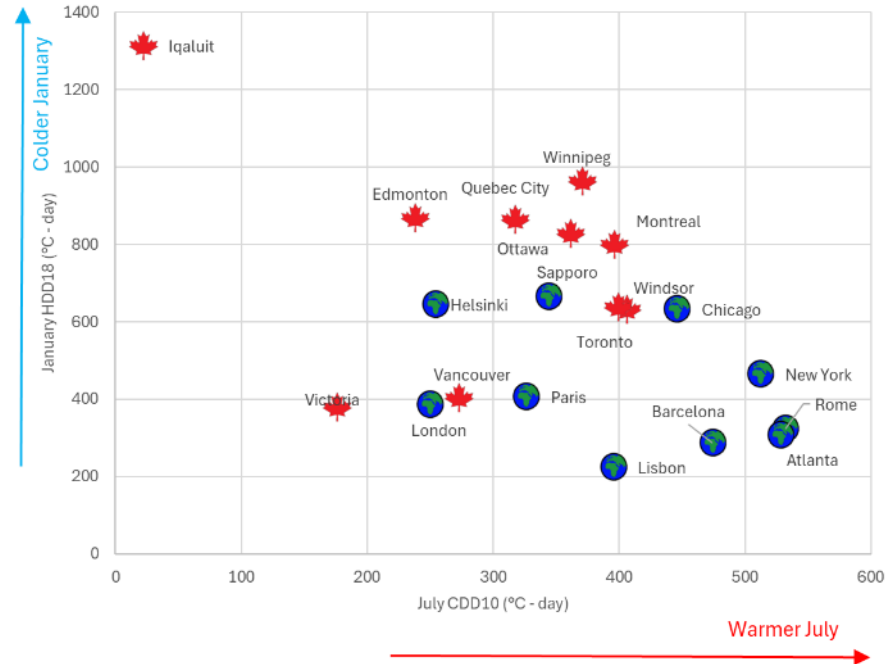


Outline

- Canada's climate and construction practices
- National Building Code of Canada (NBC)
- Energy considerations in the NBC
- Overheating measures currently in the NBC
- Future overheating measures

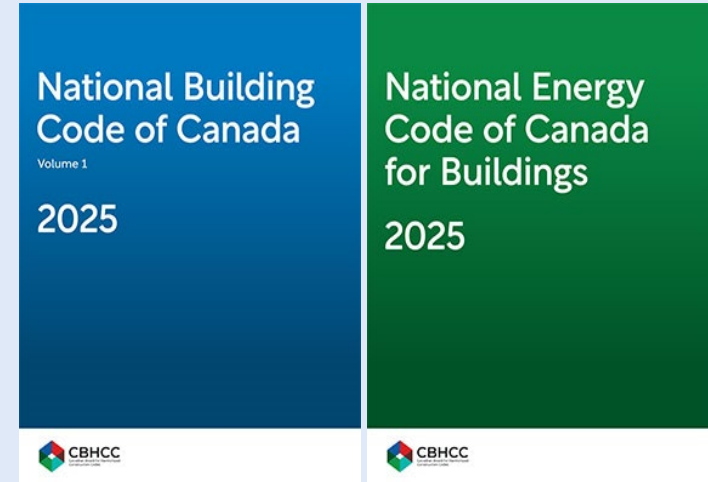
Canada's climate and building construction

- Canada's climate varies greatly seasonally and geographically.
 - Cold winters might not allow for people to adapt to relatively short, but hot summers, and might make them more susceptible to overheating
 - This is still an active research area
- Building code compliance generally focuses on reducing heating energy consumption
 - Cooling energy consumption is relatively small.
 - Small residential buildings (NBC's focus for overheating so far), are mostly light construction (wood-framed) and highly insulated.



National Building Code of Canada (NBC) and National Energy Code for Buildings (NECB)

- Model codes that can be adopted by provinces and territories of Canada.
 - New versions are released every 5 years
 - Most provinces and territories currently using 2020 version
 - Latest version released in 2025



Energy in the National Building Code

- For small buildings (less than 3 storeys or 600 m² footprint) the NBC is used (but NECB allowed).
- For larger buildings, the NECB is used.
- So far, overheating measures have only been implemented in the energy section of the small buildings part of the NBC.
 - **Focus is on residential buildings, with plan on bringing some of the same measures to larger MURBS.**

Large Buildings (NECB)



Small Buildings (NBC)



Source: https://commons.wikimedia.org/wiki/File:Duplex_house_in_Yeronga_03.2014.jpg

Overheating-related measures in each of the compliance paths

- Depending on compliance path chosen:
 1. Maximum SHGC based on fenestration and door to wall ratio (FDWR) and climate zone
 - Potential issues
 - Reduces solar gains in the winter (potential for increased heating demand)
 - Climate zones are based on Heating Degree Days (HDD) and are not a good predictor of overheating risks

Fenestration and Door Area to Gross Wall Area Ratio (FDWR)	Heating Degree-Days of Building Location ⁽¹⁾ in Celsius Degree-Days					
	Maximum Solar Heat Gain Coefficient					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000 to 4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 ≥ 7000
FDWR ≤ 17%	0.35	0.40	0.45	0.50	0.55	0.60
17% < FDWR ≤ 22%	0.30	0.35	0.40	0.45	0.50	0.55
22% < FDWR ≤ 30%	0.26	0.30	0.35	0.40	0.45	0.50
FDWR > 30%	0.26					

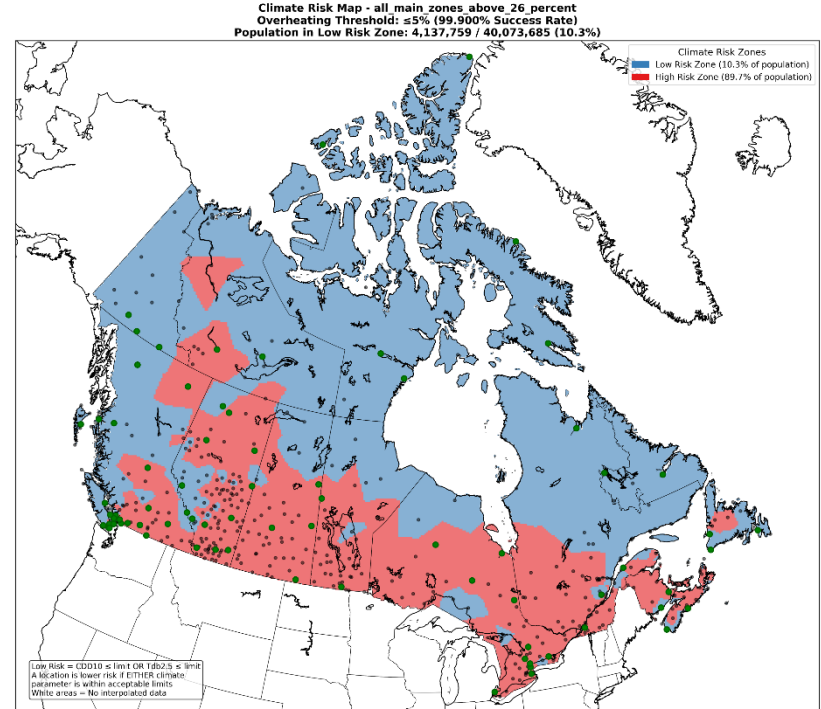
Overheating-related measures in each of the compliance paths

- Continued:

2. *“Where a cooling system is not installed, the proposed house shall have*
 - *a peak cooling load not greater than the peak cooling load for the reference house, or*
 - *a design cooling intensity not greater than 10 W/m³”*
 - Potential Issues:
 - Cooling load is not a good indicator of overheating.
3. Houses with higher than 25 W/m² cooling load shall be equipped with cooling equipment.
 - Potential Issues:
 - Cooling load is not a good indicator of overheating.

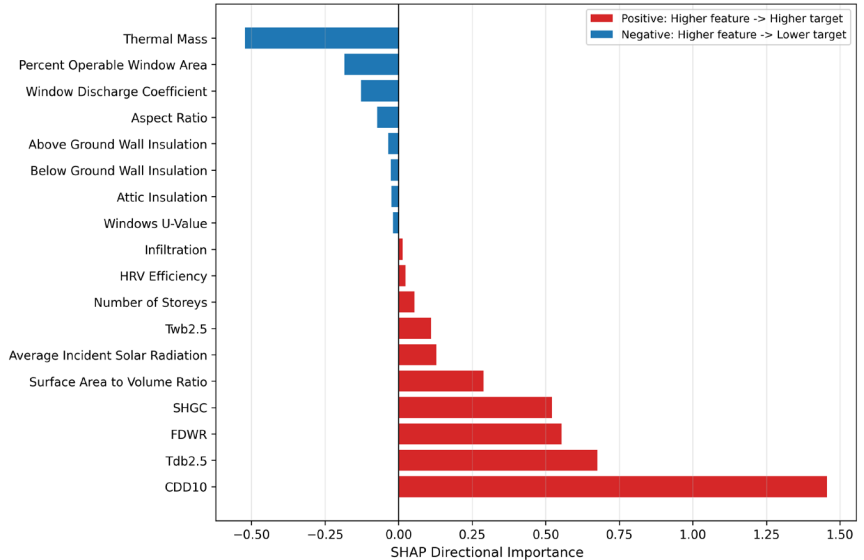
Future measures

- NBC committees are currently discussing adding requirement for active cooling in all residential buildings if less than 26 °C can't be maintained passively.
- Research is ongoing to look at which areas of the country (based on CDD and 97.5th or 99th percentile of July dry bulb temperatures) might be exempt.
- If building is not in “exempt” area, then simulation (likely over the entire cooling season) would be required to show reasonable levels of overheating.
- This work is still ongoing, and no decisions have been made on thresholds, methods, and requirements.



Other research work

- Important factors in overheating for code-built detached/attached housing
 - In this order: climate, windows, thermal mass, building shape
 - MURBs work is starting
- Assessing energy impacts of low SHGC windows
- Surrogate model tool for code compliance for small buildings



Canada 