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the platform for resilient ventilative cooling

Overheating assessment & ventilative cooling in national building codes on IEQ & energy performance

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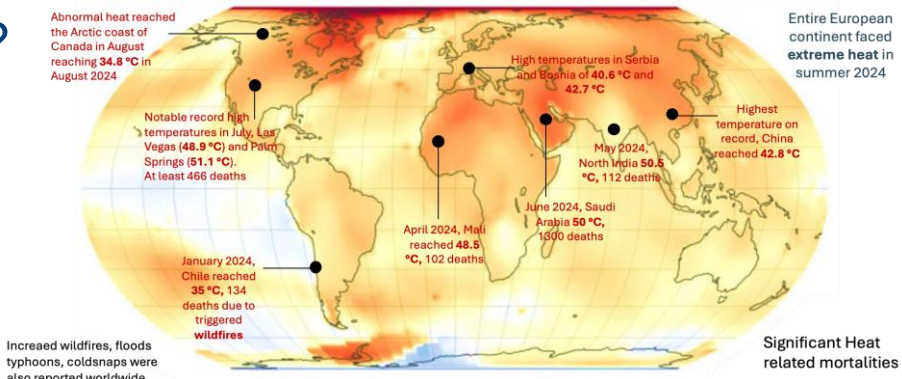
Why?



Source: WMO 2024 report

- Overheating risk
  - 2024 warmest year in 175-y WMO's observational records
  - Shift in building practice: heating -> cooling demand & overheating risk
  - Ventilative cooling recognised key strategy to reduce risk

Why?

- National building codes on IEQ & energy performance
  - Designers rely on these building codes to assess overheating
  - Key questions
    - Do current building codes adequately reflect climate change?
    - Which requirements and methods for overheating?
    - Residential <> non-residential buildings?
    - Impact of ventilative cooling considered?

Objectives

- Provide practitioners overview current status national building codes on IEQ and energy performance
  - how they address overheating and ventilative cooling in buildings
  - focus on building codes applicable to new buildings
  - Focus on cold and moderate climates
- Highlight international good practices -> inspire policy makers, standard writers and legislators

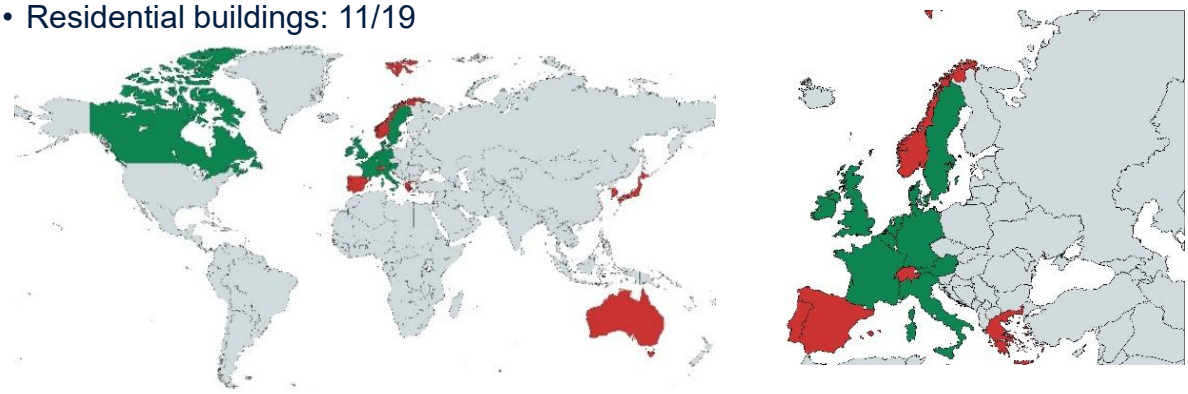
How?

- Cross-country survey developed & executed 2024-2025
  - 19 countries/regions
  - National experts selected based on expertise in national building regulations
  - Information reflects interpretation and judgment of national experts
- Deliverable: AIVC TechNote
  - Survey responses systematically compiled
  - Presented in comparative tables and summary figures
  - Double-checked by national experts

Overheating requirements

Overheating requirements included?

- Residential buildings: 11/19



- Non-residential buildings: 7/19

Residential buildings: indicator for overheating

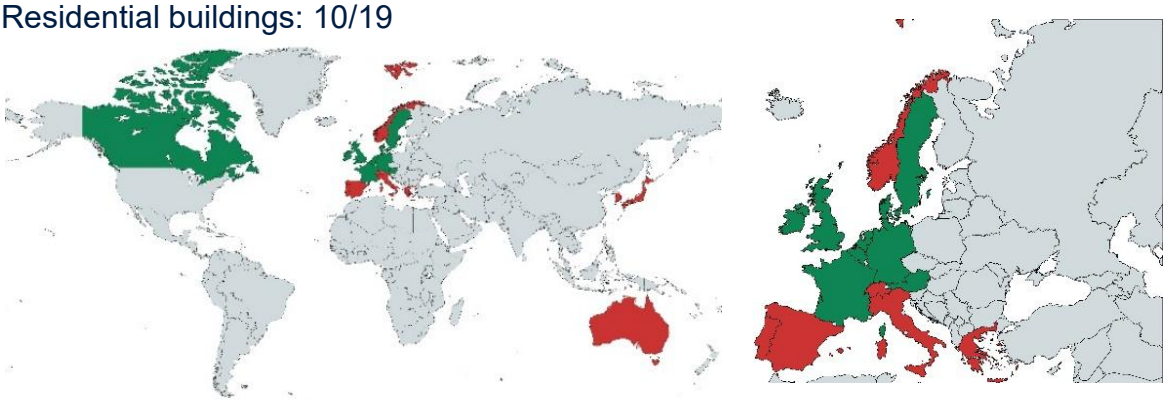
Country	Seperate indicator?
Austria	Yes
Flanders (Belgium)	Yes
Canada	No
Denmark	Yes
France	Yes
Germany	No
Ireland	No
Italy	No
Netherlands	Yes
Sweden	No
England & Wales (GB)	Yes

- Separate indicator: 6/19 countries
- Thermal comfort model
  - Adaptive comfort: Austria, Denmark
  - Other
- All performance based
- Parameter
  - Operative temperature
  - Exceedance hours

Overheating assessment method

Overheating assessment method included?

- Residential buildings: 10/19



- Non-residential buildings: 6/19

Assessment method for residential buildings

- Assessment approach

Country	Simplified	Intermediary	Detailed
Austria	√	√	
Flanders (Belgium)	√		
Canada	√		
Denmark			√
France			√
Germany			√
Ireland	√		√
Netherlands	√		
Sweden	√		√
England & Wales (GB)	√		√

Assessment method for residential buildings

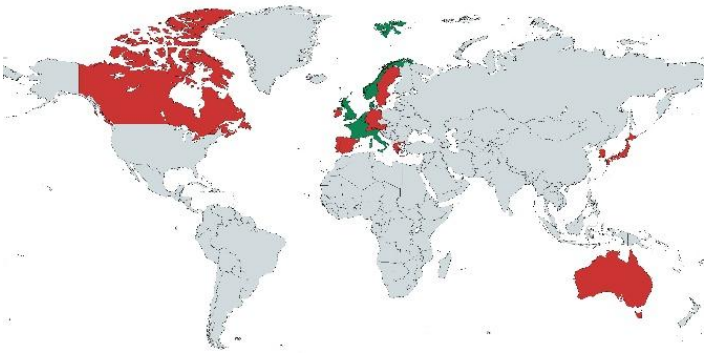
- Timestep, single <> multi zone, scale of single zone

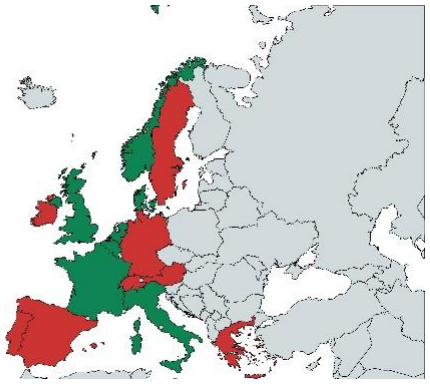
Country	Timestep			Model		Scale of single zone	
	Monthly	Hourly	Other	Single zone	Multi zone	Whole building	1-room
Austria	√	√		√			√
Flanders (Belgium)	√			√		√	
Canada					√		
Denmark		√		√			√
France		√			√		√
Germany		√		√			√
Ireland			√	√		√	
Netherlands	√			√		√	
Sweden	√	√			√		
England & Wales (GB)		√			√		

Ventilative cooling

Ventilative cooling included to mitigate overheating?

- Residential buildings: 7/19





- Non-residential buildings: 6/19

Ventilative cooling in residential buildings

- Effect on overheating <> energy performance
- Design and control

Country	Day <> night	Manual <> automated control	Effect on over-heating	Effect on energy performance	manual operation of windows	natural <> mechanical
Belgium (Flanders)	No	Yes	√		Yes	Yes
Denmark	Yes	Yes	√	√	Yes	Yes
France	Yes	Yes	√	√	Yes	Yes
Netherlands	No	Yes	√		Yes	Yes
Norway	No	No	√		Yes	No
England & Wales (GB)	Yes	No	√	√	Yes	Yes

Conclusions

Conclusions (1/2)

- Overheating requirements
  - Included in about 50% countries
  - Separate indicator for overheating in residential buildings in 6/19 countries
  - Performance based
- Overheating assessment methods
  - In about 50% of countries
  - Simplified and detailed assessment approaches
  - Single-zone and multi-zone models
  - Hourly and monthly time step

Conclusions (2/2)

- Ventilative cooling
  - < 50% countries explicitly include ventilative cooling as mitigating strategy
  - Building codes provide multiple options for design and control
- Residential <> non-residential buildings
  - Overheating requirements & assessment methods more common in residential
  - No clear line about inclusion of ventilative cooling
- Current building codes do not account for climate change impact
  - Up to date: no future weather files
  - Resilience to overheating only mentioned in 5/19 countries