

Meeting Summary:

Seventh meeting of the Building Energy Codes Working Group – Focus on Cost-Benefit Analysis and Affordability

IEA-EBC Working Group on Building Energy Codes

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1 Summary

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- **Overheating Review and Weather Data:** Aeric Siu presented a consolidated review of overheating codes and research, and participants including Michael Donn, Michael Dodd, Arnold Janssen, Mahsan Sadeghi, and Meli Stylianou identified revisions concerning climate data, European compliance methods, and Australia's developing metrics.
 - **Review Purpose:** Aeric explained that the presentation consolidated lessons from the group's earlier overheating sessions and relevant literature, with the aim of identifying approaches that different countries could adopt. The review was initially prepared for Canada's overheating task group and generalized for broader international use.
 - **Weather Data:** Michael Donn said the review should address weather-data selection more explicitly. They questioned whether the SIBSE design-summer-year approach, developed in a UK context, is appropriate for geographically distinct settings such as New Zealand, Brazil, and Australia. They distinguished typical future years from extreme heat-risk years and identified the selection of future overheating design conditions as an area requiring further research.
 - **European Methods:** Arnold said the presentation overstated European use of dynamic simulation. They noted that some European countries do not yet have overheating requirements, while countries that do have them may permit simplified assessment methods. Aeric agreed to revise the wording from most European countries to some European countries.
 - **Australian Metrics:** Mahsan described Australia's research approach: standard effective temperature using six environmental and personal parameters, degree-hours as the metric, and an adaptive-model threshold based on 80% of the upper acceptability limit. Michael Dodd and Mahsan clarified that this approach is still research intended to inform a future standard and is not currently part of Australian building codes. Mahsan offered to share published papers, and Aeric agreed to identify the approach as under development and reference the literature.
 - **Publication Revisions:** Meli said Michael Donn's weather-data comment would be integrated before the presentation is posted on the ECCC website. Participants were also invited to send further comments to Meli or Aeric.
- **National Cost-Benefit Analysis Frameworks:** Representatives from New Zealand, Australia, the UK, Belgium, Brazil, Canada, and the IEA compared how their organizations quantify building-regulation costs, energy and carbon benefits, market impacts, and difficult-to-monetize health outcomes.
 - **New Zealand Approach:** Richard London explained that New Zealand uses impact analysis or regulatory impact analysis when proposing policy changes, with cost-benefit analysis as a required component. The assessment considers direct costs, workforce capability, supply chains, market competition, payback periods, and discount rates based on government Treasury rates. Health and quality-of-life benefits are more difficult to quantify and may require long-term studies and assumptions about effects on work, social participation, healthcare use, and families.
 - **Australian Approach:** Michael Dodd said Australian regulatory impact analysis follows rules established by the Department of Prime Minister and Cabinet's Office of Impact Assessment. Quantifiable costs and benefits are monetized, while non-monetary benefits may be represented through proxies. Assessments can include carbon reductions, social or market carbon values, projected energy prices, grid impacts, health effects, and respiratory illness. External economists commonly support the analysis, which runs alongside regulation development and requires ongoing translation between economic and engineering assumptions.
 - **Health Modeling:** Mahsan described the Australian Housing Stock Model, which estimated renovation costs across the housing stock and reviewed the health impacts through mortality, morbidity, and productivity. The

project looked at the literature around heat health cost benefits and used indicators such as hospital registrations and ambulance calls, but the research team narrowed the scope because health benefits are highly diverse and difficult to model comprehensively.

- **UK Health Evidence:** Sally Semple described the UK Green Book and Better Regulation Framework, which require cost-benefit analysis for new regulations but may not always determine the final regulatory decision. They highlighted the difficulty of modeling overheating-related health outcomes because the mechanisms linking outdoor temperature, building conditions, and deaths remain uncertain. By contrast, insulation-related impacts can be modeled more robustly where mechanisms such as ventilation, mold, and radon are established. UK work is examining temperature, humidity, indoor air quality, and the mediating effect of buildings.
- **Other Jurisdictions:** Arnold said Belgium uses life-cycle costing and examines sensitivity to building lifetime and use assumptions; current research is also monetizing health impacts using disability-adjusted life years. Roberto said Brazil's regulatory impact analysis is comparatively basic, focusing on costs to government and industry and benefits to society without detailed health-impact analysis. Iain Macdonald described Canada's shift from direct financial payback toward energy savings and greenhouse-gas impacts, with the 2025 codes introducing a greenhouse-gas objective expected to be tested in the 2030 code. Giulia Angiolini said the IEA has published cost-benefit examples for labeling programs and conducts scenario modeling for technologies such as heat pumps.
- **Affordability And Long-Term Value:** The group decided that affordability should be considered together with cost-benefit analysis, with Richard, Sally, Danielle Krauel, Tristan Grant, and Michael Dodd describing disputes over first costs, developer profitability, operating expenses, health benefits, and climate outcomes.
 - **New Zealand Cost Disputes:** Richard argued that affordability should not be separated from cost-benefit analysis because a nominally unfavorable result may change when long-term value and actual assumptions are examined. In a New Zealand insulation example, the estimated additional cost was approximately \$3,000–\$8,000 for standardized homes, but public discussion inflated it to \$50,000. Richard said the variation reflected climate zones and that reducing a house from 140 to 135 square meters could offset the insulation cost while preserving long-term benefits.
 - **Developer Affordability Claims:** Sally described a London case in which developers attributed increased apartment costs to overheating requirements, although the relevant cross-ventilation requirement was a local planning rule rather than a UK-wide building-code requirement. They noted that affordability arguments may be presented by developers as a concern for residents while primarily reflecting development capacity or profit impacts.
 - **Canadian Fuel Switching:** Danielle said affordability is important to Environment and Climate Change Canada, particularly when switching from natural gas to heat pumps can increase operating costs for low-income housing and multi-residential buildings. Social-cost-of-carbon analysis can support regulatory decisions, but it does not by itself resolve the immediate affordability impacts of higher operating costs.
 - **US Cost Tests:** Tristan said US affordability discussions often prioritize first cost and overlook energy, maintenance, durability, and life-cycle benefits. US assessments may include social costs of greenhouse gases, air-pollutant emissions, regional public-health effects, and respiratory diseases. Tristan noted that the Department of Energy is reviewing its long-standing cost-effectiveness methodology, creating concern that future tests could be simplified in ways that affect energy-code progress, particularly for single-family residential buildings.
 - **Australian Code Pressure:** Michael Dodd said Australia is experiencing similar affordability-based challenges during a review aimed at modernizing and simplifying the Building Code. They cited disputes in which accessibility and energy-related measures originally estimated at several thousand dollars or less were represented as costs exceeding \$100,000. They offered to collect Australian research linking energy efficiency with mental health, sick days, respiratory illness, and other health outcomes for circulation to the group.
 - **Nonlinear Savings:** Danielle noted that incremental code improvements may obscure the cost savings achieved when high-performance design is implemented as a complete package. A sufficiently efficient building may require substantially less HVAC equipment, creating savings that are not always captured in regulatory cost-benefit analysis.

- **Staged Requirements:** Michael Dodd described Australia's electric-vehicle readiness requirements as an example of staged policy. The 2022 code required commercial buildings to provide cabling, switchboard capacity, and electrical infrastructure, producing a positive cost-benefit result by avoiding future retrofit costs. When mandatory charging was considered for 2025, much of the benefit had already been claimed by the readiness requirement, making the later measure harder to justify economically.
- **Performance-Based Codes and Sufficiency:** Participants discussed whether codes should move from prescriptive requirements toward performance-based flexibility and introduced Ali's proposed international study of sufficiency, floor area, embodied carbon, and operational energy.
 - **Prescriptive Versus Performance:** Richard said New Zealand removed one prescriptive compliance method to encourage calculation and modeling, but the effectiveness of that change remains uncertain because many practitioners still prefer explicit instructions. They identified a regulatory challenge in deciding when designers should receive flexibility and autonomy, while ensuring sufficient workforce capability to support modeling and compliance.
 - **Canadian Code Options:** Iain said Canadian home builders remain interested in prescriptive pathways, while recent code cycles have expanded options to include points-based and performance-based routes. They described the current system as offering multiple compliance choices and said performance-based simulation could allow builders to identify the least-cost solution that meets the required outcome. Iain also asked whether a broadly accepted definition or measurement method for affordability exists.
 - **Sufficiency Study:** Ali Gulamhussein explained that their proposed research will examine building codes worldwide to determine where sufficiency is explicitly addressed and where its principles are embedded indirectly. The study will consider floor area per person, embodied carbon, operational carbon, and heating demand, with particular relevance to Canada, the United States, and Australia, where floor-area growth is significant. The goal is to identify transferable code practices.
 - **Planning Implications:** Michael Dodd said Australia's large homes and growing floor area are not currently addressed directly through building codes and may instead require examination of planning systems, including state frameworks that influence density and development patterns.
- **International Knowledge-Sharing Plan:** Meli and the group agreed to continue the work through monthly, discussion-oriented webinars supported by shared papers, country case studies, and presentations, beginning with Mahsan's cost-benefit literature review in mid-October.
 - **Webinar Format:** Michael Donn recommended repeating the earlier model of international webinars scheduled across time zones, using preliminary paper sharing and discussion-focused presentations rather than formal slide-heavy sessions. Meli agreed that presentations would enable richer exchange than simply circulating papers.
 - **First Presentation:** Meli proposed starting with Mahsan's literature review on cost-benefit analysis. Mahsan agreed to prepare a presentation for mid-October and send Meli possible times, preferably after 6:00 a.m. for Meli. The group noted that daylight-saving changes in different countries will require scheduling coordination.
 - **Meeting Frequency:** Meli proposed one meeting per month to allow participants time to reflect and prepare. Richard indicated that a monthly schedule was workable.
 - **Reference Collection:** Meli asked participants to send papers and other references, including research on health benefits and cost-benefit analysis. Meli will collect and distribute the material to the full group, including members who were not present.
 - **Country Case Studies:** Richard offered to prepare a New Zealand case study covering rolling building-code changes since 2021, the removal of a prescriptive compliance method, industry pressure, and the transition toward predictive modeling and possible energy certificates over a five- to ten-year period.

2 Action items

- **Overheating Review Updates:** Revise the overheating presentation to address weather-data limitations, qualify the statement about European countries requiring dynamic simulation, and identify Australia's SET*, degree-hour, and adaptive-threshold approach as research in development with supporting references. (Aeric)
- **Australian Overheating References:** Send Aeric the published papers describing Australia's SET*, degree-hour, and adaptive-threshold research for inclusion in the presentation. (Mahsan)
- **Presentation Link Access:** Recheck the presentation's extreme-heat and resilience-resource links from a personal email account and report any remaining access problems. (Richard)
- **Cost-Benefit Research:** Send relevant cost-benefit, affordability, and health-benefit papers or references to Meli for distribution to the group. (Michael Dodd, all participants with relevant references)
- **Cost-Benefit Webinar:** Prepare and present the literature review on cost-benefit analysis at the next group session. (Mahsan)
- **Next Meeting Scheduling:** Send Meli proposed mid-October meeting times, taking regional daylight-saving changes into account. (Mahsan)

3 Attendees

Name	Affiliation	Country
Giulia D'Angiolini	International Energy Agency	France
Michael Dodd	Australia Capital Territorial Government	Australia
Michael Donn	Victoria University of Wellington	New Zealand
Tristan Grant	New Buildings Institute	USA
Ali Gulamhussein	Carleton University	Canada
Arnold Janssens	University of Ghent	Belgium
Danielle Krauel	Environment and Climate Change Canada	Canada
Roberto Lamberts	Federal University of Santa Catarina	Brazil
Richard London	Ministry of Business, Innovation & Employment	New Zealand
Iain Macdonald	National Research Council Canada	Canada
Mahsan Sadeghi	CSIRO	Australia
Aeric Siu	Natural Resources Canada	Canada
Meli Stylianou	Natural Resources Canada	Canada