EBC

Energy in Buildings and Communities Programme

Net/Nearly Zero Energy Buildings

May 18, 2020, 21:00 - 22:30 UTC

EBC Building Energy Codes Working Group Webinar

Some Administrative Notes

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- We are recording this webinar so that we can make it available to EBC members and interested parties in the future. Your participation indicates your consent.
- We would like everyone to mute themselves to minimize extraneous noise.
- Please put questions in comments and we will go over as many as possible during the Q&A section (see the chat function at the bottom of the screen).

Agenda

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21:00 **Welcome and Introduction**
Stanford Harrison, Manager, Commercial Buildings Policy, Australian Government

21:05 **Zero Energy Building Definitions and Policy Activity**
Adam Hinge, Manager, Sustainable Energy Partnerships

21:20 **Towards Net Zero in Australia: Residential Building Codes and Complementary Measures**
Jodie Pipkorn, Manager, Residential Buildings Policy, Australian Government

21:30 **Toward Nearly Zero Energy in the European Union: From a Common Framework to National Implementation**
Vincenzo Corrado, Professor, Department of Energy - Politecnico di Torino

21:45 **Canadian Experiences with Net-Zero Ready Housing Codes: Observations from Metrics Research and Impact Analysis**
Alex Ferguson, Research Officer, CanmetENERGY, Natural Resources Canada

22:00 **Q&A**
Stanford Harrison

22:15 **Close**
Stanford Harrison

Zero Energy Buildings

IEA EBC Building Energy Codes Working Group
18 May 2020

Adam Hinge

Sustainable Energy Partnerships

Tarrytown, New York USA

Key terms and acronyms

ZEB: Zero Energy Building

nearly ZEB: Nearly Zero Energy Building

NZE: Net Zero Energy

ZC: Zero Carbon

ZE: Zero Energy

ZNC: Zero Net Carbon

ZNE: Zero Net Energy

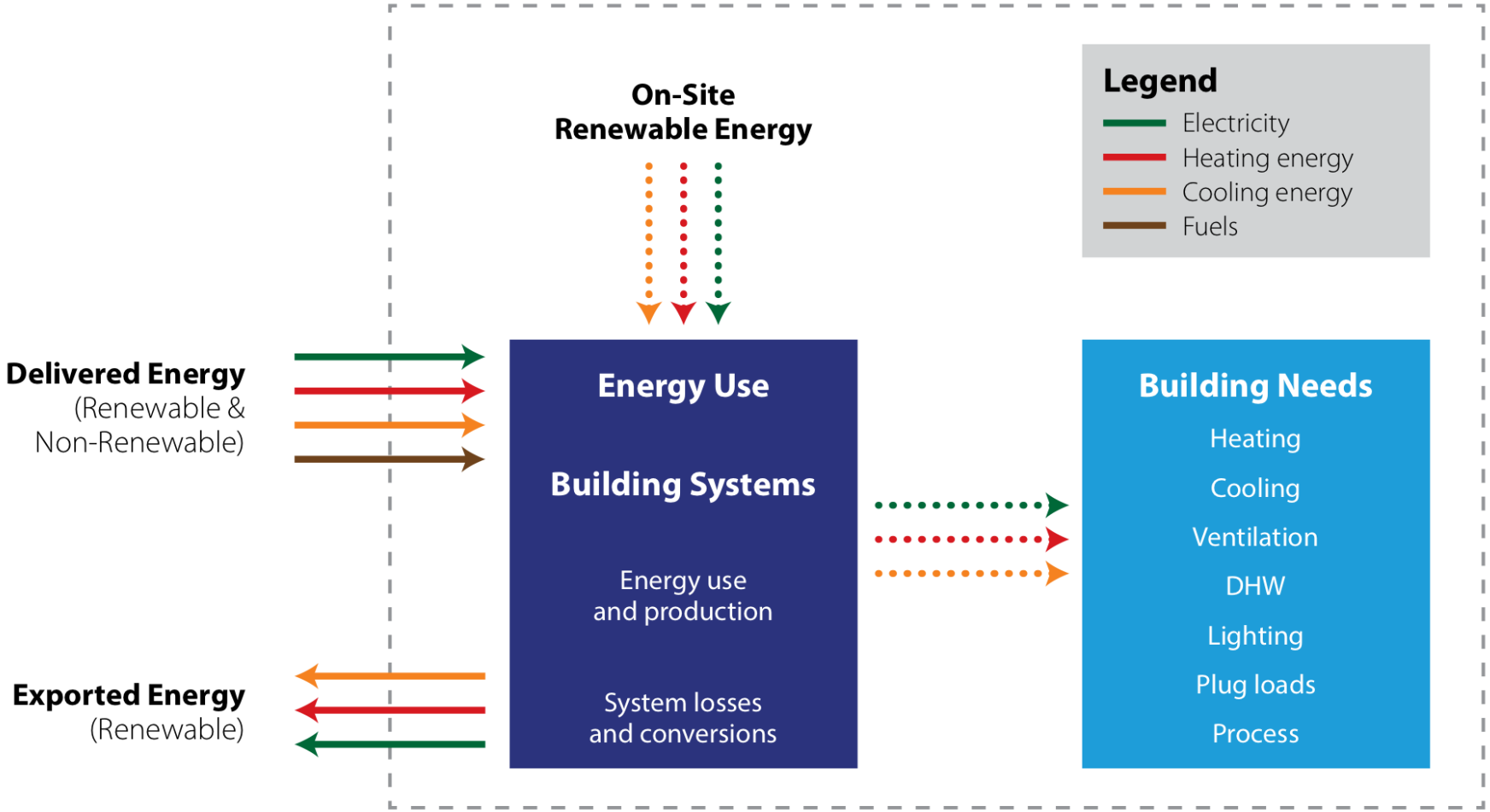
Leading ZEB Dates and Characteristics

Country/ Region	Responsible Agency/ Organization	Year Initiated	Date for ZEB Target		Unique Characteristics
			New Public Buildings	All New Buildings	
EU EPBD	European Commission, Individual Member States	2010	2019	2021	Set EU wide framework definition for nearly ZEB, but delegates full definition and implementation to individual EU Member States
California	California Energy Commission, Public Utilities Commission	2007		2020 for residential buildings, 2030 for commercial	Initial goals for full ZNE compliance by these dates, and have scaled back specific requirements to phase in major market shift
Japan	METI	2014	2020	2030	Includes very significant funding for pilot projects

Common ZEB Expressions

Concept	Description
Zero Site (delivered) Energy	Addresses energy as consumed at the building site and measured by the consumption of all energy meters at the building, but not considering upstream losses from energy generation, transmission or distribution.
Zero Primary (Source) Energy	In addition to site energy, the energy needed for generation, transmission and distribution to the building site; gives extra benefit to on-site electricity generation exports, which offset the purchased electricity losses, and can help with offsetting any fossil fuel consumed at the site.
Zero Energy Costs	Selling enough energy back into the grid to offset the cost of all energy purchases —a different form of energy accounting.
Zero Emissions	Instead of energy as the measurement of consumption to be netted to zero, carbon emissions are measured and need to net to zero.

Site Boundary for Zero Energy Accounting



Dotted lines represent energy transfer within the boundary. Solid lines represent energy transfer entering/leaving the boundary used for zero energy accounting.

What counts toward RE contribution?

Solution \ Country	BE-BR	BE-FL	BE-WA	BG	CY	DE	DK	EE	GR	ES	FI	FR	HR	HU	IT	LT
RES as part of district heating	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y
RES as part of district cooling	N	N	N	Y	Y	Y	N	Y	Y	N	Y	Y		N	Y	N
Solar thermal panels for DHW	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Solar thermal panels for DHW	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y
PV for self-use	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PV for feed-in	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	Y	Y	Y	N	Y
PV for heating (input to heat storage)	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
PV/T hybrid solar collectors for self-use	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PV/T: PV for feed-in, T for self-use	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	Y	Y	Y	N	Y
Micro wind-turbine for self-use	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y
Micro wind-turbine for feed-in	N	N		Y	Y	N	Y	Y	Y	N	N		N	N	N	Y
Local hydro for self-use	N	N	N	N	N	N	Y	Y	N	Y	Y	N	N	N	Y	Y
Local hydro for feed-in	N	N	N	N	N	N	N	Y		N	N	N	N	N	N	Y
Biomass boiler	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Biomass CHP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y/N	Y/N	Y	Y	Y	Y/N	N
HP coupled to external or exhaust air	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
HP coupled to ground/ ground-water	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Direct geothermal	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N
Direct ground water cooling	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	N
RES electricity via grid (specific contract)	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	Y
Alternative: higher insulation level	Y	Y	N	Y	N	Y	N	Y	Y/N	Y/N	N	N	N	N	Y	N

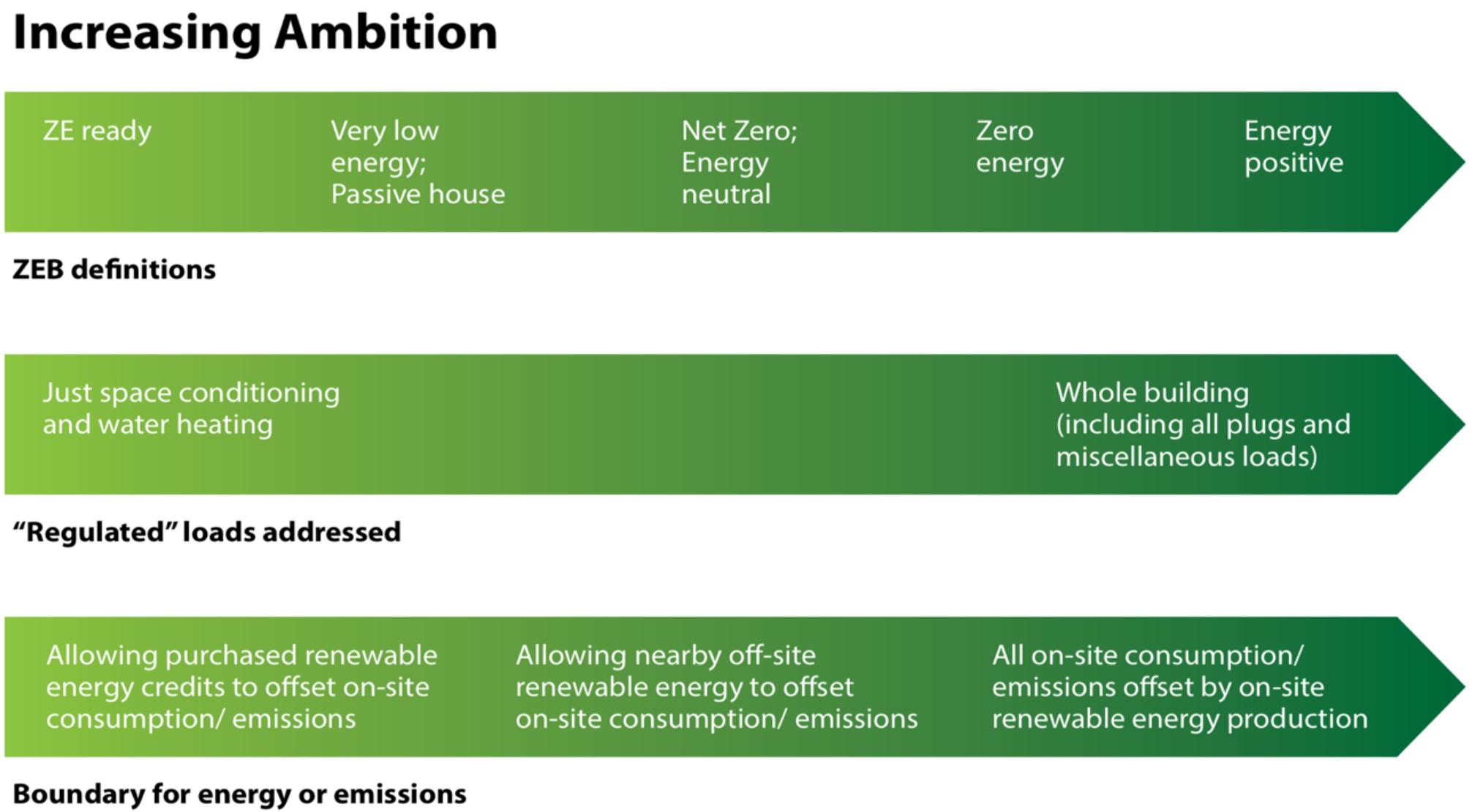
Solution \ Country
RES as part of district heating
RES as part of district cooling
Solar thermal panels for DHW
Solar thermal panels for DHW
PV for self-use
PV for feed-in
PV for heating (input to heat storage)
PV/T hybrid solar collectors for self-use
PV/T: PV for feed-in, T for self-use
Micro wind-turbine for self-use
Micro wind-turbine for feed-in
Local hydro for self-use
Local hydro for feed-in
Biomass boiler
Biomass CHP
HP coupled to external or exhaust air
HP coupled to ground/ ground-water
Direct geothermal
Direct ground water cooling
RES electricity via grid (specific contract)
Alternative: higher insulation level

Key parameters and boundaries

Country/Region	Definition/Policy/Initiative	Metric			Plug loads included in energy consumption?	Calculated (C) vs Actual/ Measured (M) Energy Use	RE system boundary		Minimum requirements	
		Primary (Source) energy	Final (Site) energy	Carbon emissions			On-site	Off-site	EE*	RE* share
Australia	Carbon Neutral Certified Building			✓	✓	M		✓	✓	
California	ZNE	✓			✓	C	✓		✓	✓
EU	EPBD	✓				C or M	✓		✓	✓
France	EPBD Implementation	✓				C	✓	✓	✓	✓
Germany	EPBD Implementation	✓				C	✓	✓	✓	
Italy	EPBD Implementation	✓				C	✓		✓	✓
Japan	Zero Energy Building Definition	✓				C			✓	

Country/Region	Definition/Policy/Initiative	Metric			Plug loads included in energy consumption?	Calculated (C) vs Actual/ Measured (M) Energy Use	RE system boundary		Minimum requirements	
		Primary (Source) energy	Final (Site) energy	Carbon emissions			On-site	Off-site	EE*	RE* share
Australia	Carbon Neutral Certified Building			✓	✓	M		✓	✓	
California	ZNE	✓			✓	C	✓		✓	✓
EU	EPBD	✓				C or M	✓		✓	✓
France	EPBD Implementation	✓				C	✓	✓	✓	✓
Germany	EPBD Implementation	✓				C	✓	✓	✓	
Italy	EPBD Implementation	✓				C	✓		✓	✓
Japan	Zero Energy Building Definition	✓				C			✓	
Korea	Zero Energy Building Certification	✓				C			✓	
UK	Zero-carbon building			✓		C	✓		✓	
US	Zero Energy Building (DOE)	✓			✓	M	✓		✓	
US	Architecture 2030 ZERO CODE	✓			✓	C		✓	✓	
World	Passive House		✓		✓	C			✓	
World	World GBC Net Zero Carbon			✓	✓	C		✓		

Range of Ambition



Policy Progress

- Most ZEB policies begin with a quite ambitious target several years away
  - Allows time for capacity building and experience
  - Most early adopters now facing the target implementation dates, with uncertain compliance
- Emerging trend toward Zero Carbon/ Emissions instead of Zero Energy

Increasing and Ongoing “Net Zero Carbon” Commitments

World Green Buildings Council collaborating with C40 Cities and others on “Net Zero Carbon Buildings Commitment”

- As of May 2020: 48 Businesses and Organizations; 28 Cities; and, 6 States and Regions have signed the commitment
- Cities will lead “…by ensuring that new buildings operate at net zero carbon by 2030…also pledged to ensure all buildings in the cities, old or new, will meet net-zero carbon standards by 2050”

However, lots of variation in what is meant by “Net Zero Carbon”

More information, see: https://www.worldgbc.org/thecommitment

Zero Energy Building Definitions and Policy Activity

An International Review

IPEEC Building Energy Efficiency Taskgroup

Full Report available at:

https://ipeec.org/upload/publication_related_language/pdf/766.pdf

Other IPEEC Buildings EE Taskgroup reports:

https://ipeec.org/beet

More info: Adam Hinge - hingea@aol.com

Australian Government

Department of Industry, Science, Energy and Resources

Towards Net Zero in Australia – Residential Building Codes and complementary measures

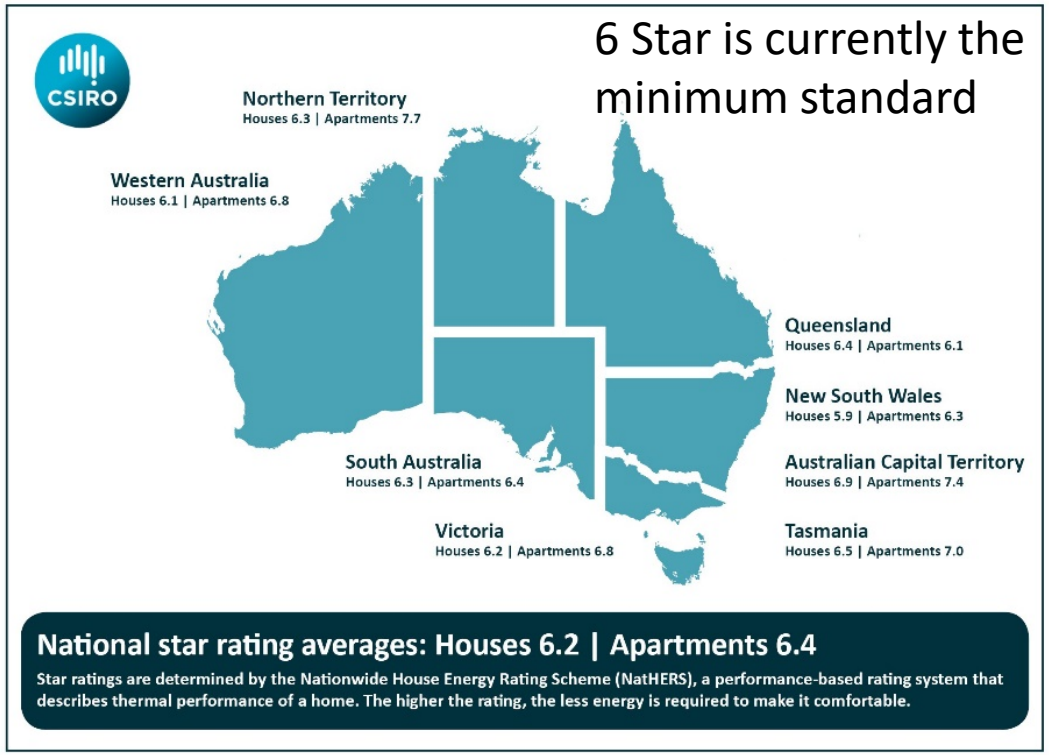
EBC BECWG Webinar May 2020

Jodie Pipkorn

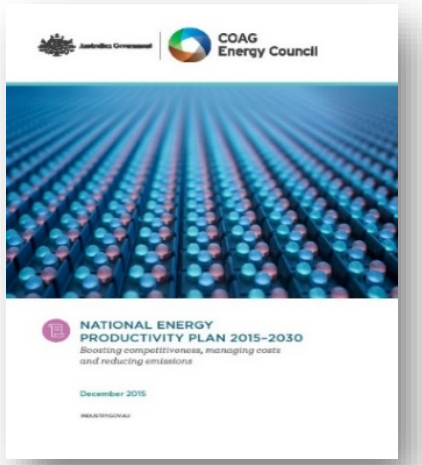
Australian context

- Australia has a National Construction Code that is implemented by 8 state and territory governments
- Australia updated our Code in 2019 – this mainly focused on commercial buildings
- Residential building energy efficiency measures were last updated in the Code in 2010 – they are proposed to be updated in 2022
- 80 per cent (160,000) new buildings each year are assessed using the Nationwide House Energy Rating Scheme (NatHERS)

6 Star is currently the minimum standard



National Policies



2015 | 2016 | 2017 | 2018 | 2019 | 2020

National Energy Productivity Plan (NEPP) 2015-2030

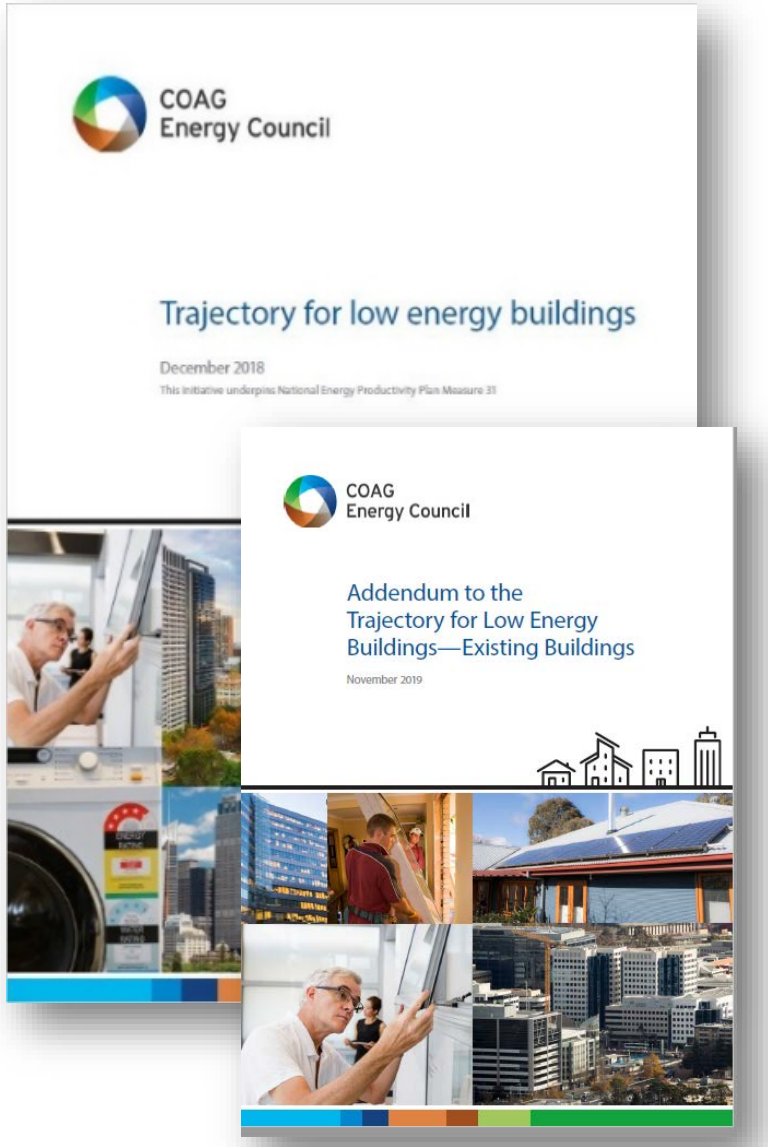
- Measure 31: Advance the National Construction Code; Measure 32: Improve compliance

***Trajectory for Low Energy Buildings* and its *Addendum – Existing Buildings*.**

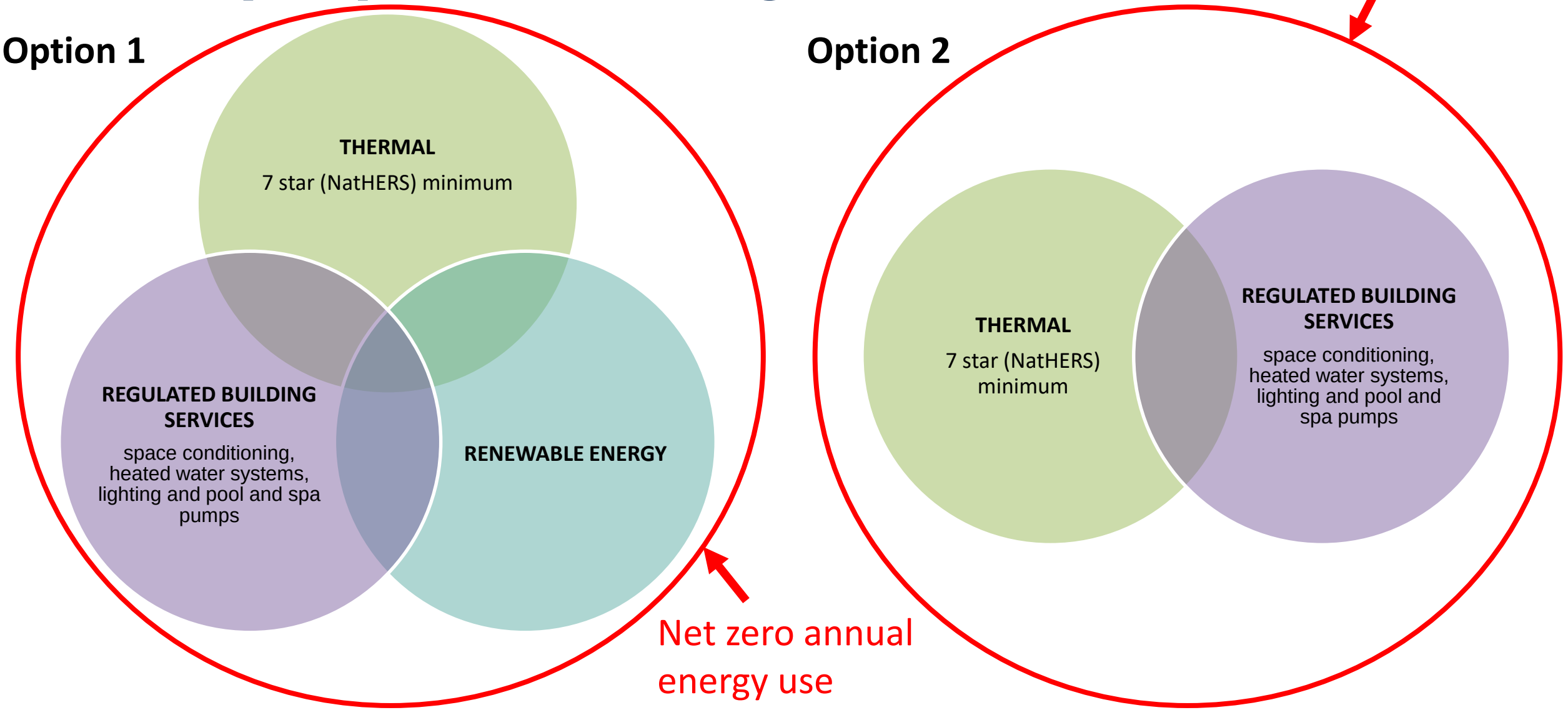
- Set a trajectory towards zero energy (and zero carbon) ready buildings

The Trajectory and Addendum

- Set a trajectory towards zero energy (and zero carbon) **ready** buildings.
  - These have an energy efficient thermal shell and appliances, have sufficiently low energy use and have the relevant set-up so they are ‘ready’ to achieve net zero energy (and carbon) usage, if they are combined with renewable or decarbonised energy systems on-site or off-site.
- Proposed increases to energy efficiency provisions in the National Construction Code (NCC) 2022.
- Outlined a suite of initiatives to improve the energy efficiency of existing buildings.



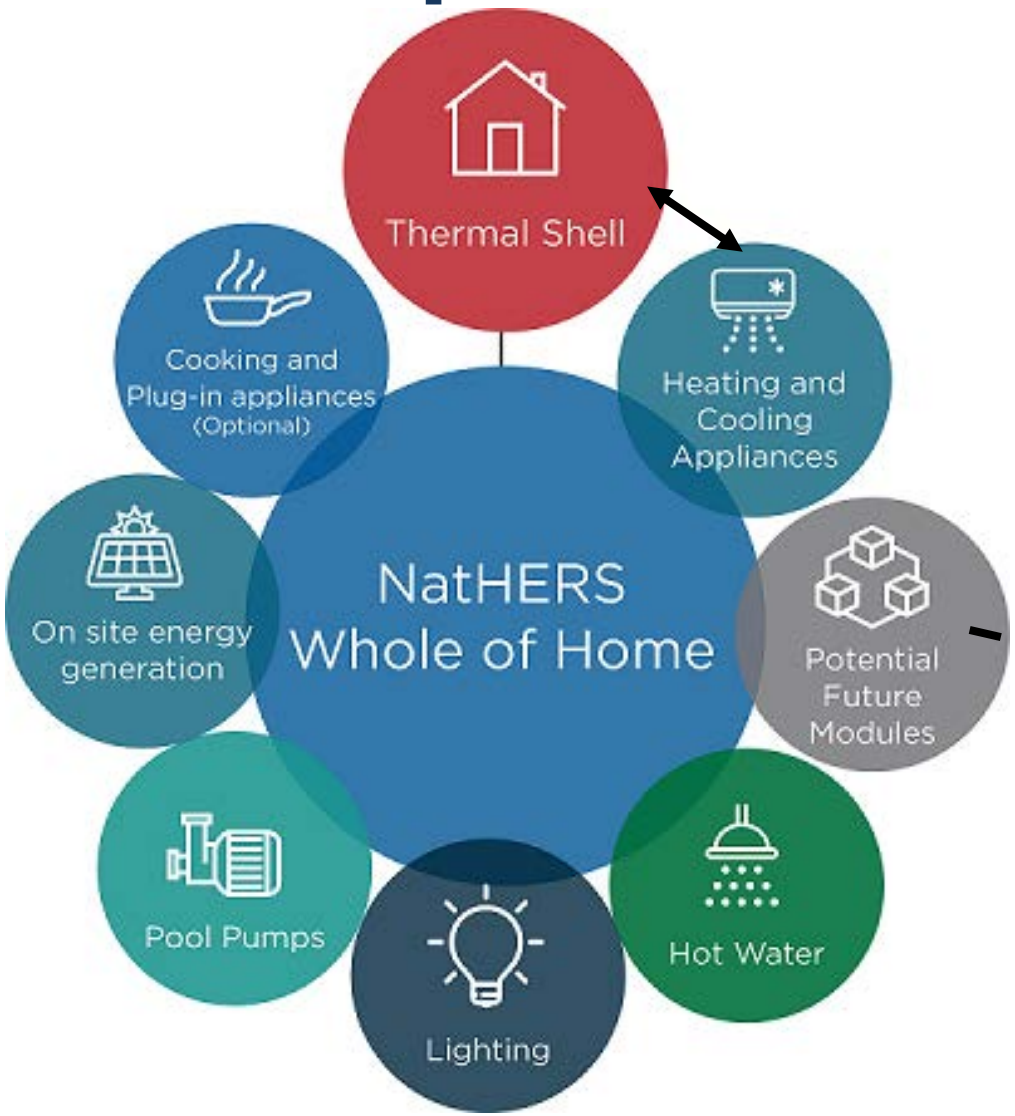
NCC proposed changes

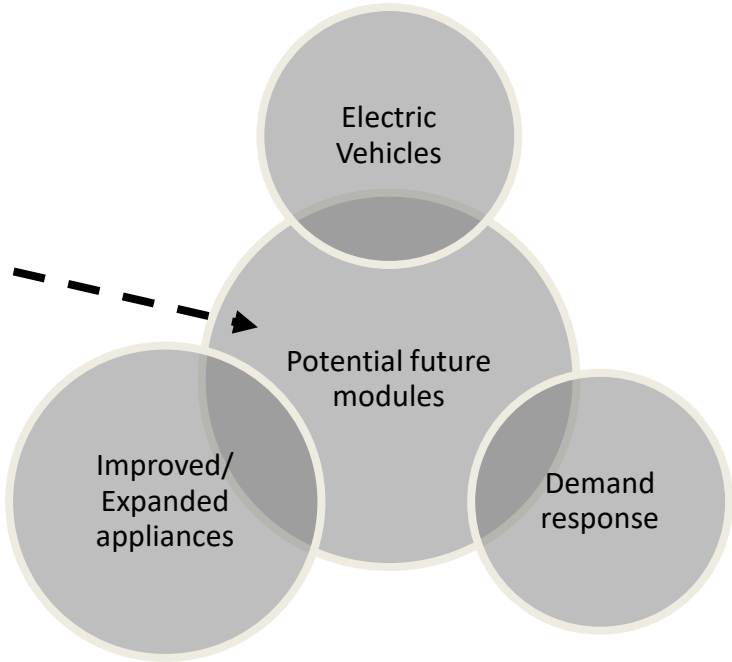


NatHERS Framework

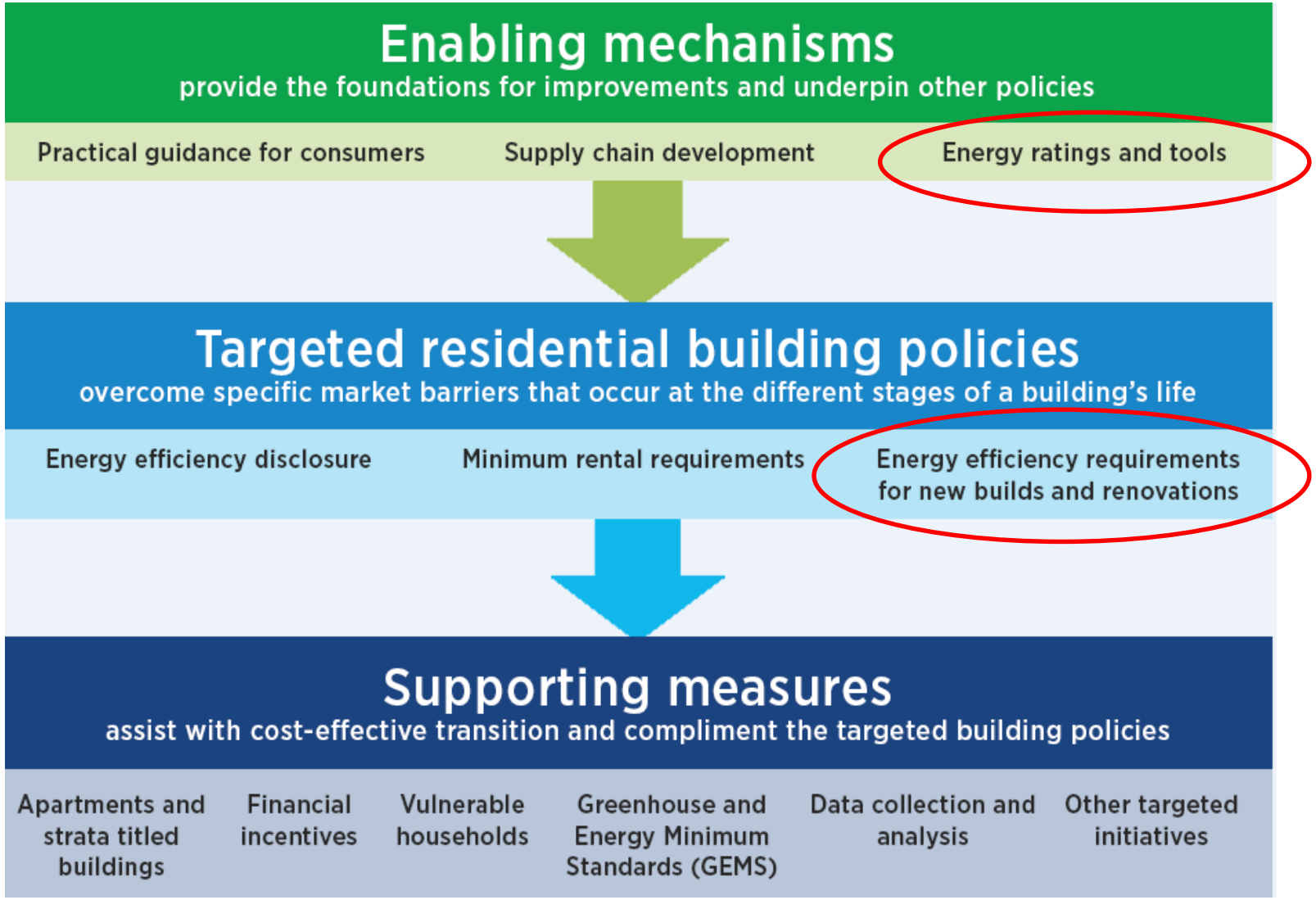
- Used by 80 per cent (160,000) new buildings each year to demonstrate compliance with mandatory minimum energy efficiency requirements.
- A national 10-star rating system that assesses the thermal performance of dwellings across Australia.
- Key elements of the Scheme are:
  - Accredited tools that produce a robust and credible assessment of a home.
  - Accredited assessors who conduct assessments that are then quality assured.
  - A nationally consistent Certificate and assessment report, and national data set.

NatHERS expansion





Trajectory work streams



Trajectory work streams

Enabling mechanisms
provide the foundations for improvements and underpin other policies

- Practical guidance for consumers
- Supply chain development
- Energy ratings and tools

Targeted residential building policies
overcome specific market barriers that occur at the different stages of a building's life

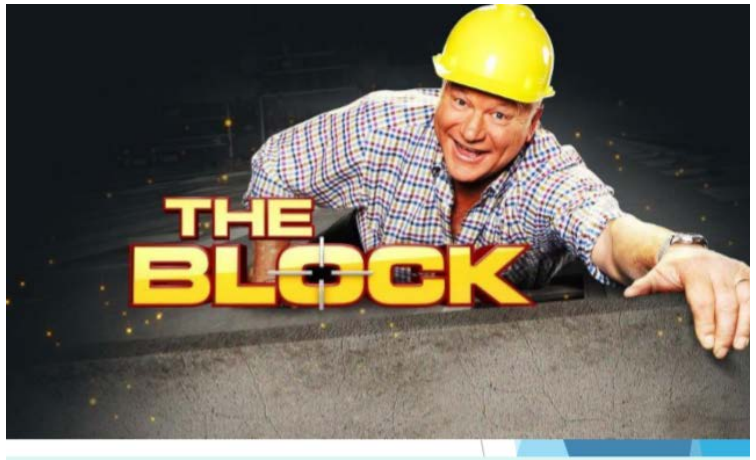
- Energy efficiency disclosure
- Minimum rental requirements
- Energy efficiency requirements for new builds and renovations

Supporting measures
assist with cost-effective transition and compliment the targeted building policies

- Apartments and strata titled buildings
- Financial incentives
- Vulnerable households
- Greenhouse and Energy Minimum Standards (GEMS)
- Data collection and analysis
- Other targeted initiatives

Practical guidance
www.yourhome.gov.au

Mass media project
http://renovateorrebuild.com.au



$251M

$251 million boost to quarterly renovations investment two quarters (or six months) following the airing.*

1.5M

Average audience size per episode for 2015 series of The Block

3.3%

increase in economic activity associated with home renovations attributable to The Block

NatHERS ecosystem

Under development

CURRENT STATE OF PLAY

Three tools are accredited under NatHERS (thermal) to deliver consistent ratings: used for new build compliance

NATIONWIDE HOUSE ENERGY RATING SCHEME ®

AccuRate

FirstRate5 house energy rating software

B.E.R.S

A variety of tools incorporate, or align, NatHERS thermal into Whole-of-Home: includes appliances, solar PV, etc.

AccuRate Sustainability

BASIX Building Sustainability Index

AusZEH

Victorian Residential Efficiency Scorecard STAR RATING

EXPANSION

NatHERS will accredit Whole-of Home rating tools: focus is new builds

EXTENSION

NatHERS is investigating accrediting existing home rating tools

FUTURE

NatHERS could accredit tools beyond energy efficiency. This could include resilience, embodied energy, etc.

NatHERS will consider communication clarity with other government rating systems and industry-led initiatives

NABERS

Contact

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Toward Nearly Zero Energy in the European Union

From a Common Framework to National Implementation

European legislation framework on energy efficiency in buildings

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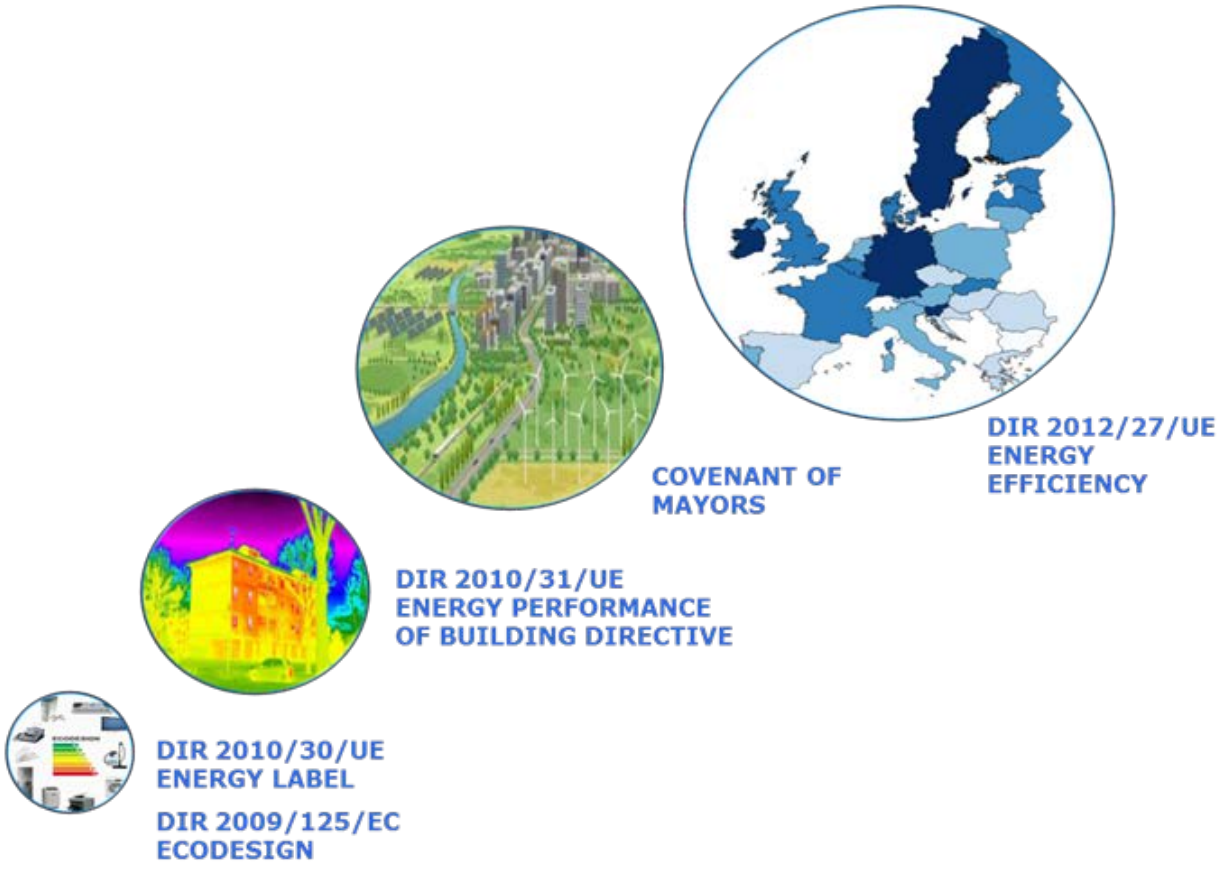
- EU energy efficiency targets for 2020 and 2030
- Roadmap of the Energy Union



Source: European Commission website

Energy Performance definition according to the EPBD

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Energy Perfomance (*EP*) of a building means:

The calculated or measured amount of energy needed to meet the energy demand

associated with a typical use of the building,

which includes, inter alia, energy used for heating, cooling, ventilation, hot water and lighting.

Mandates of the EC to technical standardization bodies

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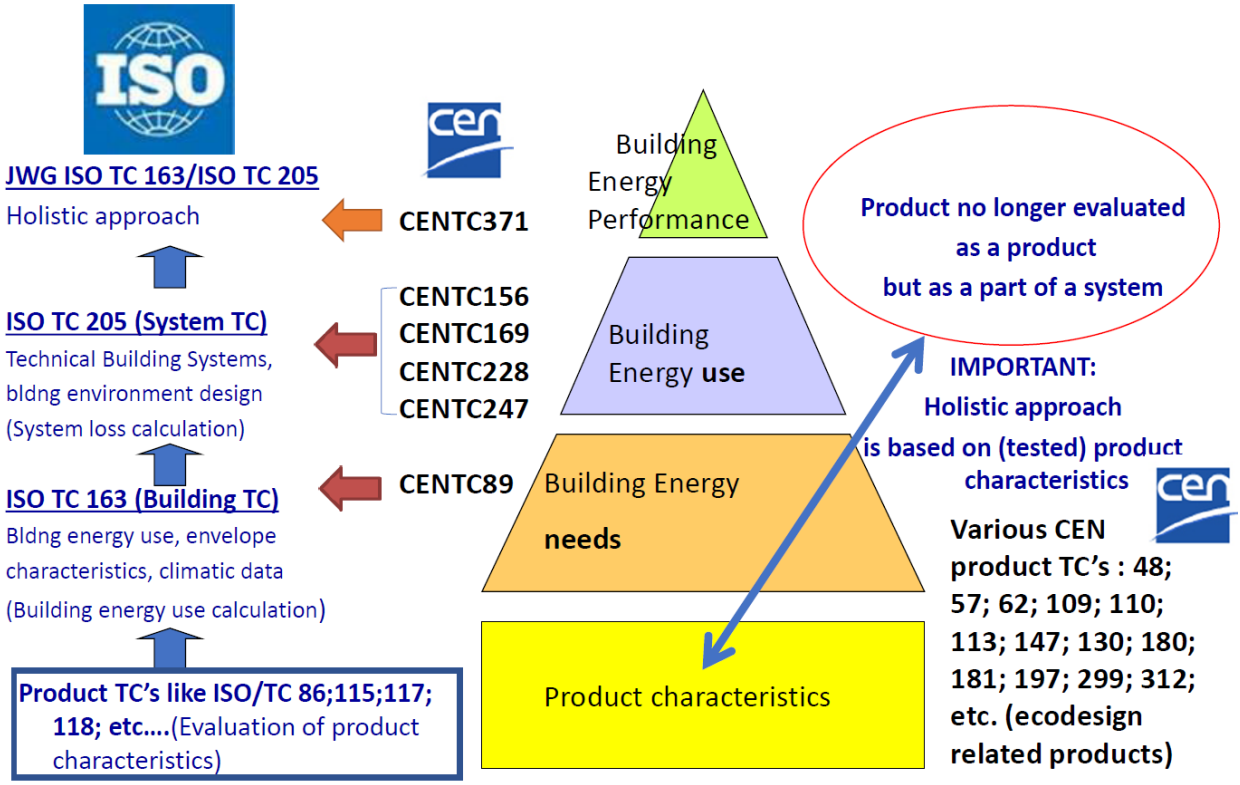
Mandate 343:2004

Mandate 480:2010

Elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and promoting the energy efficiency of buildings



Source: J. Hogeling, EPB Center

Key topics around NZEB and EP concepts

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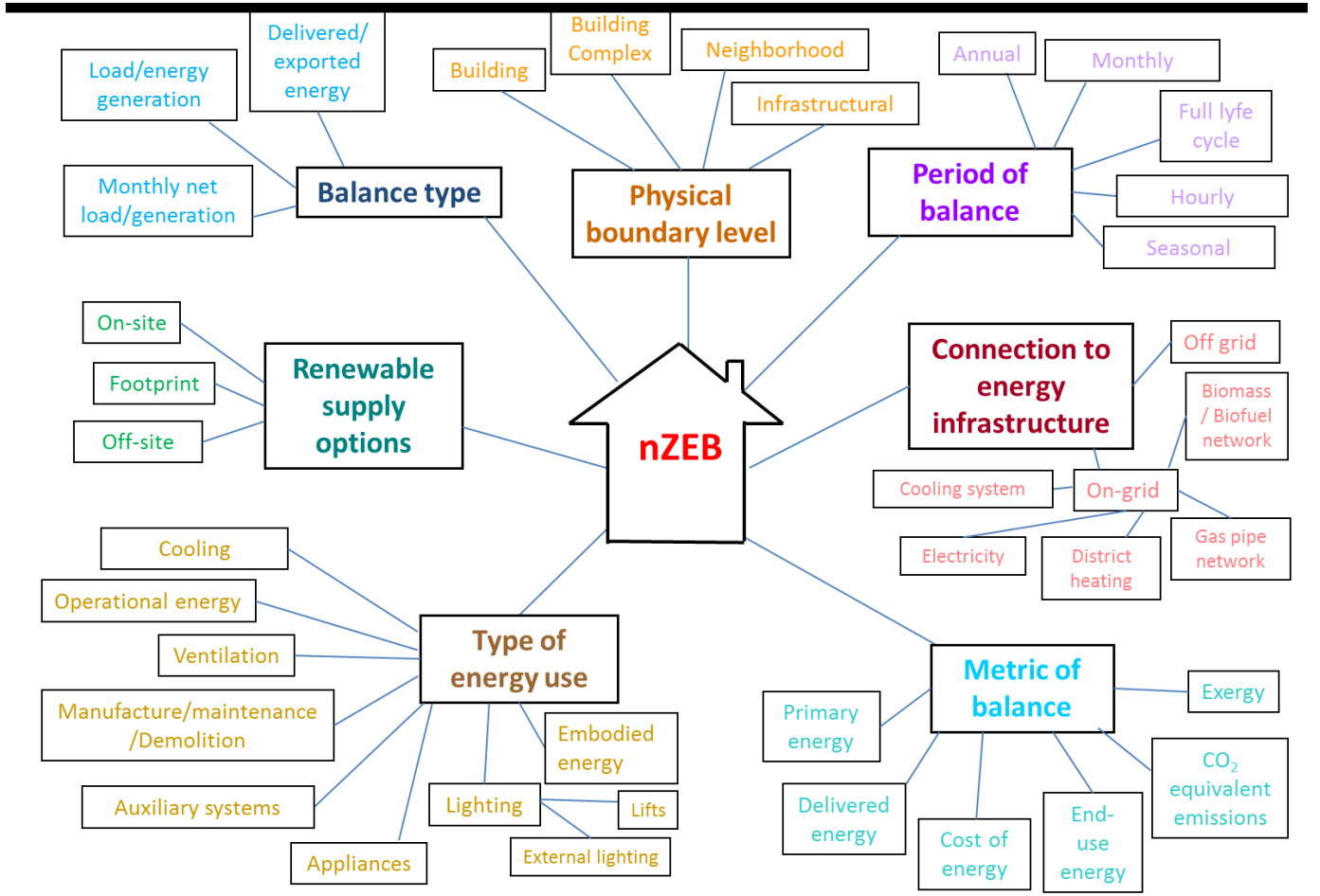

Source: D'agostino D., Zangheri P., Development of the NZEBs concept in Member States, JRC, 2016

Energy performance assessment

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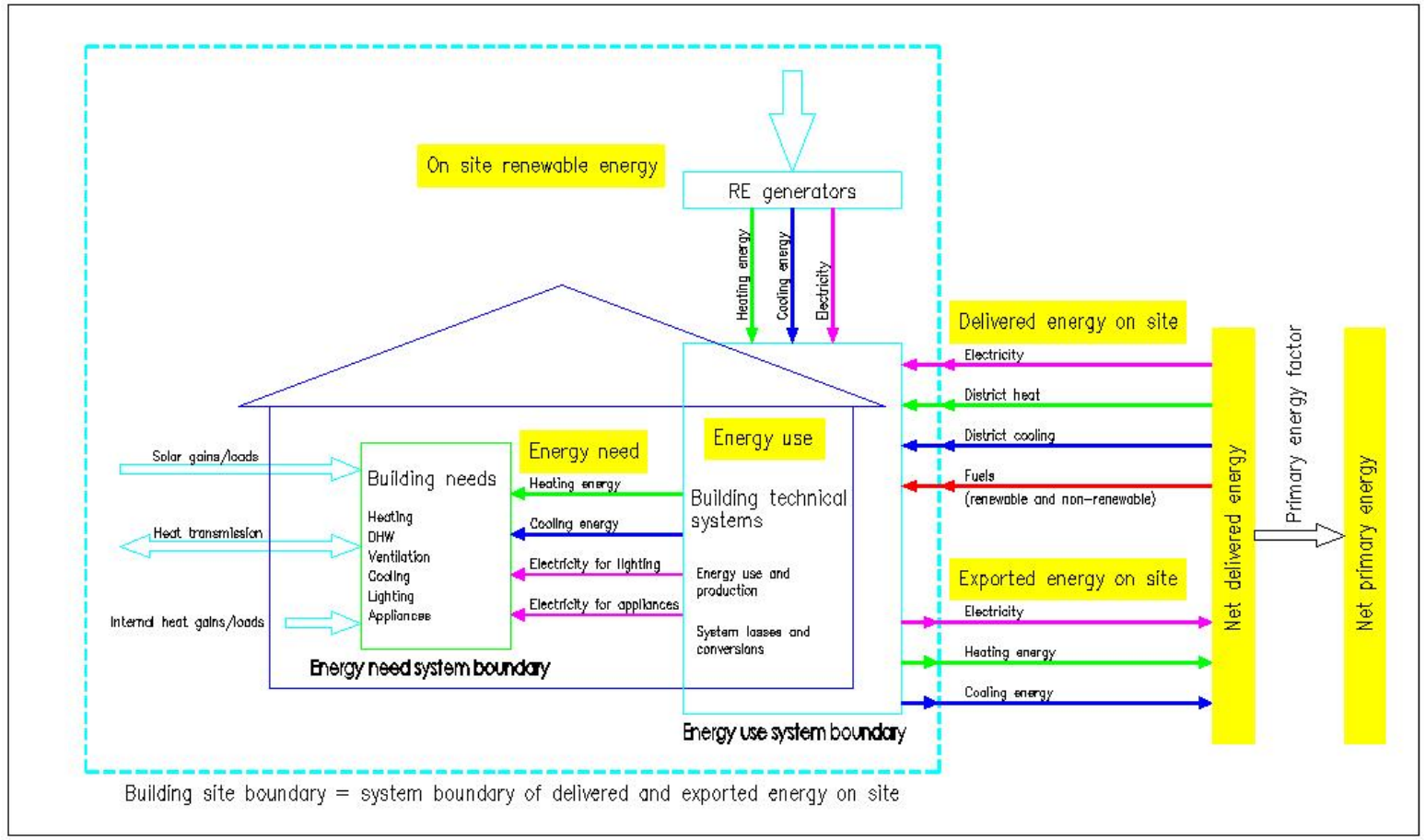

Source: REHVA Journal

Energy performance assessment

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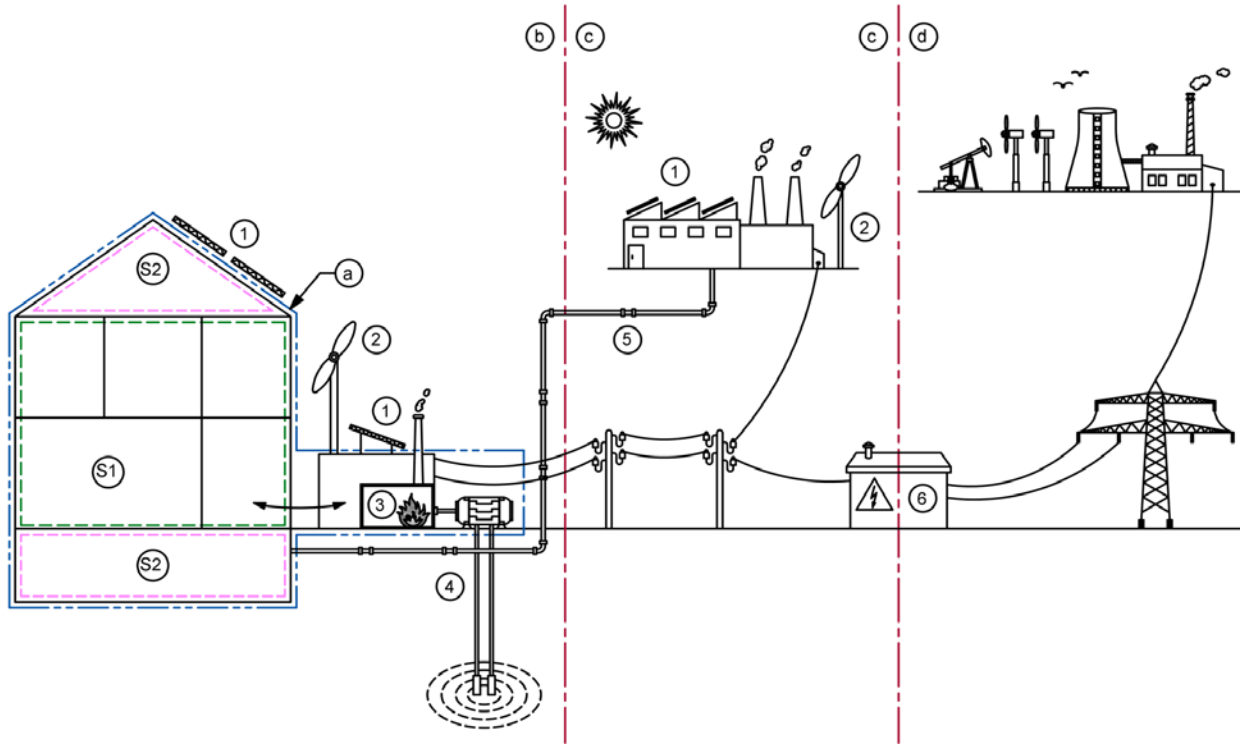
$$E_P = \sum \left(E_{del,i} \; f_{P,del,i} \right) - \sum \left(E_{exp,i} \; f_{P,exp,i} \right)$$

Key issues:

- Building energy assessment boundary
- Energy from renewable sources produced on-site/Exported energy assessment
- Primary energy conversion factor (renewable and non-renewable)
- Share of renewable energy



Source: EN ISO 52000-1:2017

Overall energy performance and Renewable Energy Ratio

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- The *Energy Performance* (*EP*) is expressed as the building *overall primary energy demand* divided by the *conditioned area*. *Overall* means that it is referred to all the EPB energy services (heating, cooling, DHW, ventilation, lighting …).

- *EP* includes either only non-renewable energy (E_{Pnren}), or both non-renewable energy and renewable energy (E_{Ptot}):

$$EP_{tot} = EP_{nren} + EP_{ren}$$

- The Renewable Energy Ratio (*RER*) is the ratio of the renewable primary energy to the total primary energy:

$$RER = EP_{ren} / EP_{tot}$$

- The Energy Performance is fully described by a couple of indicators:
  - EP_{tot} and EP_{nren} , or alternatively
  - EP_{tot} and *RER*

Global Cost

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- The *Global Cost* (*GC*) is the net present value of all costs (referred to the starting year), determined according to EN 15459.
- The Global Cost is linked to the calculation period (usually 30 years) and includes:
  - investment costs;
  - replacement costs;
  - running annual costs.
- The differential Global Cost (ΔGC) considers the extra-costs referred to a baseline building

Cost Optimality according to the EPBD recast

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- Member States shall take the necessary measures to ensure that minimum energy performance requirements for buildings or building units are set with a view to achieving cost-optimal levels.
- Member States shall take account of the cost-optimal levels of energy performance when providing incentives for the construction or major renovation of buildings.
- The Member States are allowed to provide incentives for new buildings, renovations or building elements which go beyond the cost-optimal levels.

Cost Optimality according to the EPBD recast

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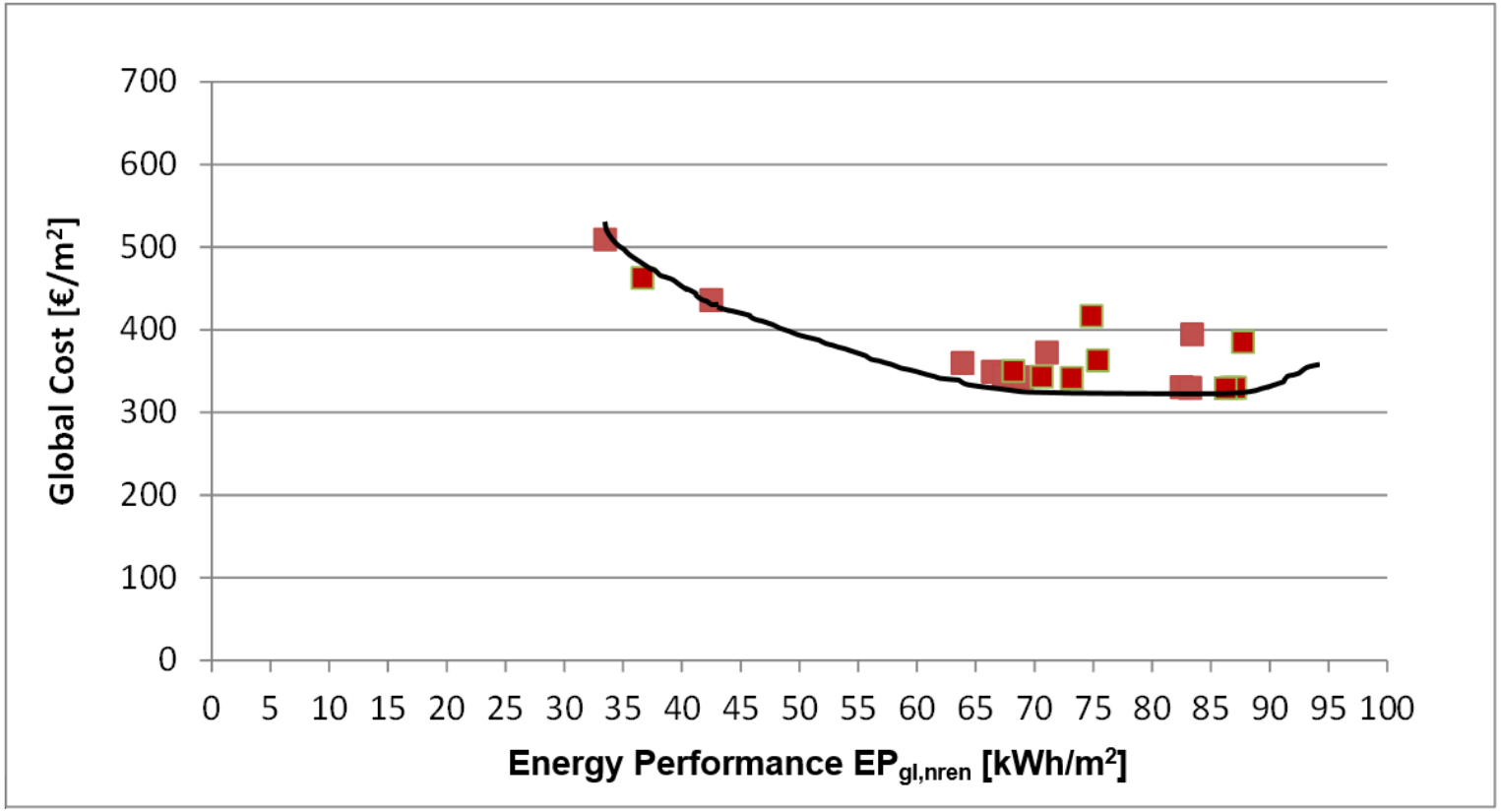
- Cost-optimal level' means *the energy performance level which leads to the lowest cost during the estimated economic lifecycle*

- The cost-optimal level shall lie within the range of performance levels where the cost benefit analysis calculated over the estimated economic lifecycle is positive.



Nearly Zero-Energy Buildings according to the EPBD recast

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- Member States shall ensure that:
  - all new buildings are nearly zero- energy buildings (by 31/12/2020);
  - new buildings occupied and owned by public authorities are nearly zero-energy buildings (after 31/12/2018).
- Member States shall draw up national plans for increasing the number of nearly zero-energy buildings.

A Nearly Zero-Energy Building (NZEB) means:

- A building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

NZEB requirements according to international standards

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- A methodological proposal rather than a binding definition of NZEB is provided in EN ISO 52000-1.
- The use of only one requirement is misleading. Different requirements are combined to a coherent assessment of a NZEB:
  - indoor environmental conditions;
  - thermal characteristics of the building;
  - HVAC installation, DHW supply, built-in lighting installation, optimising the energy use of technical building systems;
  - active solar systems and other systems based on energy from renewable sources;
  - district or block heating and cooling systems.

NZEB requirements according to international standards

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Four classes of requirements are proposed:

1. Energy needs (building fabric)
2. Total primary energy use
3. Non-renewable primary energy use
    a. without compensation between energy carriers
    b. with compensation between energy carriers

NZEB requirements according to international standards

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1. REQUIREMENTS ON THE BUILDING FABRIC
   - the quality of the building envelope (e.g. insulation, windows);
   - the bioclimatic design (e.g. solar gains, natural lighting);
   - the inertia, the zoning;
   - the need to guarantee adequate indoor environmental conditions in order to avoid possible negative effects such as poor indoor air quality (e.g. lack of ventilation) or hygro-thermal problems (e.g. mould).

NZEB requirements according to international standards

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2. REQUIREMENTS ON THE TOTAL PRIMARY ENERGY USE
   - The total primary energy use is a coherent way for setting technical building system requirements by considering systems losses outside the building assessment boundary (e.g. electricity generation).
   - Only energies delivered through the assessment boundary from the perimeters defined are taken into account to link the total primary energy use with the energy counters.
   - The total primary energy factors take into account the losses outside the assessment boundary.

NZEB requirements according to international standards

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3. REQUIREMENTS ON NON-RENEWABLE PRIMARY ENERGY USE
   - Reflects the contribution of energies from renewable sources (e.g. active solar systems or other systems based on energy from renewable sources, district heating and cooling systems).
   - Two options:
     a) Only the energy that is used to provide on-site services (heating, ventilations, etc.) is taken into account
     b) Also the compensation between energy carriers and the effect of exported energy is taken into account (e.g. between delivered gas and on-site PV).

National requirements and assessment metric

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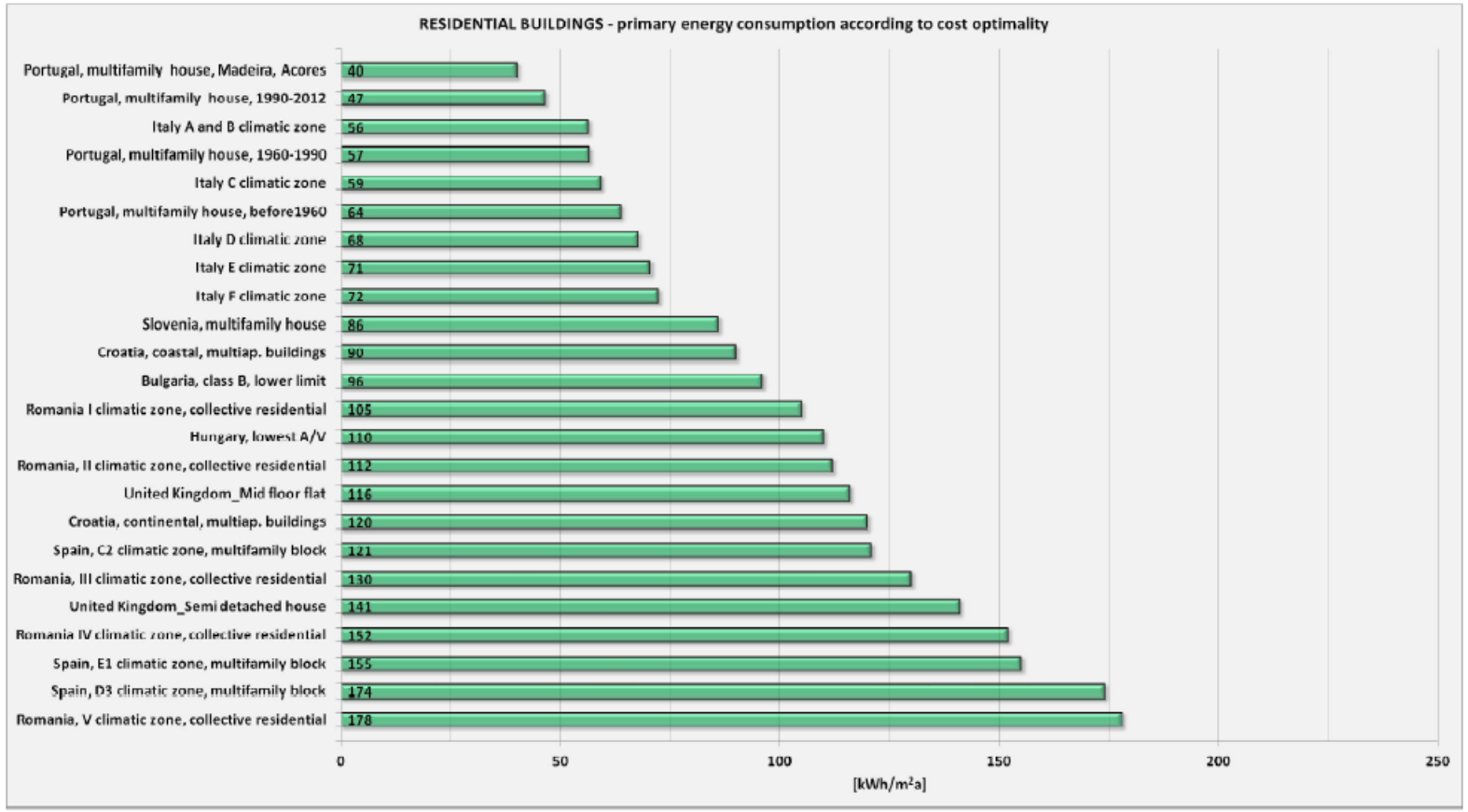

Flexible approach, taking into account country-specific climate conditions, ambition levels, primary energy factors, calculation methodologies, and building traditions.

An example: NZEB requirements in the Italian legislation

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- Limit values of the following parameters:
  - Mean thermal transmittance of the thermal envelope
  - Summer effective solar area per unit floor area
  - Total overall energy performance;
  - Thermal energy needs for heating and cooling;
  - Seasonal efficiencies of heating, cooling and domestic hot water systems.
- Obligations of contribution from renewable sources:
  - Minimum value of the Renewable Energy Ratio (*RER*) for DHW and for heating, cooling and DHW
  - Minimum electrical power from renewable sources produced on-site per unit footprint of the building area

Natural Resources Canada
Ressources naturelles Canada

Better Evidence for Better Building Codes

Net-Zero Energy Ready Requirements for New Housing

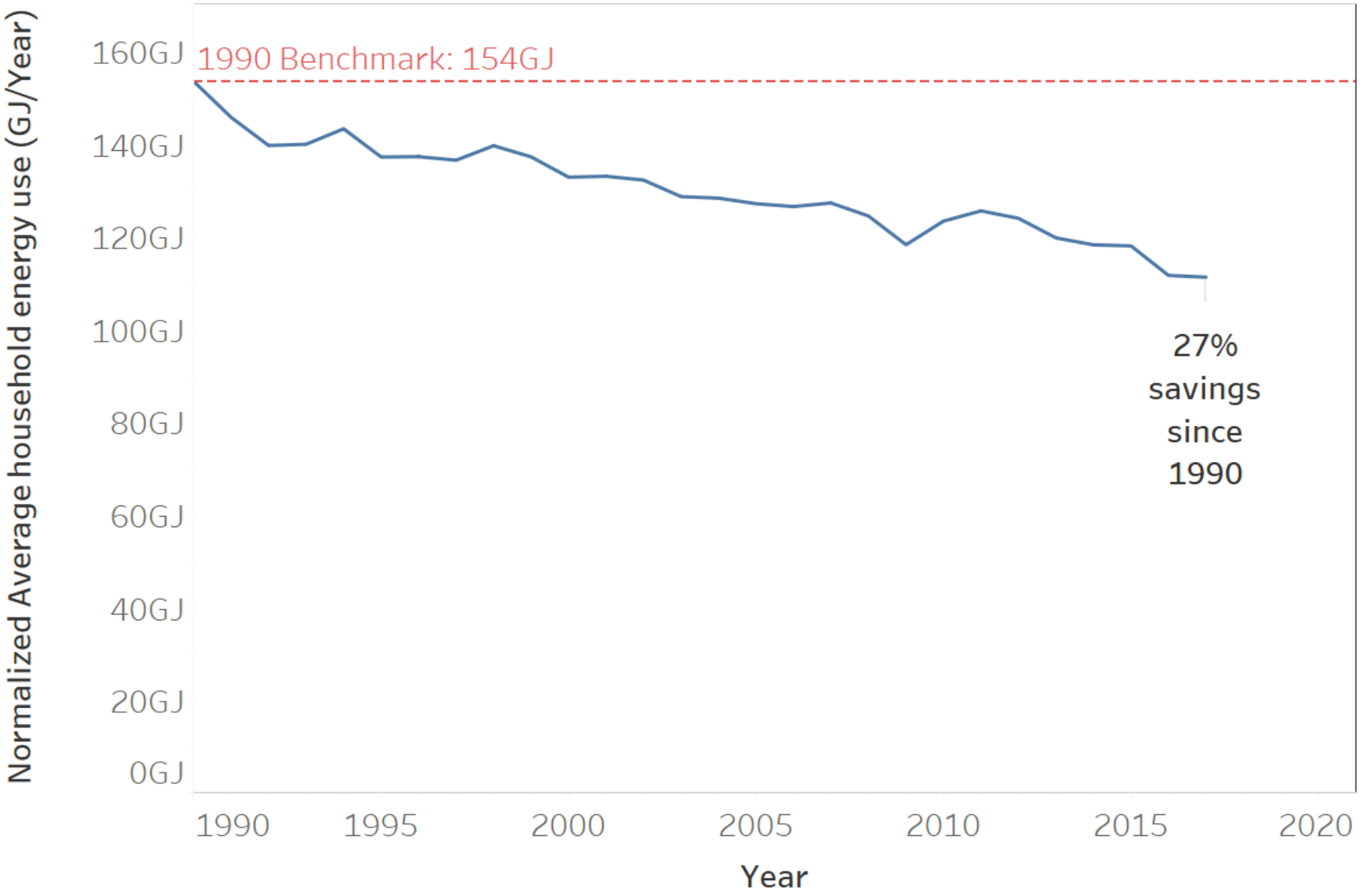
May 19, 2020

Canada

Canada's Buildings Strategy

Key Measures:

1. **Net-Zero Energy Ready codes** for new construction
2. **Energy-efficiency Alterations codes** for existing houses and buildings



Reason #1:
Strong track record of improving energy efficiency year-over-year

Reason #2:
Growing portfolio of Passive House, Net-Zero & Net-Zero Ready projects across the country

ENERGY STEPCODE

BUILDING BEYOND THE STANDARD

BRITISH COLUMBIA

3) Local leadership on Next-Gen Codes

From Programs to Codes

Programs	Codes
Often popular in specific regions	Must apply to entire country
Can focus on specific housing types	Must govern all housing types
Operate on opt-in basis	Stipulate mandatory participation

Net Zero-Ready Codes raise the stakes!

Housing Technology Assessment Platform

Housing Audit Databases:

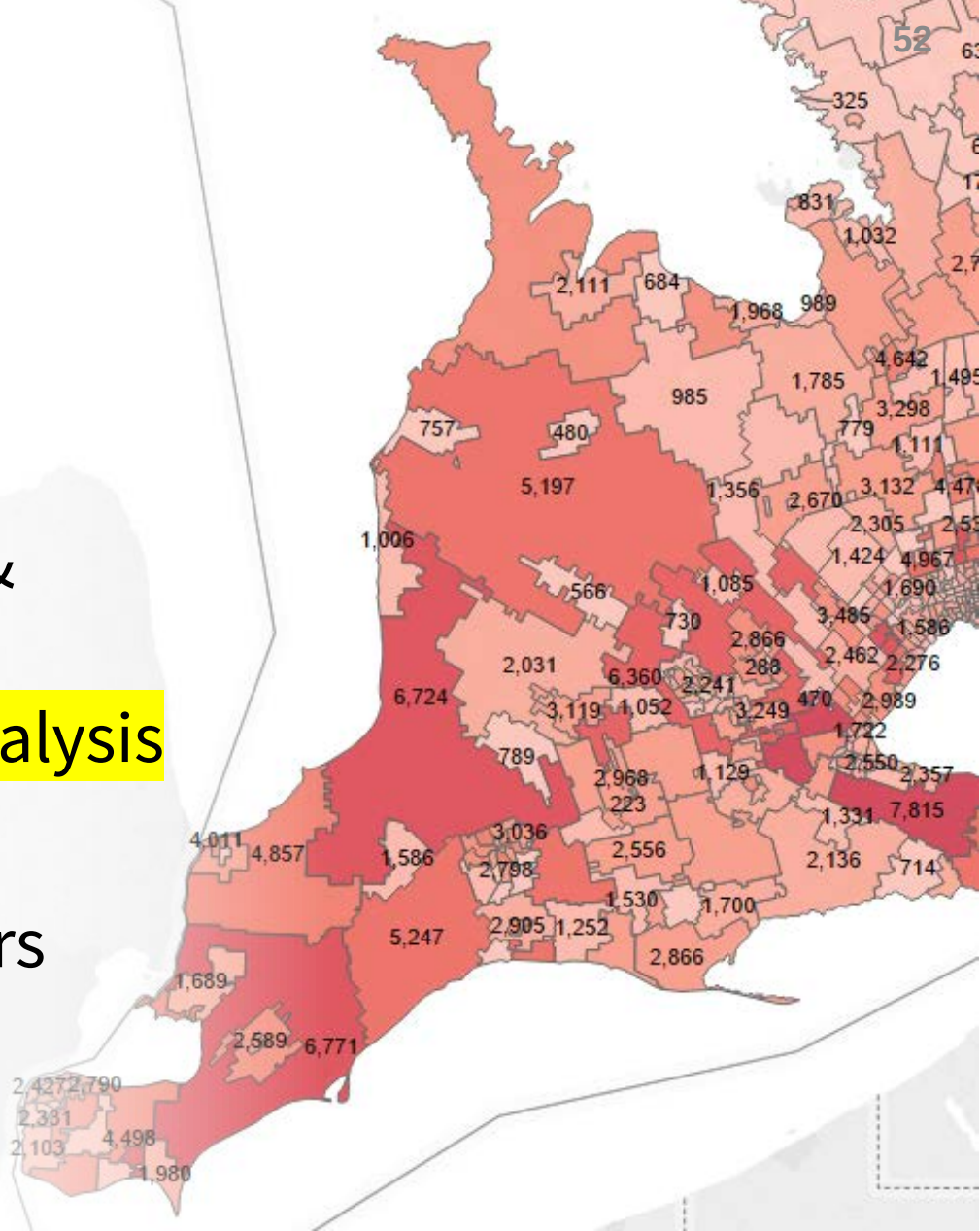
- 1M+ labelled homes
- Existing & new construction
- Includes ENERGY STAR, R-2000, NZE-Ready & Passive House labelled homes
- Statistically-selected archetypes for code analysis

Costing Data:

- Feedback from home builders, manufacturers

Cloud Computing:

- Batch Scripts + Amazon Web Services



Research Objectives

1. Choose **metrics** that:
   - Are achievable across all housing types
   - Deliver equitable and intuitive outcomes for all Canadian regions

2. Set **targets** that:
   - Align with current Net-Zero/Passive-house performance

3. Evaluate **feasibility & costs**

Which metrics should we use?

Relative Performance
(% Better than the reference house)

- Compares as-designed energy performance to similar building built to prescriptive targets.
- Requires all homes to have similar construction specifications.
- Generally more permissive for architectural form.

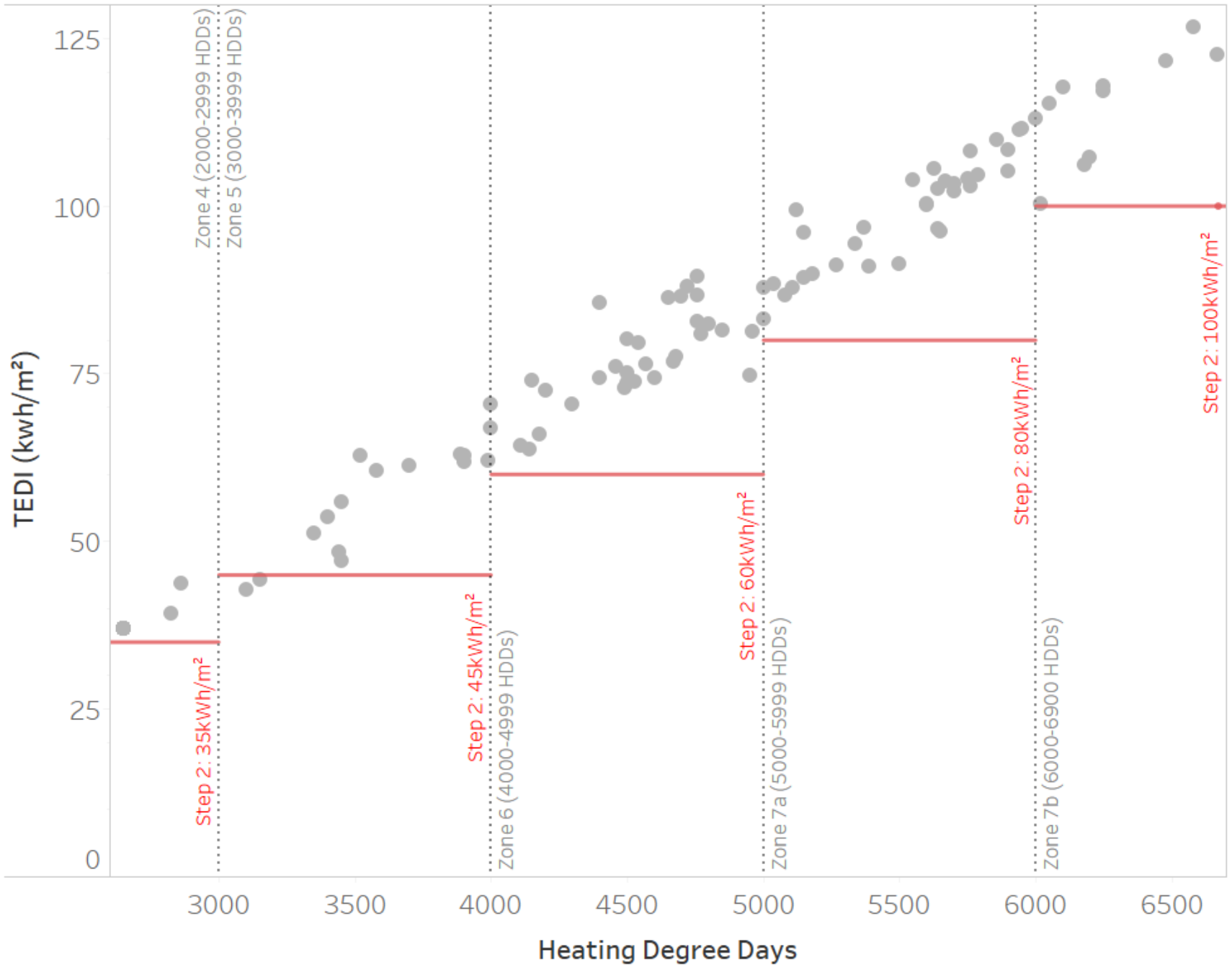
Absolute Energy Intensity
(TEDI, MEUI, EUI: kWh/m^2)

- Limits the as-designed home to a prescribed energy intensity.
- Requires all homes to have similar energy use (as designed)
- Generally more restrictive in architectural form

Equity Across Architectural Forms

Manufactured Housing:
Physical dimensions limited by transport regulations

Northern Housing:
Conditioned crawl-spaces required to accommodate water and waste utilities that cannot be constructed below grade

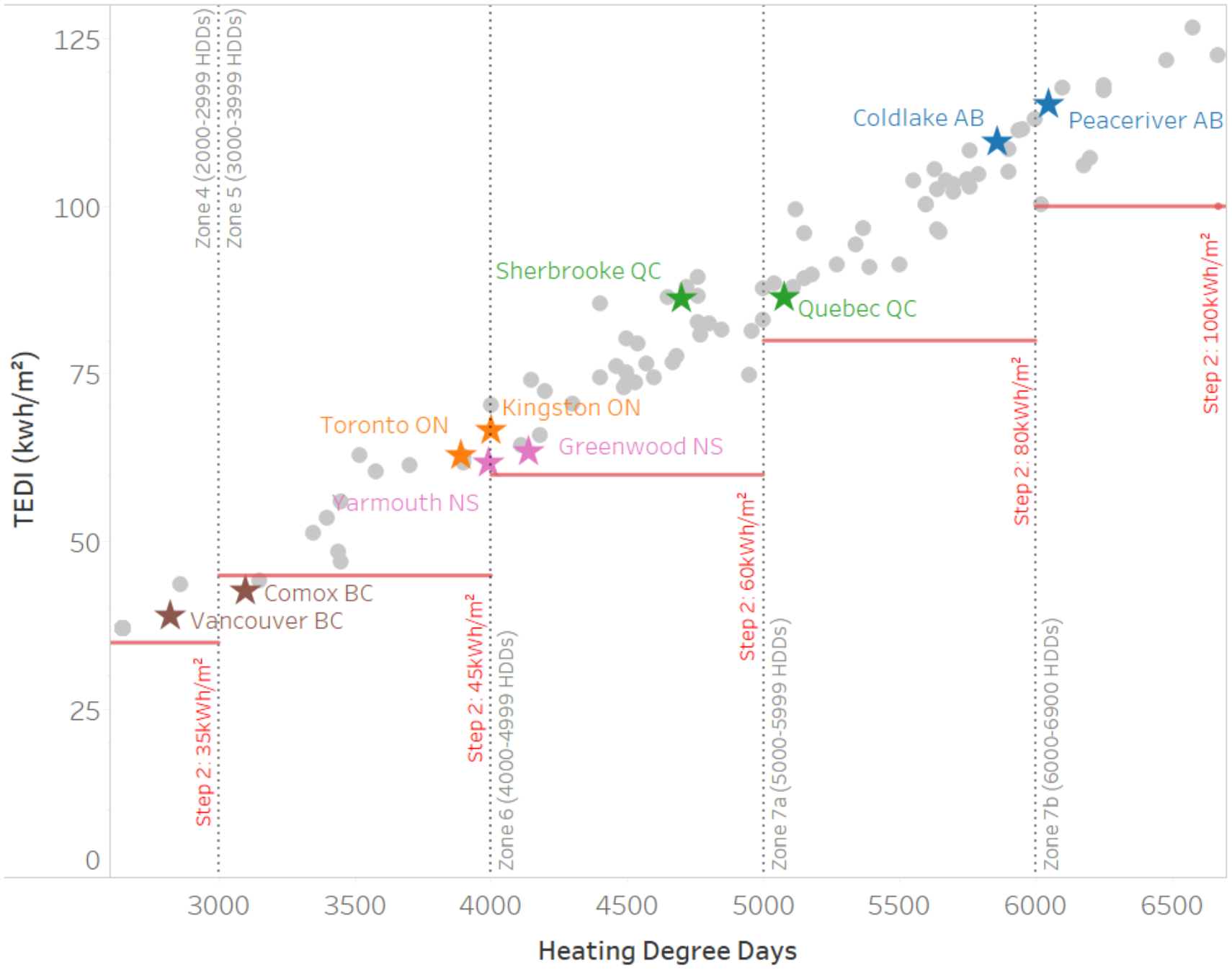


Outcomes by Climate Zone

Staggered approach required to ensure intensity-based approaches are equitable in colder climates.

Outcomes by Climate Zone

At CZ boundaries, our data shows intensity-codes place more onus for insulation on builders in warmer locations than near-by, colder communities.



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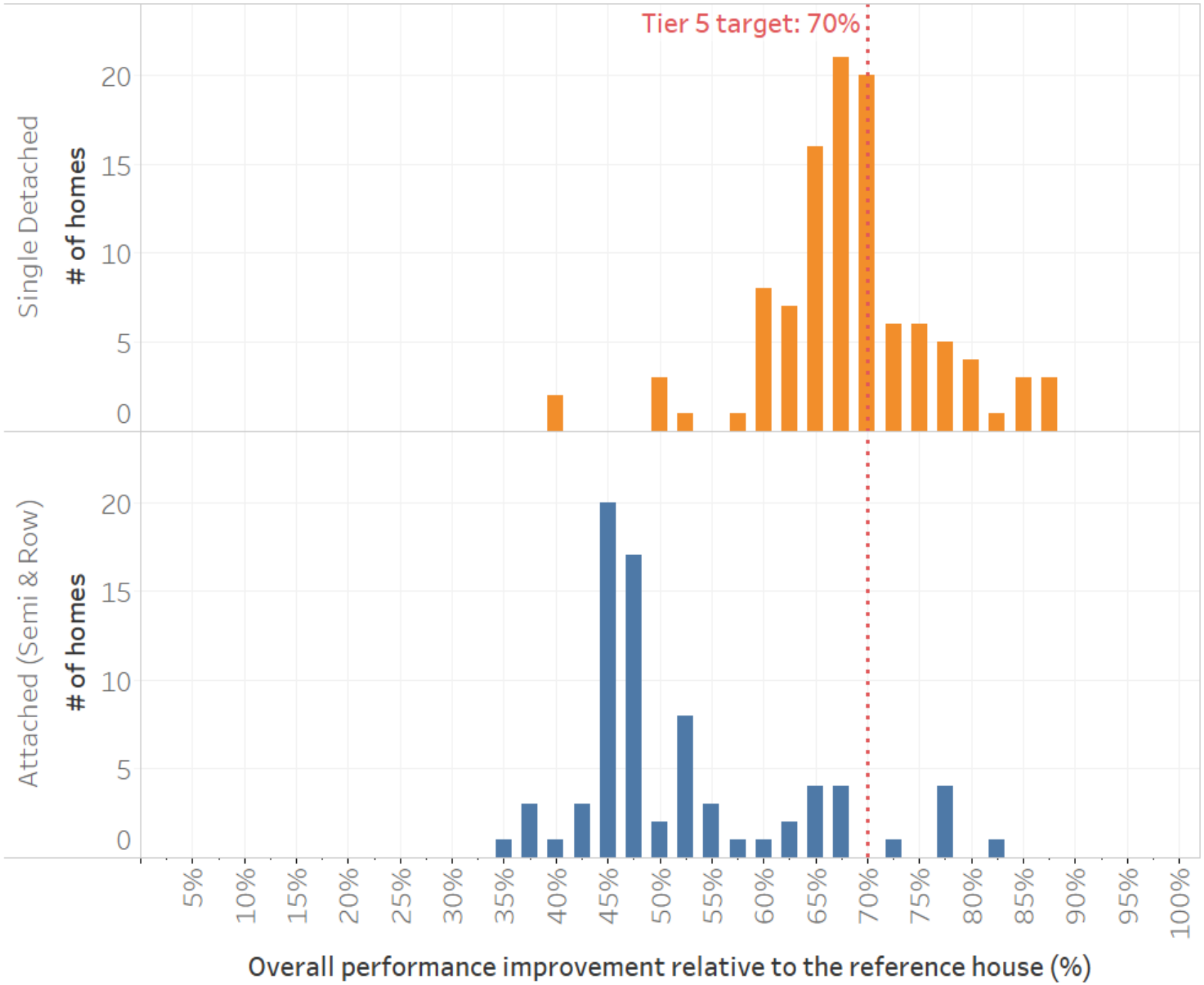
Result: Tiered Code with Reference House Metrics

Tier	Envelope Performance Improvement (%)	Overall Energy Performance Improvement (%)
1	N/A	≥ 0
2	≥ 5	≥ 10
3	≥ 10	≥ 20
4	≥ 20	≥ 40
NZE-Ready Tier 5	≥ 50	≥ 70

Note: As of May 2020, these proposed code changes are undergoing public review. If adopted, the actual requirements may differ from those outlined here.

Benchmarking vs. NZE-Ready & PH homes

Majority of PH & NZE-Ready homes would not comply with proposed NZE-Code



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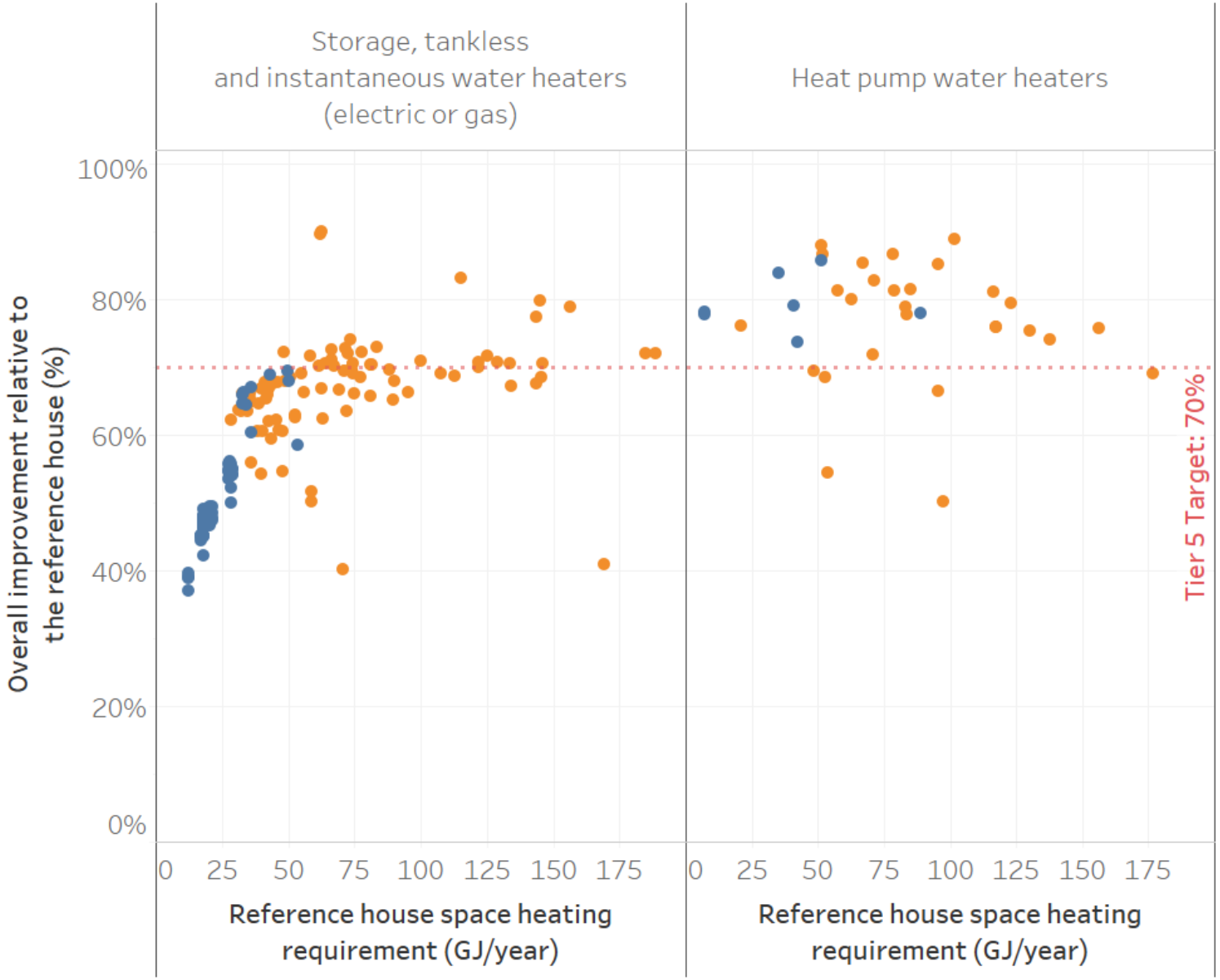
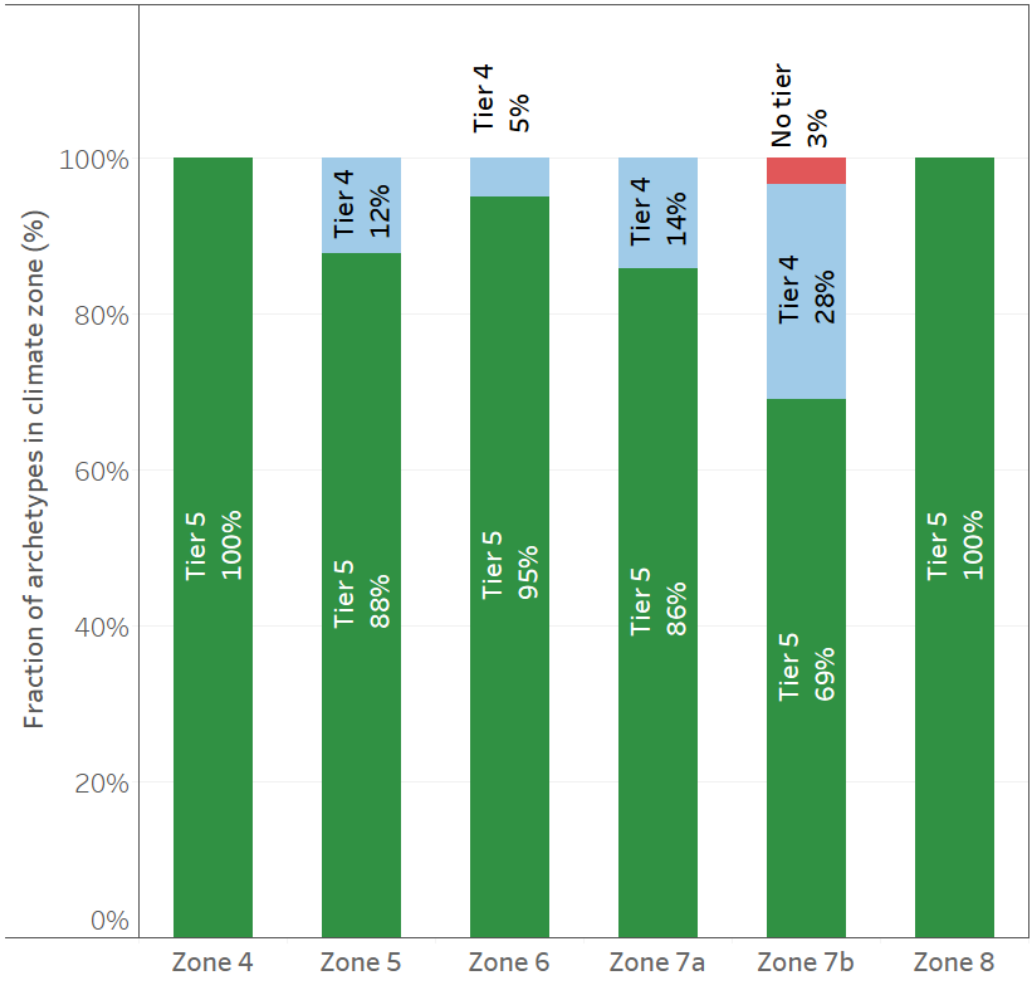


Key Factor: Heat Pump Water Heaters

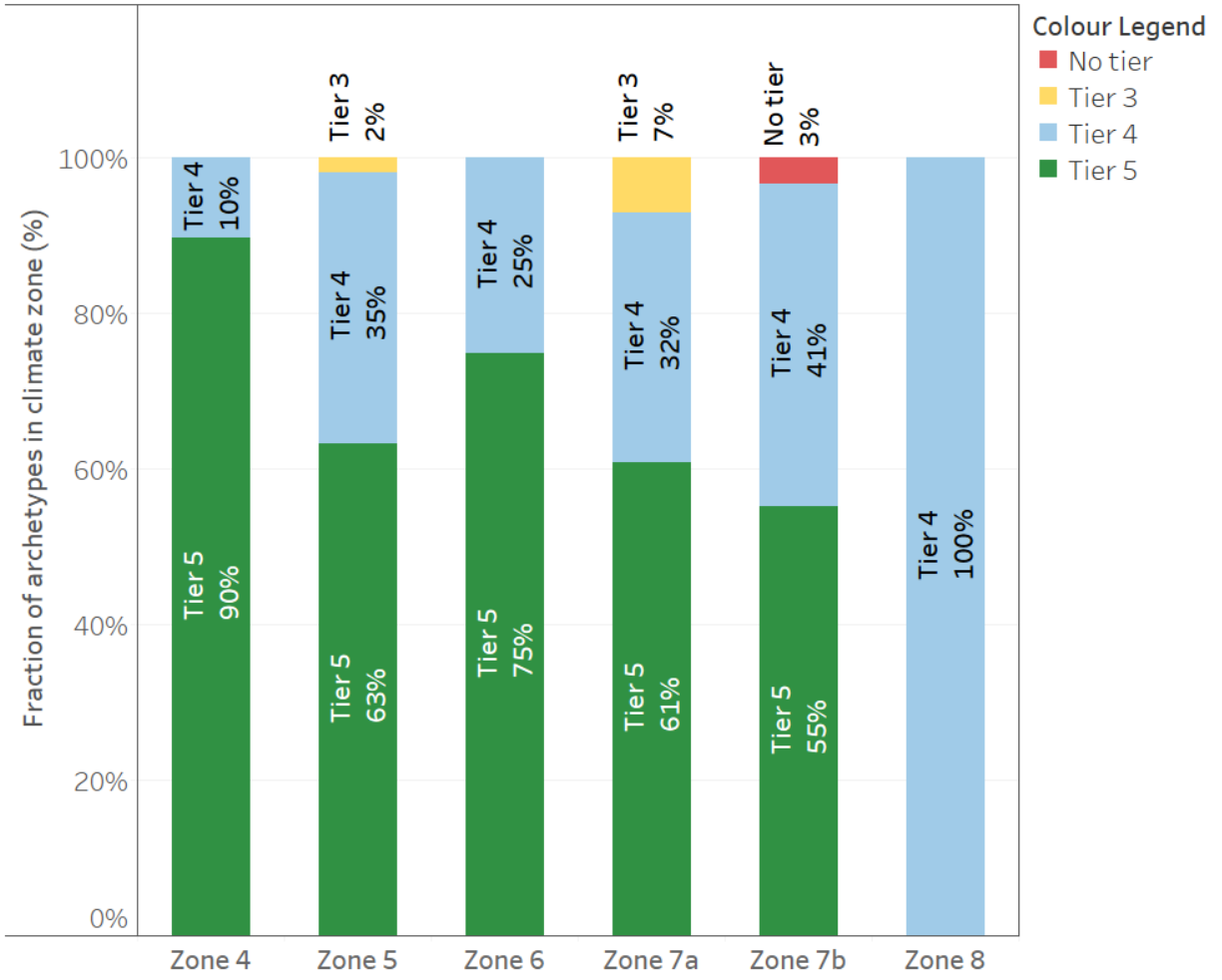
Proposed NZE-Ready code puts more emphasis on overall performance than just space-heating alone.

Code Feasibility

Electric heating

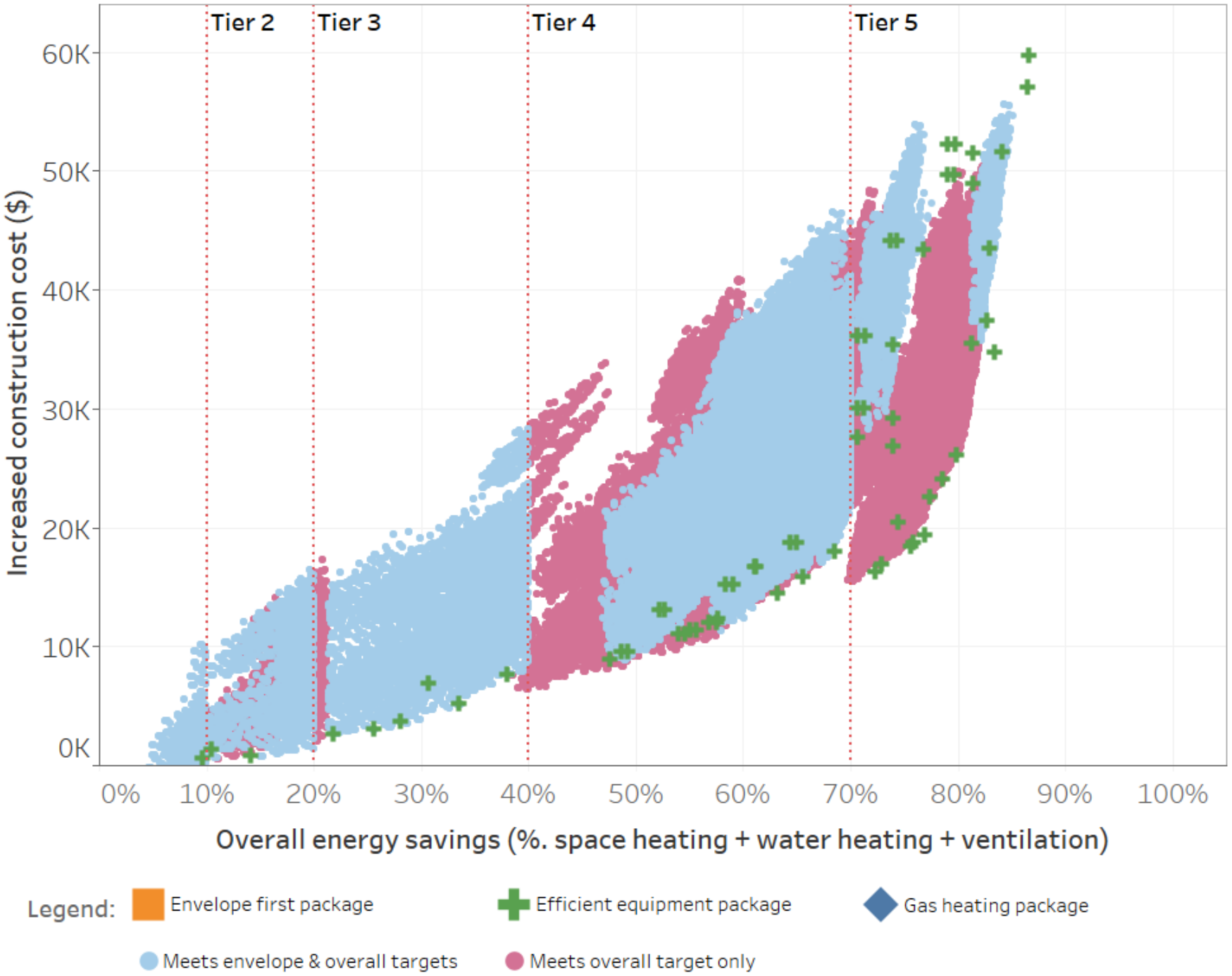


Gas heating



Cost Optimization

At CZ boundaries, our data shows intensity-codes place more onus for insulation on builders in warmer locations than near-by, colder communities.



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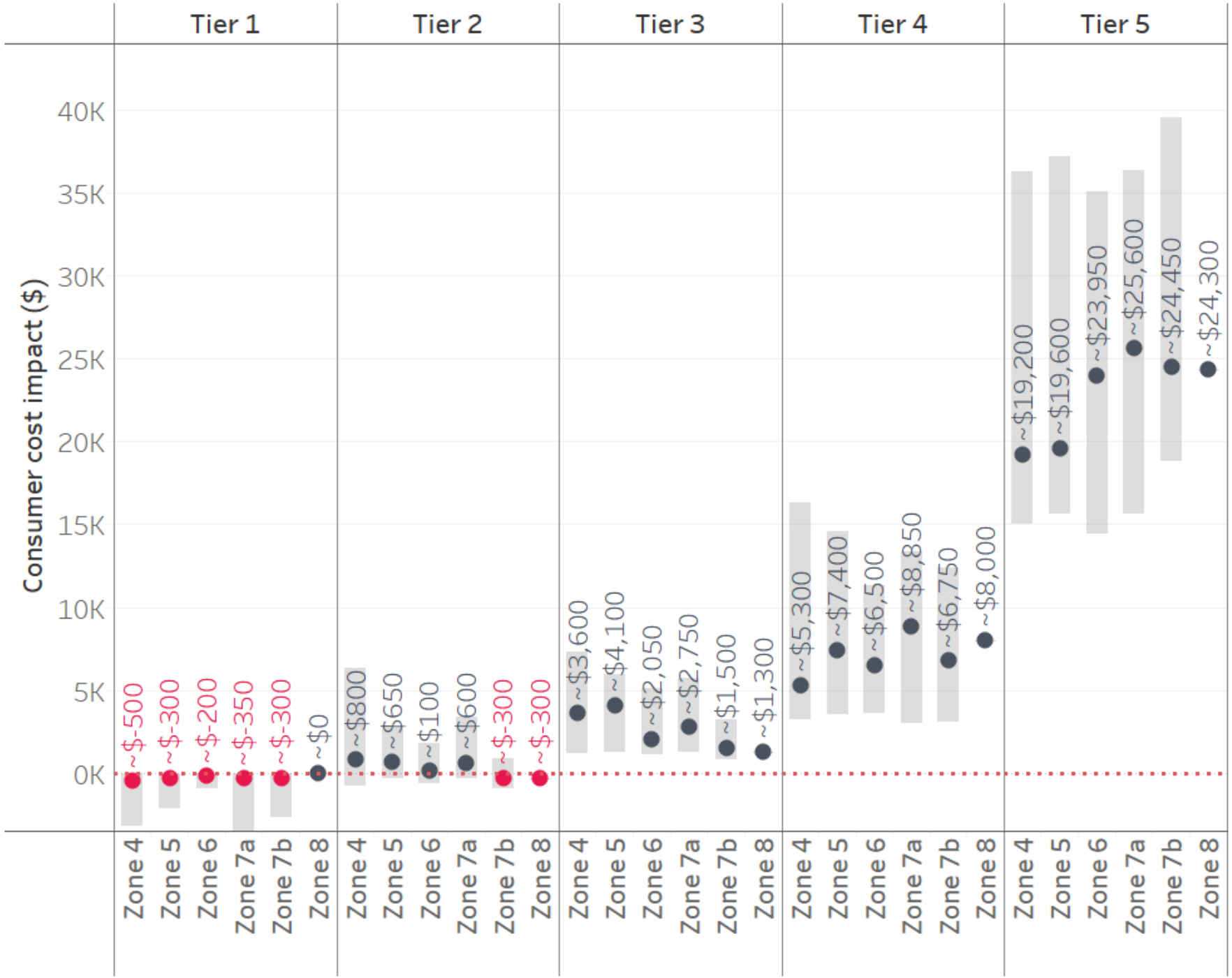
Cost Impacts



Canada

Next Steps:

1. The **Tiered Energy Code** completed public review in March. If approved, these requirements will become part of Canada's national building code in 2021.

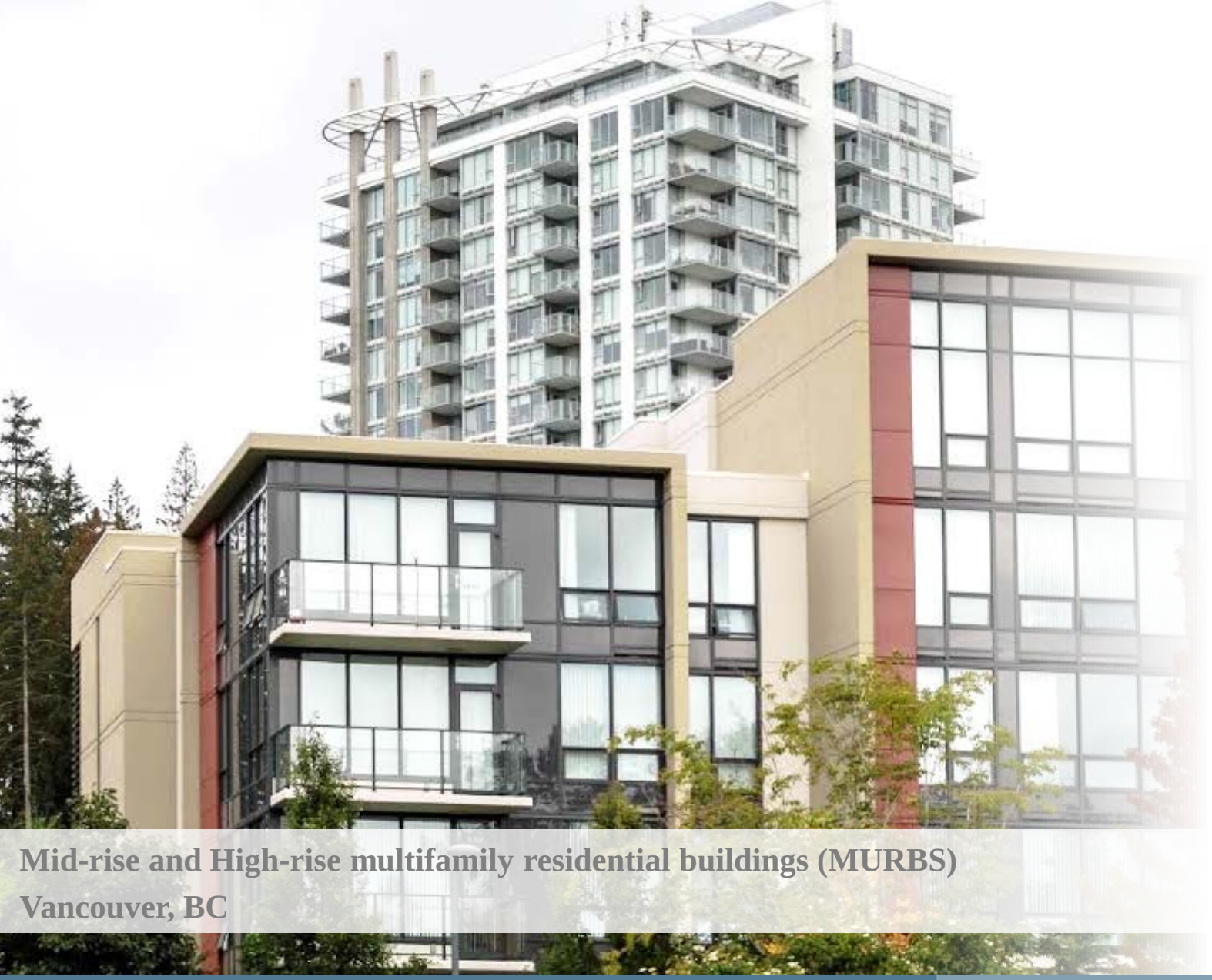
2. Codes Canada has begun work on new requirements for **Alterations for Existing Buildings**

HTAP Project Team

Researchers: Rasoul Asaee
Jeff Blake
Alex Ferguson
Julia Purdy

General Questions: Meli Stylianou

GitHub project:
https://github.com/NRCan-IETS-CE-O-HBC/HTAP



Mid-rise and High-rise multifamily residential buildings (MURBS)
Vancouver, BC


Canada

Q&A

EBC
Energy in Buildings and Communities Programme

Please put questions in comments and we will go over as many as possible (see the chat function at the bottom of the screen).

Presenters were:

Adam Hinge – Zero Energy Building Definitions and Policy Activity

Jodie Pipkorn – Towards Net Zero in Australia: Residential Building Codes and Complementary Measures

Vincenzo Corrado – Toward Nearly Zero Energy in the European Union: From a Common Framework to National Implementation

Alex Ferguson – Canadian Experiences with Net-Zero Ready Housing Codes: Observations from Metrics Research and Impact Analysis

Close

EBC
Energy in Buildings and Communities Programme

Thank you all for coming.

We will be sharing a recording of this event with all registered participants.

If you're interested in future Building Energy Codes Working Group webinars and events please email Alison Delgado at Alison.Delgado@pnnl.gov or visit the website for further information: https://www.iea-ebc.org/working-group/building-energy-codes.