

Breakout 2A: Decarbonization Policies

Regulations driving the
decarbonization of new buildings



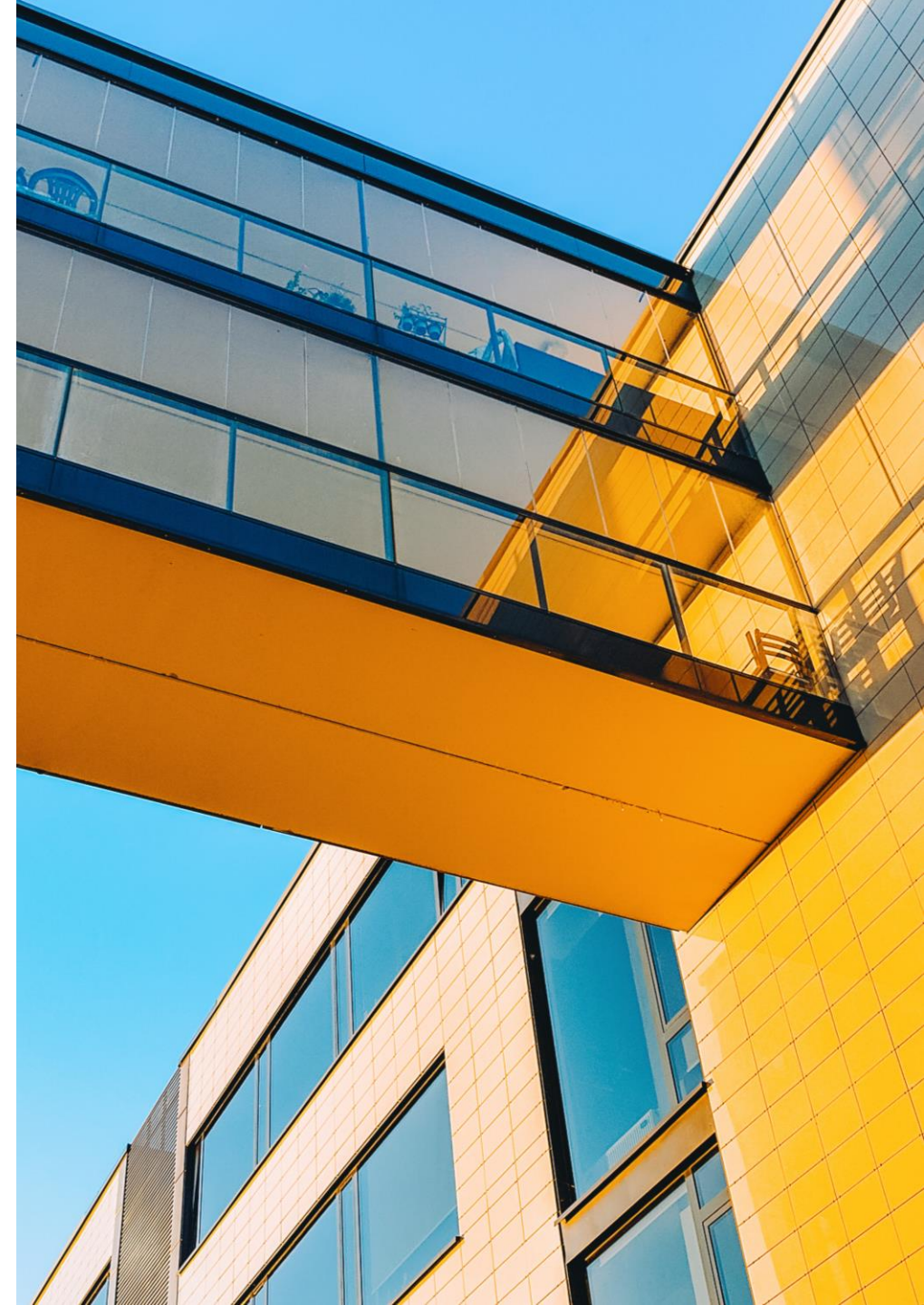
Moderated by:
Leslie Malone, Managing Consultant



April 17, 2024

Agenda

1. Opening, context setting and introduction
2. Introductory remarks from panelists
3. Q&A
4. Participant discussions
5. Participant replay



Today's Panelists



Dean Haslip

Director General, Office of
Energy Efficiency
Natural Resources Canada



Tom Berkhout

Building Electrification,
Strategic Implementation
BC Hydro



Ian McVey

Manager of Sustainability
Region of Durham



Bryan Purcell

Vice-President of Policy and
Programs
The Atmospheric Fund

Federal Perspective



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Dean Haslip, Director General,
Office of Energy Efficiency



April 17, 2024

Natural Resources Canada: The Office of Energy Efficiency

- **Energy efficiency** is recognized as core to Canada's climate, economic and social objectives – yielding emissions reductions, economic benefits, supporting affordability, and providing pathways toward reconciliation.
- The **Government of Canada** is making significant investments to advance Canada's green building priorities.
- **Natural Resources Canada** is working with partners and stakeholders to mobilize national action to create a net-zero emissions buildings sector by 2050.
- The **Office of Energy Efficiency** has been working on energy efficiency for 50 years.

Emissions Reduction Plan

- The **Emissions Reduction Plan** outlines how Canada will achieve our target of reducing emissions by 40 to 45% below 2005 levels by 2030 and net-zero emissions by the year 2050.
- Under the Emission Reduction Plan, we are specifically targeting buildings through the **Canada Green Buildings Strategy**.
- Three main objectives:
 1. Accelerate the rate of deep retrofits;
 2. Transform space and water heating; and,
 3. **Build net-zero and resilient from the start.**



National Model Codes

- The 2020 editions of the national model **energy codes** are an important step toward achieving Canada’s climate goals.
- The introduction of new **energy performance tiers** set a pathway to make all new buildings consistent with national “net zero” policy objectives.
- NRCan’s **Codes Acceleration Fund** supports jurisdictions in adopting the highest feasible energy performance tiers of the 2020 energy codes, or other high-performance building codes, and higher rates of code compliance.
- Code development priorities for the 2025 code cycle includes work to develop and publish the first requirements to address energy efficient **alterations to existing buildings** and to reduce **GHG emissions in buildings**, starting with operational carbon in new construction.

Thank you!



BC's Zero Carbon Step Code: An Introduction



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Tom Berkhout
Building Electrification, Strategic
Implementation



April 17th, 2024

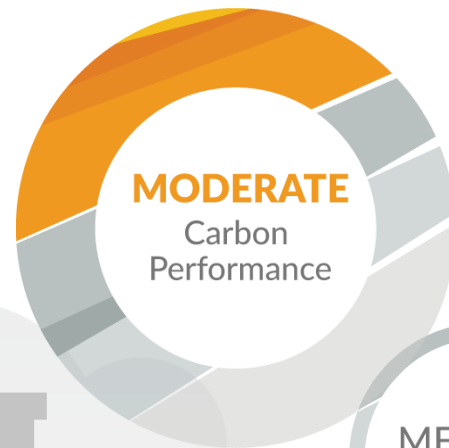
Origin of the new regulation

“By 2030, all new buildings will be zero carbon, and all new space and water heating equipment will meet the highest standards for efficiency.”

– *CleanBC Roadmap to 2030*



Staggered carbon performance tiers



Note: The Zero Carbon Step Code only regulates **indoor equipment**. It does not restrict outdoor grills, heated driveways, nor pools.

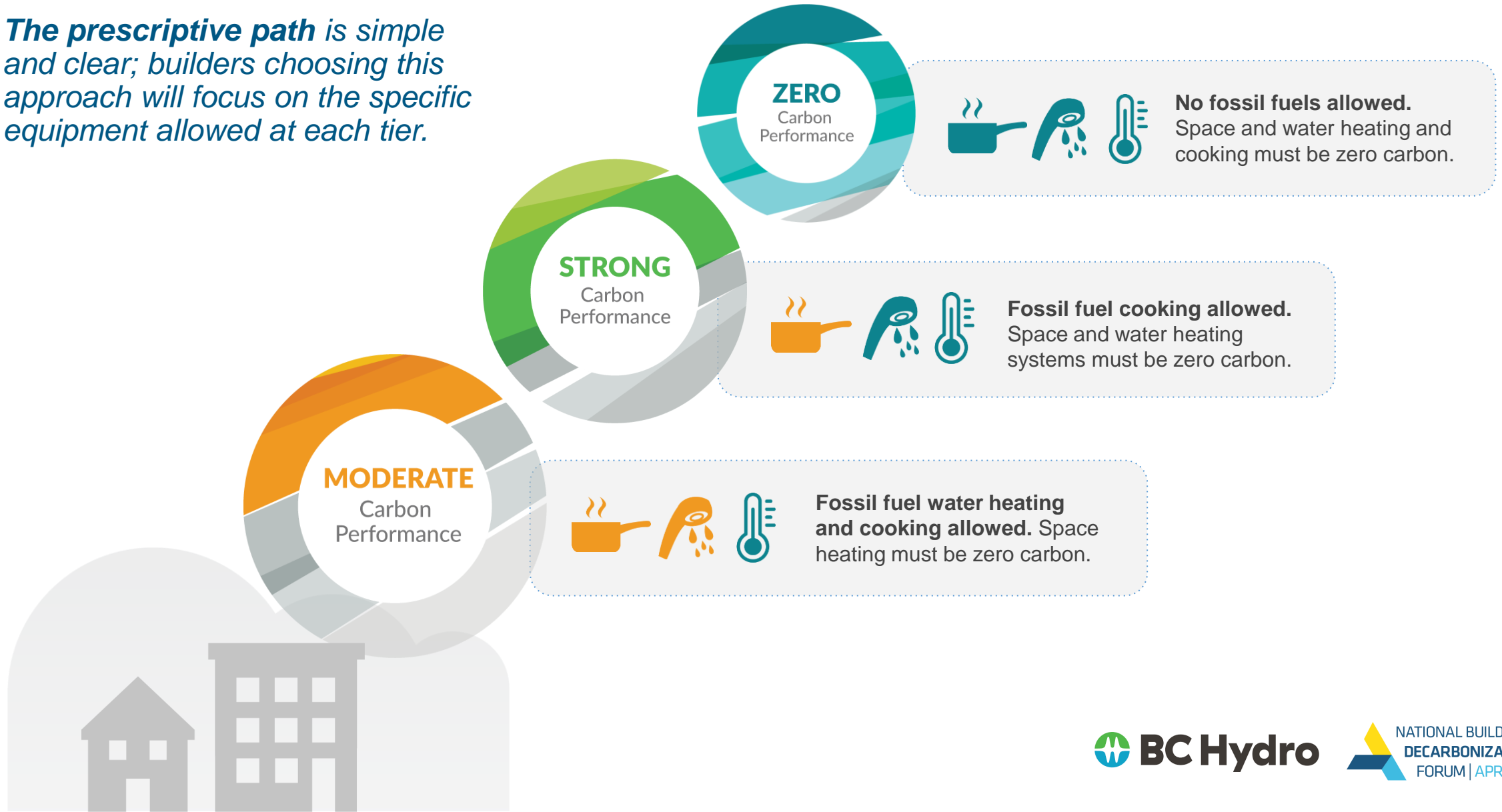




Compliance options: Part 9 homes

Part 9 Buildings: The prescriptive path for Zero Carbon Step Code compliance

The prescriptive path is simple and clear; builders choosing this approach will focus on the specific equipment allowed at each tier.



Part 9 Buildings: The performance path for Zero Carbon Step Code compliance

Builders choosing this approach will focus on decarbonizing heat and hot water; they can still include fossil fuels in cooking and other minor end uses.



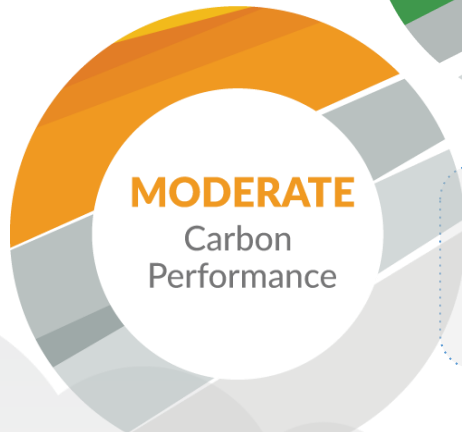
Homes at this tier must emit:

- <500 kg CO₂e per year *and*
- <1.5 kg CO₂e per m² per year GHG intensity



Homes at this tier must emit:

- <800 kg CO₂e per year *and*
- <2.5 kg CO₂e per m² per year GHG intensity



Homes at this tier must emit:

- <2,400 kg CO₂e per year *and*
- <6 kg CO₂e per m² per year GHG intensity

Note: Calculations only consider emissions produced by heating, cooling, ventilation, and domestic hot water equipment. Builders need not include emissions from auxiliary end uses (e.g., cooktops or clothes dryers) nor backup heating sources (e.g., wood stoves or decorative gas fireplaces) that are not designed to cover the home's entire heating load. They may include this equipment at any tier.



Exempted: Secondary heating equipment

The Zero Carbon Step Code regulates **primary space-heating equipment**. Secondary heating systems are exempted.



**Wood-burning
stoves OK**



**Decorative fossil-
fuel fireplaces OK**



Compliance options:
Part 3 Larger buildings

Part 3 Buildings: The performance path for Zero Carbon Step Code compliance

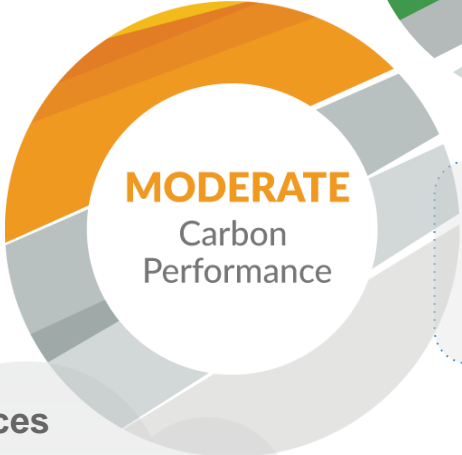
Developers must use the performance compliance pathway



- **Larger residential buildings:** <math><1.8 \text{ kg CO}_2\text{e} / \text{m}^2 \text{ per year}</math>
- **Offices:** <math><1.5 \text{ kg CO}_2\text{e} / \text{m}^2 \text{ per year}</math>



- **Larger residential buildings:** <math><3 \text{ kg CO}_2\text{e} / \text{m}^2 \text{ per year}</math>
- **Offices:** <math><3 \text{ kg CO}_2\text{e} / \text{m}^2 \text{ per year}</math>



- **Larger residential buildings:** <math><7 \text{ kg CO}_2\text{e} / \text{m}^2 \text{ per year}</math>
- **Offices:** <math><5 \text{ kg CO}_2\text{e} / \text{m}^2 \text{ per year}</math>

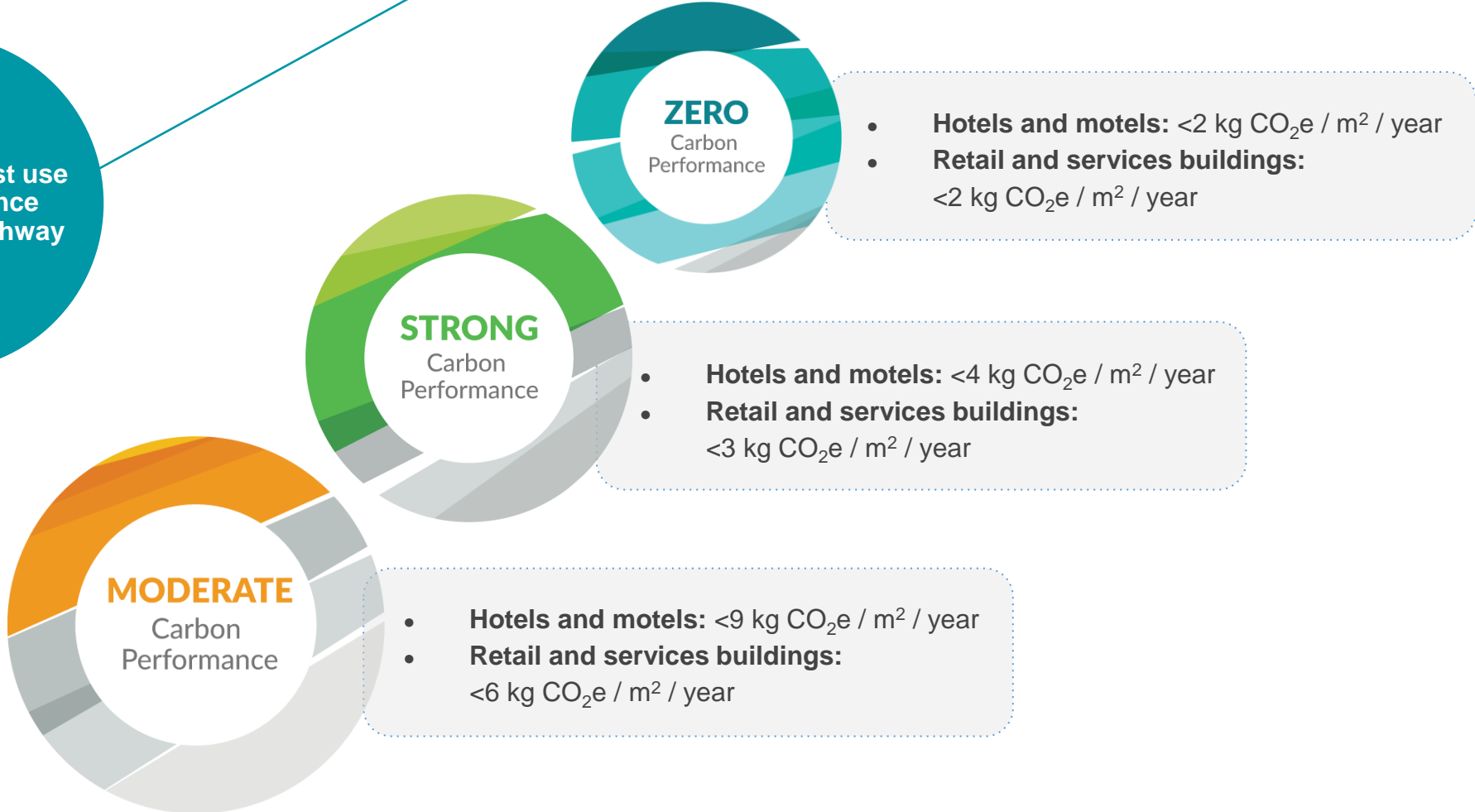


Note: In Part 3 buildings, Zero Carbon Step Code calculations consider heating, cooling, ventilation, and domestic hot water, plus cooking appliances and gas fireplaces.

Part 3 Buildings: The performance path for Zero Carbon

Step Code compliance

Developers must use the performance compliance pathway



Hotels and motels



Retail and services



Note: Zero Carbon Step Code calculations consider heating, cooling, ventilation, and domestic hot water, plus cooking appliances and gas fireplaces.



ZCSC adoption to date

- 24 Authorities Having Jurisdiction
- ~40% of all new residential units will be built in jurisdictions where the ZCSC is already adopted
- 25% of adopting communities are in Climate Zone 5
- More expected in 2024 and 2025

Local governments that have adopted the ZCSC (as of March 2024)

Lower Mainland

Burnaby
Richmond
District of North Vancouver
New Westminister
North Vancouver
Township of Langley
Vancouver*
West Vancouver
Whistler (CZ 5)
Squamish
Tsleil-Waututh Nation
UBC Campus and Neighbourhood

South/Interior

Nelson (CZ 5)
Penticton (CZ 5)
Vernon (CZ 5)

Vancouver Island

Central Saanich
Colwood
Esquimalt
Nanaimo (CZ 5)
North Cowichan
Qualicum Beach (CZ 5)
Saanich
View Royal
Victoria

North

Lessons Learned

- Ongoing support for training, education, development and implementation is critical (e.g., Code Acceleration Fund)
- Extra support for rural, northern, & indigenous communities
- Energy efficiency requirements relaxed in some communities
- Tension points:
 - Consumer "choice" - especially in Part 9 building sector
 - Affordability – "Will it cost more to build ZCSC homes?"
 - "Heat pumps don't work in colder climates"
 - Electricity connection costs & times
 - Electricity reliability – "What happens when everyone electrifies?"

Thank you!

Tom Berkhout, BC Hydro
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Photo: courtesy HCMA

Durham Region Green Development Program



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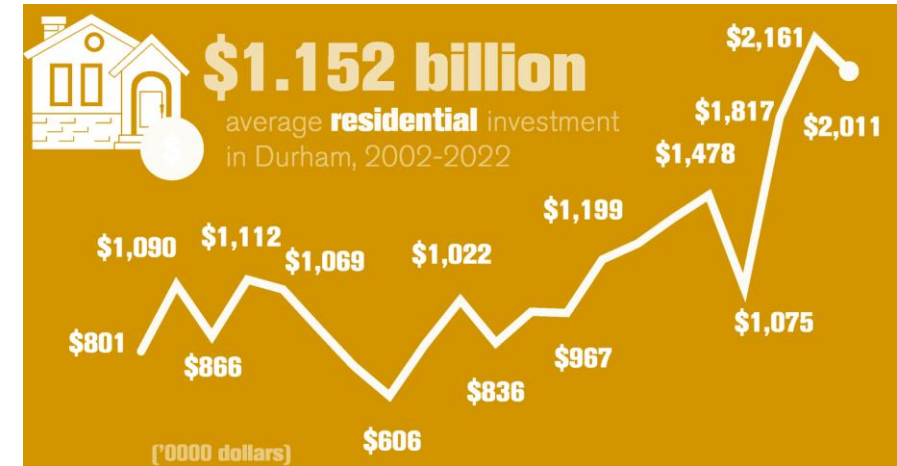
Ian McVey, Manager of Sustainability, CAO –
Strategic Initiatives



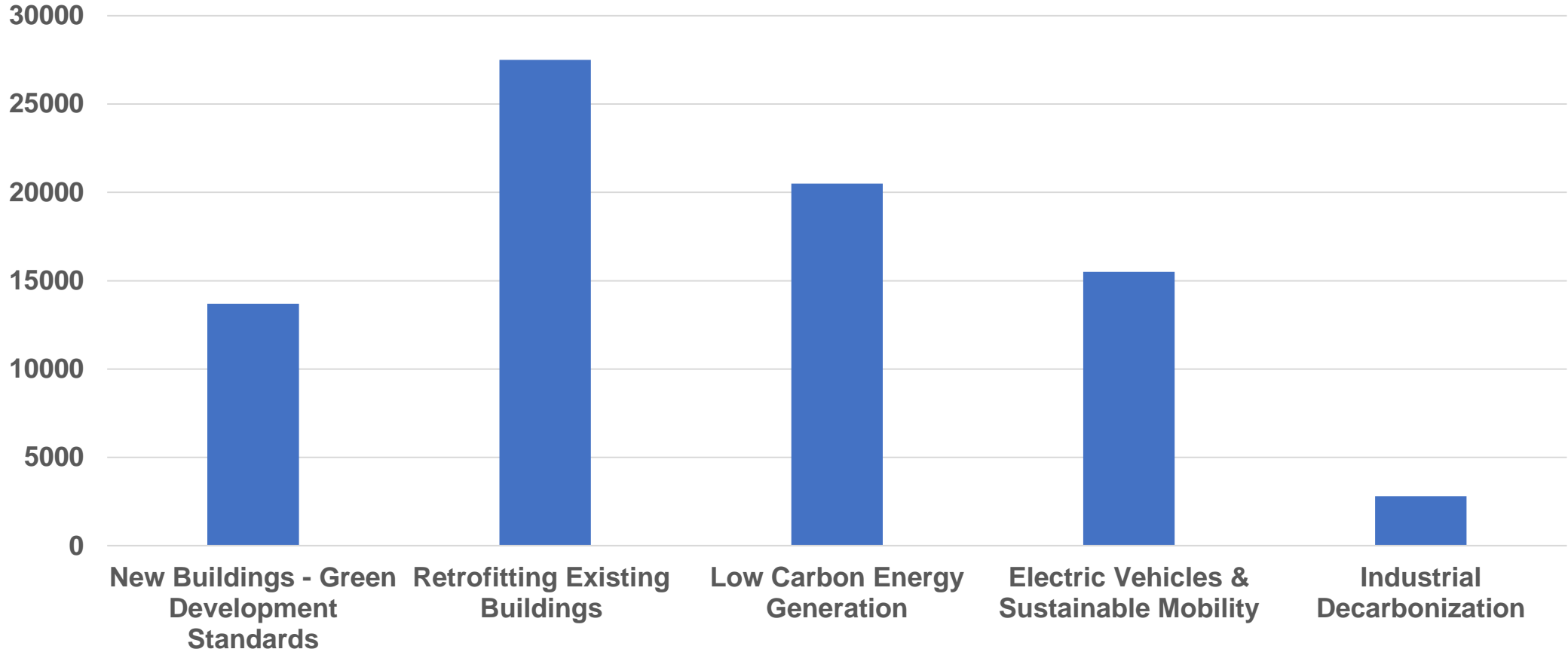
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Context/rationale

- Council endorsed Durham Community Energy Plan:
 - Contemplates LIC-based financing for high performance new construction
- Durham Region is rapidly growing
 - Expect 7,000-10,000 new dwelling units every year for the next decade
- Higher performing homes in new developments:
 - Homes will be more efficient and mitigate rising costs
 - Improves affordability (and allows for expenditures in other areas)
 - Optimizes infrastructure use
- Incremental cost for builders to shift to highest tier ranges from \$11k to \$19k / unit¹
 - Incremental cost to move all homes to top tier → \$77M-200M/year



Durham's Low Carbon Pathway – Key Strategies



■ Cumulative GHG Reductions in LCP, Compared to BAU, 2018-2050 (KTC02E)

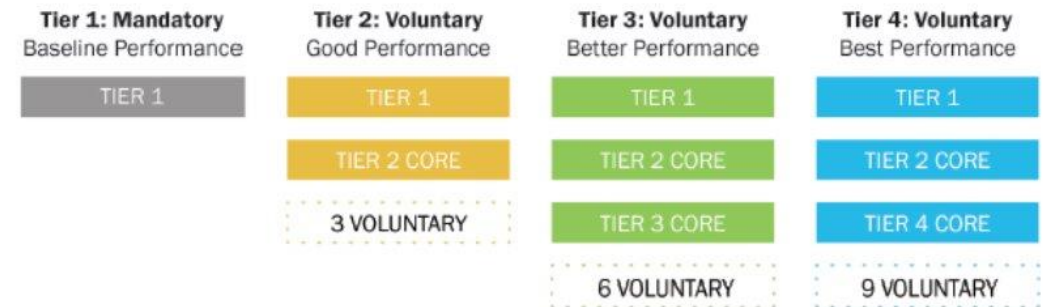
Source: *Durham Community Energy Plan (2018)*



Durham Green Standard...tiered standards implemented at the local level

- Standards currently being implemented in Pickering, Ajax and Whitby covering a wide range of sustainability measures in new development.
- Specific performance requirements for energy and emissions - Total Energy Use Intensity (TEUI), Thermal Energy Demand Intensity (TEDI), and GHG Emission Intensity (GHGI) targets

Example from Whitby Green Standard:



Municipal Green/ Sustainable Development Standards – provincial pushback

- Provincial government's Bill 23 initially limited municipalities' ability to enforce green development standards.
- Subsequent amendments, detailed in a letter from the former Minister of Municipal Affairs and Housing, Steve Clark, acknowledge the significant efforts of municipalities in implementing green development standards.
- Feb 2023 Letter stated that the Province will consult with municipalities & stakeholders later in 2023 to create a uniform province-wide approach for implementing green building standards surpassing the minimum requirements in the Ontario Building Code (OBC).
- However, as of now, such consultations have not taken place.



Challenges Related to the Implementation of Green Development Standards

- **Implementation gap** - uncertainty around roles & responsibilities, lack of internal expertise/capacity to review submissions to ensure compliance.
- **Compliance requirement at site plan approval stage** too late in the development process for major changes to community/building design
- **Pushback from development industry** on local municipal authority to enforce performance standards above Ontario Building Code,
- **Pushback from provincial government** through Bill 23 which threatened to remove ability to implement green standards; and through failure to harmonize with NBC energy efficiency tiers



Durham Green Development Program Goals

By 2030 all new residential developments will voluntarily achieve the highest tier in the national energy codes.

- currently Tier 5 NBC or Tier 4 NECB

Program encourages cost-effective connection to community/district-scale energy systems

- May include relaxation on energy performance (to at a minimum correct for modeling rules that discourage DE)

Program is cost neutral for region and municipalities

- Unless there are social or equity purposes associated with a project receiving funding

By 2025, funding for new affordable housing units will align with and support developments achieving program goals.

- In addition to the zero-carbon standard
- Applies to social housing, affordable housing, etc.



High Level Program Design- Durham Region Integrated Community Design Program

Development-Oriented Integrated Community Design Program (for any residential development)

- **Durham Region provides Navigator** to facilitate the integrated design processes
- Developer provides internal and consulting resources to evaluate design options
- 1 day or 2 half-day integrated design meetings – Goal: achieve top-tier at a reasonable price point; understand technology options (e.g., District Energy, Renewable, Heat Pumps, Sewer Heat, etc.) and funding sources; and resolve/action barriers to success
- Potential Bonus incentive paid for commitment to build all dwelling units to top energy tier



- Integrated Design Process
- Promoting Incentive Programs
- Targeted Technology Focus & associated 3rd party Incentives
- Promote Clean Technologies
- Technology recipe for high performance buildings
- Hosting Training Programs for high-rise buildings

Durham Green Development Navigator

- Resource(s) employed by Durham Region
- **Supports** Local Area Municipalities, developers and builders
- **Influences** policy development and harmonization of municipal green development standards
- **Develops** early-stage plans with developers prior to zoning or site plan approval process
- **Collaborates** with industry (utilities, governments, associations) and funding partners to support the high-performance new development
- **Creates** a centre-of-knowledge for high-performance new develops providing a toolkit and wealth of insight to developers and future residents (including Wastewater energy recovery tools)
- **Leverages** current and upcoming programs to support the developments (e.g., NRCan LEEP, Enbridge DSM, IESO/Elexicon CDM, Innovation Funds, local PACE programs)
- Develops, **encourages**, and participates in Integrated Community Design Process and Integrated Building Design Process





Thank you!

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Performance Gaps in New Construction



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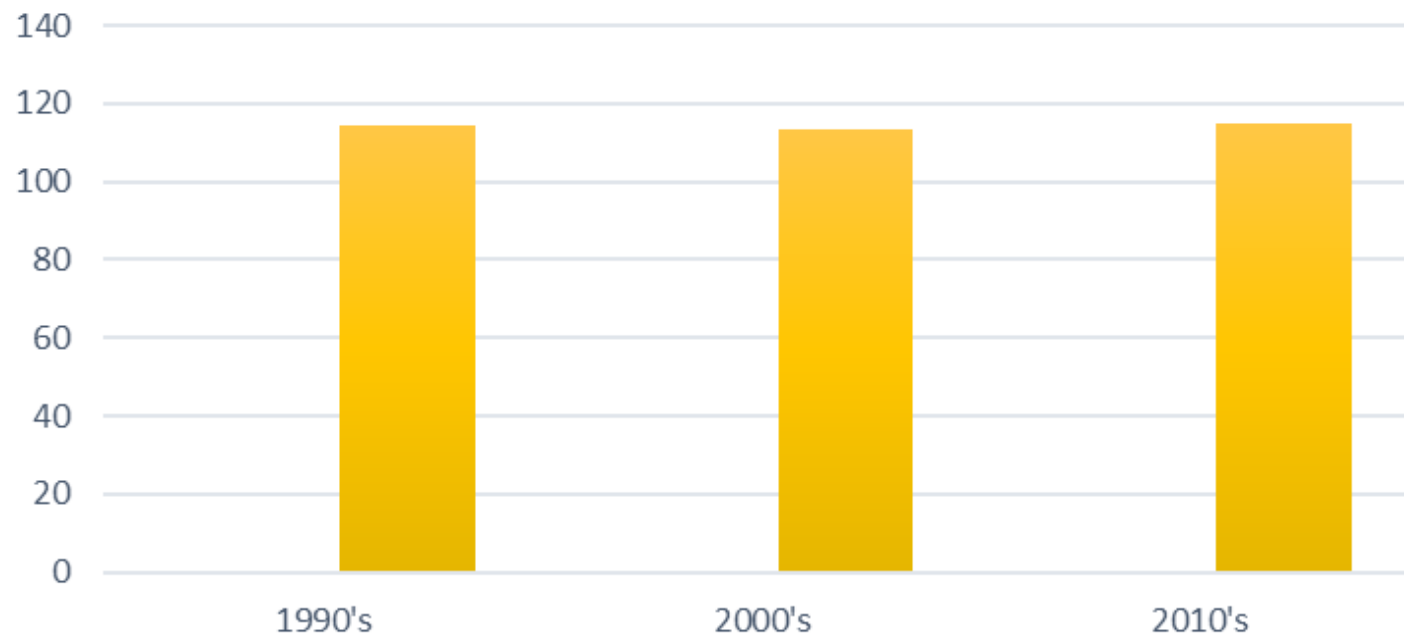
Bryan Purcell, VP Policy and Programs



April 2024

Are Buildings getting Better?

Average EUI by Decade of Construction
(Kbtu/ft²)



Performance Gaps

1 Gap between intent of codes/standards and design outcomes

Are codes and standards driving the intended improvements in designed performance

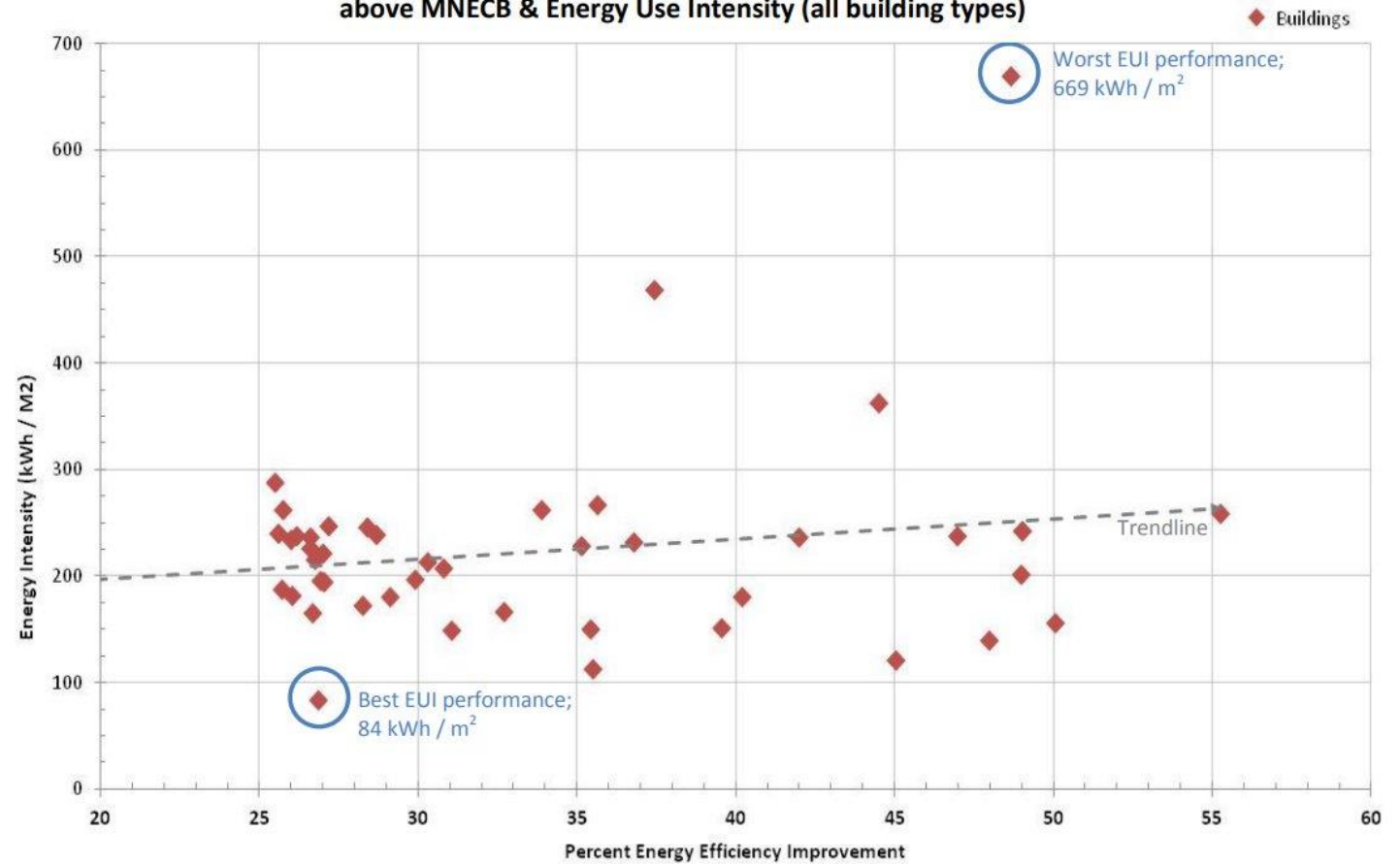
2 Gap between *designed* performance and real-world performance

Are buildings performing as well as they are designed to?

About Gap #1

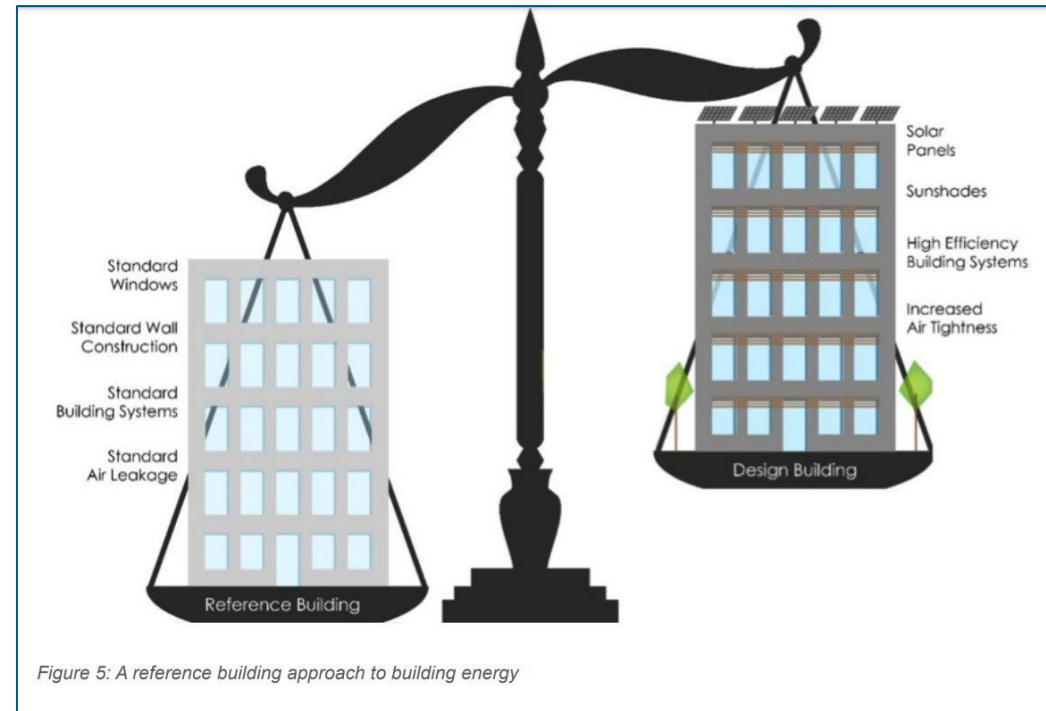
💡 There is no clear correlation between modelled % above code and modelled Energy Use Intensity

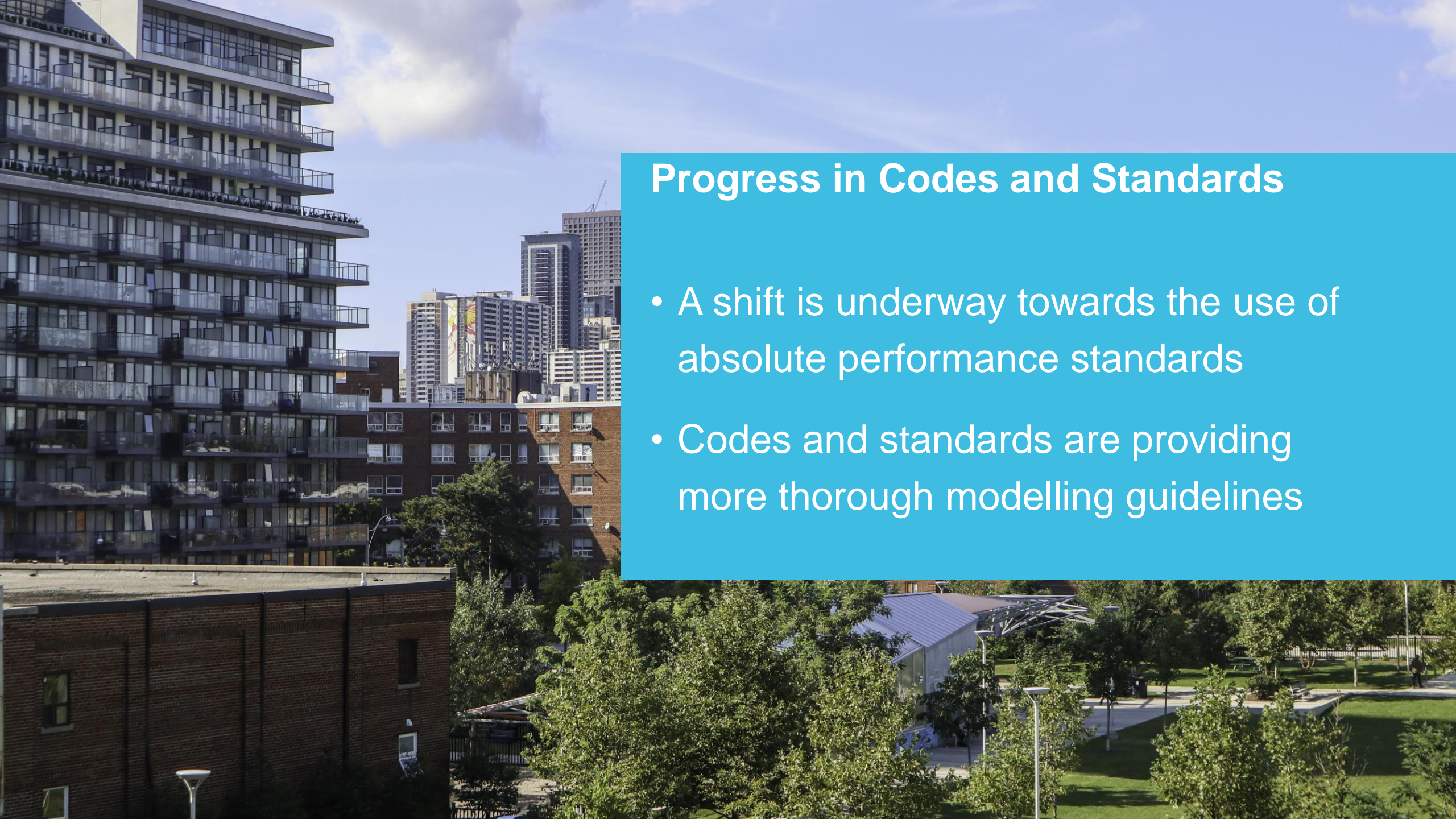
Figure 6a: Relationship between Energy Efficiency Improvement above MNECB & Energy Use Intensity (all building types)



Problems with the Code reference building approach

- **No uniformity in targets** – Inherently variable outcomes as each project will propose its own unique energy target
- **Conflict of Interest** – developers are incented to find modelers who will tell them what they want to hear





Progress in Codes and Standards

- A shift is underway towards the use of absolute performance standards
- Codes and standards are providing more thorough modelling guidelines

Gap #2 – Design vs. Real world Outcomes

No level of government in Canada tracks the difference between designed and real-world performance

We looked at 19 MURBs with both modelled and post-occupancy data

- GHG emissions 28% **higher** than modelled
- Space Heating energy use 39% **higher** than modelled
- DHW energy-use 21% **higher** than modelled

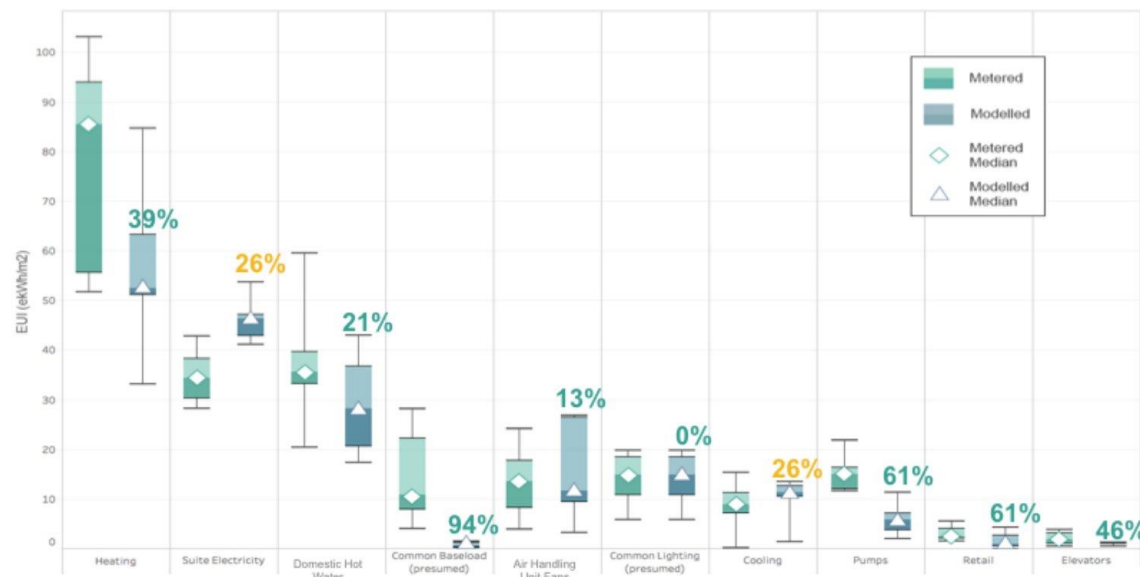


Figure 13: Performance Gap by Energy End Use



Thank you!

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Table Discussions



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Leslie Malone, Managing Consultant



April 17, 2024

Table Discussions

1

Individually reflect on the following question, then **discuss** them at your table:

- In the region(s) where you work, what is the **status** of new construction building decarbonization policies?
- What **questions**, if any, do you have on implementing new construction building decarbonization policies in your region(s)?
- What are the main areas of **pushback or tension** you have experienced or seen with respect to implementing these types of building decarbonization policies?

2

Discuss these **additional questions**. You will be asked to **share responses** with the room.

- What were your **key takeaways** from this session's panelist and table discussions?
- What can we **collectively do to overcome** the tensions limiting the pace of decarbonization of new construction?

Thank you!